4 ENVIRONMENTAL ANALYSIS

Sections 4.1 through 4.12 of this DEIR discuss existing conditions, environmental impacts associated with implementation of the proposed project, and mitigation measures to reduce the level of significance of impacts, where feasible.

As discussed in Section 2.1 of this DEIR, “Type, Purpose, and Intended Uses of this EIR,” the notice of preparation (NOP) for the proposed project (prepared by DTSC, dated May 2, 2008 [Appendix NOP]) identified the scope of the analysis in this DEIR, which is focused on the environmental issues that were determined to have potential for significant impacts. Sections 4.1 through 4.12 address the following resource areas:

- aesthetics
- air quality
- biological resources
- cultural resources
- geology and soils
- hazardous materials
- hydrology and water quality
- land use and planning
- noise
- transportation
- utilities and service systems
- water supply

Each section in this DEIR that addresses the resource areas listed above (Sections 4.1 through 4.12) includes the following components:

Existing Setting: This subsection presents the existing environmental conditions at the project area and in the surrounding area as appropriate, in accordance with Section 15215 of the CEQA Guidelines. The discussions of the environmental setting focus on information relevant to the issues under evaluation.

Regulatory Background: This subsection presents information on the laws, regulations, plans, and policies that relate to the issue area being discussed. Regulations originating from local, state, and federal levels are discussed as appropriate.

Environmental Impacts and Mitigation Measures: This subsection identifies the impacts of the proposed project on the existing environment, in accordance with CEQA Guidelines Sections 15125 and 15143. Before presenting an evaluation of impacts, the section describes the analysis methodology and the thresholds of significance used to identify impacts. Project impacts are identified alphanumerically and sequentially throughout this section. For example, in the aesthetics analysis, potentially significant impacts and corresponding mitigation measure(s) are identified as AES-1, AES-2, etc. An impact statement precedes the discussion of each impact, providing a summary of the impact and its level of significance. The discussion that follows the impact statement includes the analyses and evidence upon which the conclusion is made regarding the level of impact.

This page is left intentionally blank.

4.1 AESTHETICS

This section addresses the existing visual character of the project area, including the natural and human-made features of the landscape that contribute to the public's visual experience of the project area and surrounding environment. A visual assessment of the proposed project on the existing visual setting is provided. Visual resources are defined in terms of physical characteristics and visibility. This analysis addresses the extent to which the project's presence would contribute to the perceived visual character and quality of the environment surrounding the project area. Note that an assessment of visual quality is a subjective matter, and reasonable people can disagree as to whether a particular alteration in the visual character of a project area is adverse and significant.

4.1.1 EXISTING SETTING

4.1.1.1 EXISTING VISUAL CHARACTER

The existing visual character can be described within the context of the regional viewshed and the project area. The character of these two geographical areas is described below.

Regional Viewshed

The overall regional viewshed generally is characterized by large, relatively flat and sparsely vegetated desert expanses framed by widely spaced mountain ranges. This desert landscape contains a variety of visual resources ranging from barren dry lakebeds, rolling hills incised by drainage ways, and moderately sloping mountains to dramatic rock outcroppings and formations. The Colorado River is a dominant visual resource as it meanders through this region. Views to these natural features are accented or interrupted by various human-made features such as occasional residential structures, local roads, aboveground pipelines, railroad tracks, Interstate 40 (I-40), large industrial facilities, bridges crossing the Colorado River, and other infrastructure.

Project Area

The existing visual character of the project area is a combination of natural and constructed elements that range from relatively undisturbed topography and native vegetation to a small number of industrial structures.

The existing landscape is defined both visually and spatially by steep, rocky slopes to the south of the compressor station site and the meandering bank of the Colorado River to the north and east. The western edge of the project area is surrounded primarily by expansive, undeveloped rocky plateaus shaped by shallow drainage washes. Sparse vegetation and these pronounced landforms contribute to the overall rural, desert landscape character. The repetitious nature of the existing landscape character is visually and spatially bisected by the I-40 transportation corridor and the Burlington Northern and Santa Fe (BNSF) Railway's railroad line that runs east to west. Both transportation facilities introduce manufactured cut slopes and strong linear elements inconsistent with the natural setting. Due to its low elevation in relation to immediately adjacent cut slopes, the views from I-40 are mostly obstructed except at the Colorado River crossing and at Bat Cave Wash.

The Colorado River winds through the eastern portion of the project area in a serpentine pattern providing a unique visual feature and a dominant landscape element. Exhibit 4.1-1 depicts two views demonstrating the existing conditions and unique scenic resources near the project area, including the "Needles" rock formation and desert landscapes.

The Topock Maze, noted in Section 4.4 "Cultural Resources" as CA-SBR-219, is located on top of plateaus to the north and west of the compressor station. The maze has three loci, which are identified as Locus A, B, and C. The maze is a dominant landscape feature defined by an expansive series of geoglyphs, or human-made windrows arranged in a formal geometric pattern. This landscape element contrasts visually with the surrounding character

View of the “Needles” rock formation located approximately 3.5 miles southeast of the project area from the Colorado River. *(Photograph taken by AECOM in 2009)*

Aerial view across the desert landscape located west of the project area facing northwest toward distant mountain ranges. *(Photograph taken by AECOM in 2009*)

Regional Context Imagery **Exhibit 4.1-1**

of the desert landscape and provides a unique visual texture and memorable landscape feature. Additionally, the U.S. Bureau of Land Management (BLM) interpretive sign, located at the entrance to Topock Maze Locus A, provides an overview of the history of this cultural site and is a focal point for visitors.

The Colorado River is a dominant landscape feature within the project area. The river winds through the project area providing a unique visual resource within the desert landscape. It is an important recreational travelway. There are several bridges that cross the river, including the I-40 bridge and the BNSF railway bridge, which provide river views to those traveling across, as well as a pipeline bridge, which does not provide access or views. The Colorado River is spatially defined by the sandy banks of the floodplain, where the riverine vegetation becomes increasingly dense along the water's edge. The river affords generally unobstructed views of the mountain ranges in the distance and of the prominent rock formation known as the "Needles" closer to the project area on the Arizona side of the Colorado River. Views in the immediate vicinity of the project area tend to be constrained along the river by the steep topography to the southeast and by the expansive Havasu National Wildlife Refuge on the east. Additionally, views along the river looking toward the compressor station from the southeast are partially obstructed by the overhead utility structures. Views toward the project area from the northeast are partially obstructed by topography and overhead transportation structures such as the I-40 bridge and the BNSF rail bridge. Exhibits 4.1-2 and 4.1-3 depict the existing visual conditions along the Colorado River.

4.1.1.2 EXISTING VISUAL QUALITY

The visual quality of an area depends on the relationships between its features and their importance in the overall view. Both natural and human-made features in a landscape contribute to its perceived visual quality. The following images are provided as representative examples of the overall existing visual setting inclusive of the project area and surrounding context. Specific key views follow, and are examined individually in section 4.1.1.4.

Viewers located in, or looking toward, the western edge of the project area experience a low level of visual quality because of the relatively predictable pattern created by the repetitious, undulating, and sparsely vegetated hills in this area. Conversely, toward the east, the rock outcroppings along the steep north-facing slopes, the large open Colorado River valley, and the minimal amount of development north of the I-40 corridor all increase the visual quality of the project area. Views in the eastern portion of the project area, near the project boundary, are sharply defined by the winding form of the Colorado River. The river is the dominant landscape feature and provides a visual and textural relief to the otherwise monochromatic desert landscape. Views of the "Needles" rock formation are apparent from many locations in the eastern portion of the project area, providing a visually distinctive landscape element.

Viewers located along the southern portion of the project area looking north toward Moabi Regional Park typically enjoy a high-quality visual experience because views from this location are generally unobstructed and panoramic and are defined by a variety of texture, scale, and landscape form, which is provided by the Colorado River, the desert floor of the Mojave Valley, and distant mountain ranges north of the project area. Human-made structures are apparent in views from this location, but do not obscure or detrimentally affect views, as they are not the dominant element in the viewshed.

Viewers located on or along the Colorado River also typically enjoy a higher-quality visual experience because views from this location are complex in composition as a result of the textural and reflective properties of water, and the general contrast in landscape character of the river and its surroundings. These characteristics provide a unique visual experience and produce more memorable views than other locations around the project area. Human-made structures exist in views from this location, but are partially obstructed by other human-made landscape elements, vegetation, and/or topography.

Aerial view facing north over the Colorado River. The river is a dominant landscape element and scenic resource within the project area. *(Photograph taken by AECOM in 2009*)

Aerial view facing north of the recreational facilities within, and to the north of, the project area. *(Photograph taken by AECOM in 2009)*

Regional Context Imagery **Exhibit 4.1-2**

Aerial view facing northeast of the five bridges that span the Colorado River within the project area. *(Photograph taken by AECOM in 2009*)

View from the Colorado River facing north. Existing bridge structures obstruct views of the project area and surrounding scenic resources. *(Photograph taken by AECOM in 2009)*

Regional Context Imagery **Exhibit 4.1-3**

To further assess the visual quality, project area imagery was taken from a helicopter to broadly survey existing conditions and landscape character. Views in this group were taken from important, unobstructed vantage points, but do not represent accessible viewing locations. Images categorized with these criteria depict the existing site conditions and would clearly illustrate any dramatic change to landscape character over time. Exhibits 4.1-4 through Exhibit 4.1-6 depict the existing visual quality and character of the project area from elevated vantage points.

4.1.1.3 VIEWER GROUPS

The quality of a visual landscape is largely determined by the extent of the public's interest in and concern for a particular view. To establish a measurable threshold for this concern, views are assigned a value of visual sensitivity. Visual sensitivity refers to the likelihood of a particular view to be adversely affected by a change in existing visual character or quality.

The public is generally concerned about areas that have a high degree of visual sensitivity and these views are typically comprised of highly visible or memorable landscape elements. Views from scenic highways, other tourist routes such as the Colorado River, and surrounding cultural and recreation areas are generally considered to have greater visual sensitivity than views in and of more urbanized or otherwise developed locations.

A viewer's distance from landscape elements plays an important role in determining an area's visual quality. Landscape elements are considered higher or lower in visual importance based on their position relative to the viewer. Generally, the closer a resource is to the viewer, the more dominant, and therefore visually important, it is to the viewer. Three general viewing distances have been established for this analysis: foreground views (up to one-quarter mile), middle ground views (one-quarter to 3 miles), and background views (3 miles or greater.)

Four general groups were considered for the evaluation of viewer exposure to and awareness of the project area: residential viewers, vehicular viewers, recreational viewers, and pedestrian viewers.

Residential Viewers

Residential viewers consist predominately of those residents living within the northern part of the project area in Park Moabi. Views north from residences in Park Moabi include views of the Park Moabi and recreational areas along the Colorado River, and across the larger Mojave Valley floor toward the mountain ranges in the distance. Views south, east, and west are extremely limited by the low elevation of the neighborhood, and distant views are largely obstructed by surrounding topography. Opportunities for long distance views are isolated. Despite limited viewing distances, viewer sensitivity in this group is generally moderate to high because any change in existing conditions would be noticeable, the viewing location is fixed, and because of the extended duration of view opportunities. Because views of the project area are obstructed from this location, and project features in the vicinity of the residential area would be underground, the views experienced by residents during daily activities are considered more likely, and are considered under vehicular, recreational and pedestrian viewers.

Vehicular Viewers

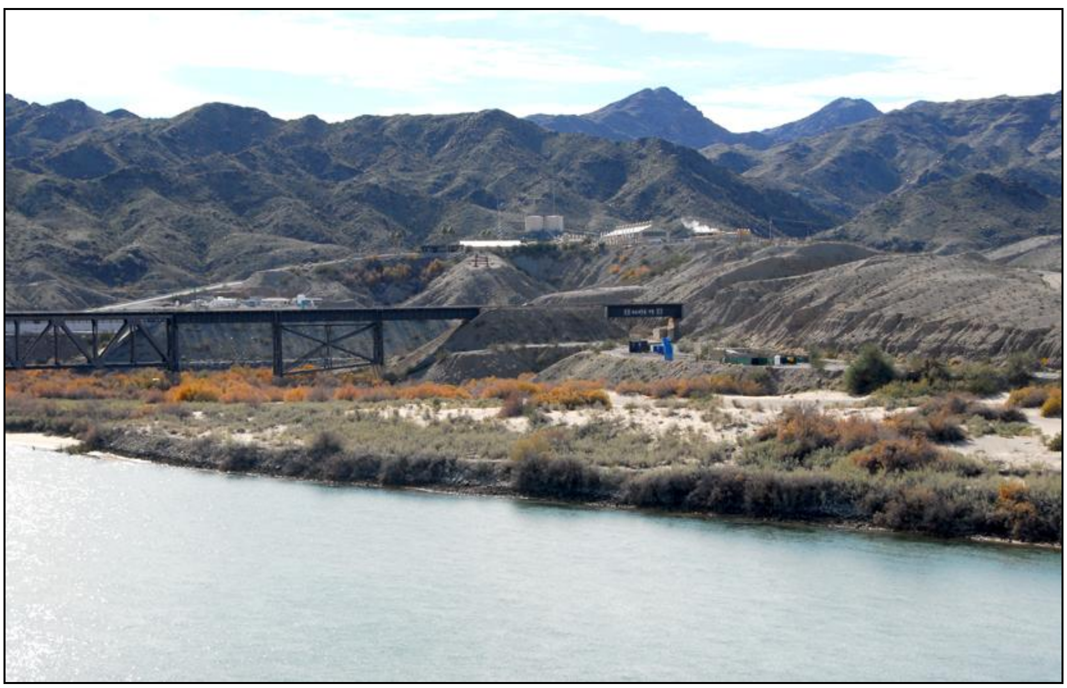
Motorists typically would be highly aware of developments at the compressor station when in the immediate vicinity of the project, although motorists driving on I-40 at average highway speeds of 65 mph, would have fleeting foreground views of the proposed project that would last only for seconds. Motorists driving on local roads such as the historic National Trails Highway have more extended exposure to and awareness of the developments in the project area. Natural and manufactured topography within the project area can obstruct views of the existing compressor station and especially the IM-3 Facility. High points in the topography and more

Site Overview—View southeast across cultural site (Topock Maze Locus A) toward the compressor station and "Needles" rock formation. *(Photograph taken by AECOM in 2009*)

Site Overview—View northwest toward the compressor station, the groundwater treatment facility (IM-3), and cultural sites. *(Photograph taken by AECOM in 2009)*

Site Overview **Exhibit 4.1-4**

Site Overview—View northwest toward the floodplain and the groundwater treatment facility (IM-3). *(Photograph taken by AECOM in 2009*)



Site Overview—View southwest toward the floodplain, railroad bridge, and compressor station. *(Photograph taken by AECOM in 2009)*

Site Overview **Exhibit 4.1-5**

Site Overview—View south toward recreational areas, the compressor station, groundwater treatment facility (IM-3), cultural sites, and “Needles” rock formation. *(Photograph taken by EDAW in 2009*)

Site Overview—View southwest toward the compressor station and “Needles” rock formation across undulating topography. *(Photograph taken by EDAW in 2009)*

Site Overview **Exhibit 4.1-6**

distinct site features (e.g., Bat Cave Wash) provide motorists with isolated opportunities to view the facilities from the local roadways. Viewer sensitivity in this group is generally low to moderate because the views are obstructed and short in duration.

Recreational Viewers

Recreational viewers consist predominantly of boaters, campers, hikers, birders, and visitors to the Havasu National Wildlife Refuge and Moabi Regional Park located within and adjacent to the project area. Boaters on the Colorado River have extended views of the project area whether traveling north or south. These extended views provide boaters with a general awareness of the project area; however, dense, mature vegetation and steep terrain obstruct most views of specific site elements from the northern and eastern edge of the project area. The project area and specific features within the project area are the most visually exposed from the southeastern edge of the project area along the Colorado River, where boaters have extended and largely unobstructed views. There are unmaintained hiking trails and paths that exist south of the project area in the Chemehuevi Mountains. When looking north, hikers using these trails have long-duration, unobstructed views of the project area. Viewer sensitivity within this group generally is moderate to high because of the relative proximity to and occasionally extended duration of the view. As opposed to motorists who must generally travel through the project area at regulated highway speeds, recreational users are free to spend as much, or as little, time as they desire viewing the local surroundings from the river or hiking trails.

Pedestrian Viewers

The Topock Maze, located north and west of the compressor station, is an important cultural resource and a popular destination for Native Americans and tourists wishing to engage in traditional cultural practices. Viewers near Locus A of the Topock Maze have limited views of the compressor station and other facilities because the views from this location are generally obscured by intervening topography. However, viewers that travel toward the eastern edge of Locus A, located deeper within the maze, have potentially long-duration, unobstructed views of the existing compressor station and auxiliary facilities. Viewer sensitivity within this group is moderate to high because of the proximity and long duration of the views.

4.1.1.4 DESCRIPTION OF KEY VIEWS

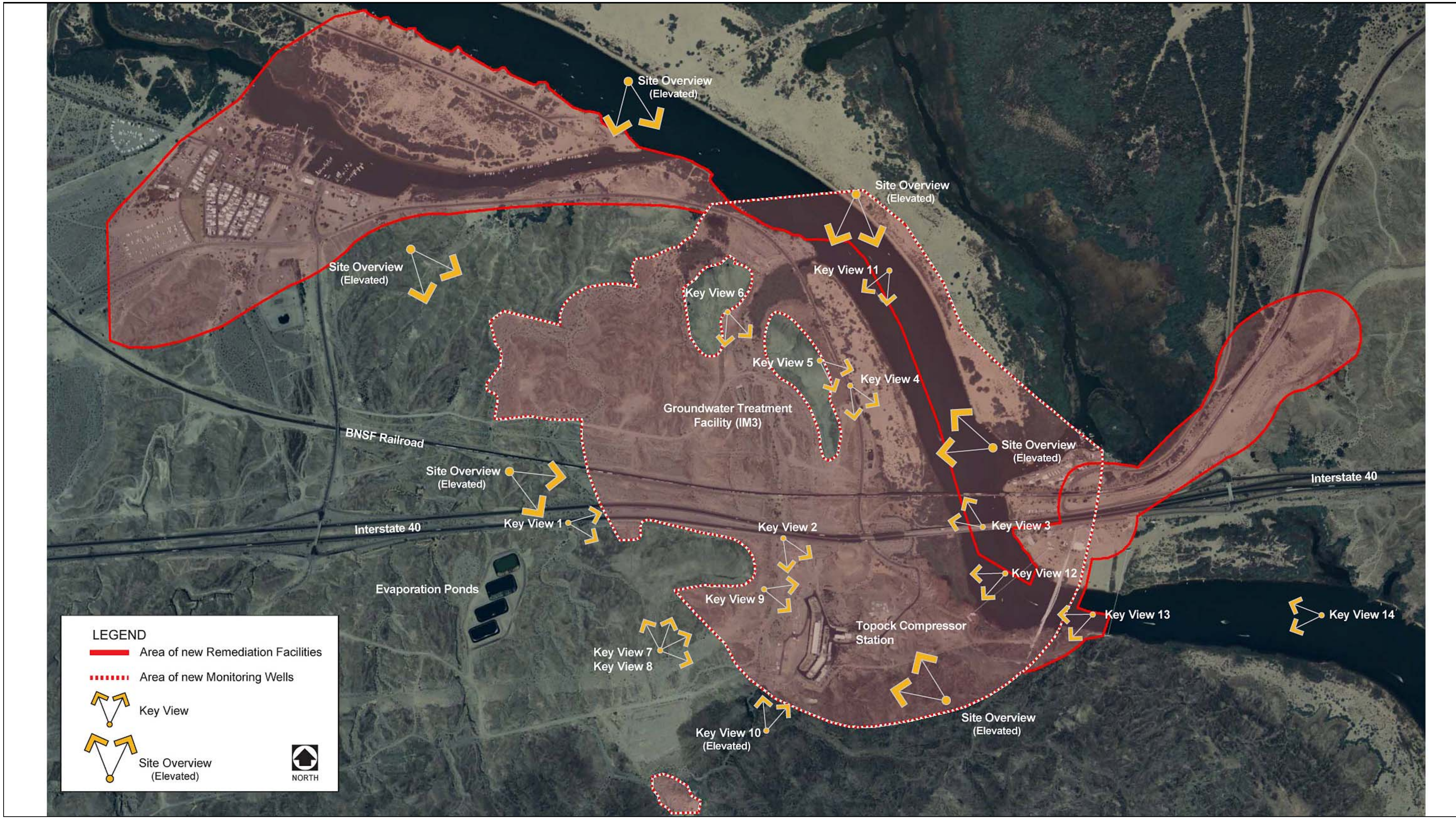
Because it is not feasible to analyze all of the views from which the project area could be seen, the methodology employed in this analysis selects a number of key viewpoints that would most clearly represent the visual effects of the project (referred to as key views). Key views also represent the primary viewer groups that could be affected by the project. To properly analyze the change to visual quality, photographs of the existing visual conditions of the project area are included to illustrate the current scenic quality. These key views are summarized in Table 4.1-1 and shown in Exhibit 4.1-7. Each key view is also described and evaluated below for its existing visual quality, character, and probable viewer response.

Key View 1

Orientation: This key view represents views experienced by motorists while traveling east along I-40 toward the compressor station and Colorado River.

Viewer Group: Vehicular

Existing Visual Quality/Character: Views in this location consist of foreground views of the I-40 transportation corridor and isolated middle ground views of the Colorado River and mountains in the distance. Views are constrained by sparsely vegetated manufactured slopes on both sides of the freeway. Viewers in this location experience isolated distant views of surrounding mountain ranges and the Colorado River as they move through the project area. Viewer sensitivity at this location is low because of the short-duration and constrained views. Exhibit 4.1-8 depicts key view 1.



Source: Digital Globe 2009, AECOM 2010

Key View Map **Exhibit 4.1-7**

Table 4.1-1 Summary of Key Views of the Project Area			
Key View	Viewer Group	View Description	View Sensitivity
1	Vehicular	View traveling east on I-40 toward the compressor station and Colorado River	Low
2	Vehicular	View traveling east on I-40 toward compressor station at crossing of Bat Cave Wash. View is approximately 900 feet from the compressor station.	Moderate
3	Vehicular	View traveling west on I-40 toward the BNSF railroad bridge.	Low
4	Vehicular	View traveling south on historic National Trails Highway looking toward floodplain and railroad bridge. View is approximately 10 feet from the floodplain.	Moderate to high
5	Pedestrian	View southeast from Topock Maze (Locus B) toward the Colorado River, transportation bridges and the “Needles” rock formation.	High
6	Pedestrian	View looking south toward IM-3 and compressor station from Topock Maze (Locus C.) View is approximately 330 feet from IM-3.	Moderate
7	Pedestrian	View looking north across Topock Maze (Locus A) at informational plaque. View is approximately 1,650 feet from the compressor station.	Moderate to high
8	Pedestrian	View looking east toward compressor station at the Topock Maze (Locus A) informational plaque. View is approximately 5 feet from maze.	Moderate
9	Pedestrian	View looking southeast toward compressor station from the secondary gathering location at Topock Maze (Locus A). View is approximately 800 feet from the compressor station.	High
10	Recreational	View looking northeast toward compressor station, IM-3 Facility, and Colorado River. View is approximately 1,000 feet from the compressor station.	High
11	Recreational	View looking southwest toward floodplain, IM-3 Facility, and compressor station from Colorado River. View is approximately 300 feet from the floodplain.	High
12	Recreational	View looking west toward compressor station from Colorado River. View is approximately 1,800 feet from the compressor station.	Moderate
13	Recreational	View looking southwest toward existing arched utilities bridge from the Colorado River. View is approximately 150 feet from the abutment of the bridge.	Low
14	Recreational	View looking west toward compressor station from Colorado river. View is approximately 5,400 feet from the compressor station.	Low
Source: Data compiled by AECOM in 2009			

Key View 2

Orientation: This key view represents views experienced by motorists while traveling east on I-40 at the crossing of Bat Cave Wash looking south from approximately 800 feet north of the compressor station.

Viewer Group: Vehicular

Existing Visual Quality/Character: Generally, the topography along the alignment of I-40 within the project area obstructs views of the compressor station, except at the topographical opening at Bat Cave Wash. Viewers in this location would have foreground views of the compressor station for a short duration as their vehicles quickly pass the wash. However, viewer sensitivity is moderate because of the proximity of the compressor station to the freeway in this location. Exhibit 4.1-8 depicts key view 2.

Key View 1—View traveling east along the Interstate 40 corridor toward the Colorado River. *(Photograph taken by AECOM in 2009*)

Key View 2—View traveling east on Interstate 40 toward the compressor station; at Bat Cave Wash. *(Photograph taken by AECOM in 2009)*

Key Views **Exhibit 4.1-8**

Key View 3

Orientation: This key view represents views experienced by motorists looking north while traveling west along I-40 toward the compressor station and Colorado River from Arizona.

Viewer Group: Vehicular

Existing Visual Quality/Character: Views at this location consist of foreground views of the transportation bridges, floodplain and the steep hillsides to the west of National Trails Highway. The view is dominated by the BNSF railroad bridge, and distant views are almost completely obstructed. The open lattice structure of the railroad bridge adds a high level of visual interest to this vantage point, and provides isolated viewing opportunities to the floodplain. Viewer sensitivity is low because of the short duration and constrained nature of views at this location. Exhibit 4.1-9 depicts key view 3.

Key View 4

Orientation: This key view represents the views experienced by motorists while traveling south along historic National Trails Highway looking toward the floodplain and railroad bridge.

Viewer Group: Vehicular

Existing Visual Quality/Character: Views are constrained by heavy vegetation in the floodplain area and by more distant landscape features, including the BNSF railroad bridge. Views of the compressor station from this location are fully obstructed by existing topography, but viewers in this location would experience foreground views of the floodplain, middle ground views of the Colorado River and transportation structures, and background views to the “Needles” rock formation. Motorists on this roadway experience longer duration views than motorists on I-40 because of lower vehicle speeds. Because the roadway is adjacent to and parallel with the floodplain, viewers in this location have a greater exposure to the existing character of the area, causing viewer sensitivity to be moderate to high. Exhibit 4.1-9 depicts key view 4.

Key View 5

Orientation: This key view represents the views experienced by pedestrian visitors to Topock Maze Locus B while looking southeast across the floodplain toward the Colorado River, transportation structures and the “Needles” rock formation.

Viewer Group: Pedestrian

Existing Visual Quality/Character: Views from this elevated vantage point include unobstructed views of several of the project areas’ most dominate landscape elements. Viewers in this location would experience foreground views of the floodplain, the Colorado River and transportation structures, and background views to the “Needles” rock formation. Pedestrian visitors at Topock Maze Locus B would experience long duration and unobstructed views and because of the long duration and higher visual expectations, viewer sensitivity would be moderate to high. Exhibit 4.1-10 depicts key view 5.

Key View 6

Orientation: This view represents a view experienced by pedestrian visitors to Topock Maze Locus C area looking south from 300 feet north of IM-3 Facility.

Key View 3—View traveling west along the Interstate 40 corridor toward the Colorado River. *(Photograph taken by PG&E in 2010*)

Key View 4—View traveling south along historic Route 66 along the floodplain and toward the railroad bridge. *(Photograph taken by AECOM in 2009)*

Key Views **Exhibit 4.1-9**

Key View 5—View southeast from Topock Maze Locus B over the floodplain toward the Colorado River, BNSF railroad bridge and the "Needles." *(Photograph taken by PG&E in 2010*)

Key View 6—View south through Bat Cave Wash toward the existing IM-3 facility in foreground and compressor station in background. *(Photograph taken by AECOM in 2009*)

Key Views **Exhibit 4.1-10**

Viewer Group: Pedestrian

Existing Visual Quality/Character: Views from this location encompass various utility elements, extreme topographical variations, and the rocky hills to the south of the compressor station. Viewers have foreground views of the IM-3 Facility and middle ground views of the compressor station and Chemehuevi Mountain. Vegetation in this area is extremely sparse because the terrain in this area has been disturbed by a substantial amount of grading. Viewer sensitivity in this location is moderate because of existing visual quality, unobstructed views and the proximity of this viewpoint to existing treatment facilities. Exhibit 4.1-10 depicts key view 6.

Key View 7

Orientation: This view represents a view experienced by pedestrian visitors to the BLM interpretive sign at Topock Maze Locus A.

Viewer Group: Pedestrian

Existing Visual Quality/Character: Viewers in this location are afforded long, unobstructed foreground views across Topock Maze Locus A and background views of the Colorado River, Mojave Valley, Goose Lake, and mountain ranges in the distance. Vegetation in this area is relatively sparse and is consistent with the native desert plants within the project area. The dominant landscape feature in this view is the Topock Maze. Other features, including I-40 and the BNSF railroad, are obscured from view by topography. Viewer sensitivity in this area is moderate to high because of the relatively high existing visual quality, potentially long duration of views and ease of access to multiple viewing locations. Exhibit 4.1-11 depicts key view 7.

Key View 8

Orientation: This view represents a view experienced by pedestrian visitors to the project area while looking east toward the compressor station from the informational plaque at Topock Maze Locus A.

Viewer Group: Pedestrian

Existing Visual Quality/Character: Despite the proximity of this viewing location to the compressor station, natural variations in topography obscure the entire facility with the exception of the roof and condensers. Views in this location include the steep hillsides of Chemehuevi Mountain to the south of Topock Maze Locus A and the mountain range to the east in the distance. Regardless of pedestrian access to views of the project area and the possibility of long-duration views by pedestrians, most views are obstructed by topography, causing viewer sensitivity in this location to be moderate. Exhibit 4.1-11 depicts key view 8.

Key View 9

Orientation: This view represents a view experienced by pedestrian visitors to the Topock Maze while visiting the tentatively identified cultural gathering location at Topock Maze Locus A.

Viewer Group: Pedestrian

Existing Visual Quality/Character: Views to the north consist of open, unobstructed views, as seen in key view 6, but views to the south and southeast have a very different landscape character, which is defined by heavily graded and disturbed terrain, sparse vegetation, and the compressor station and auxiliary station components. The compressor station constitutes the dominant landscape feature in this viewshed because of its location in the foreground of this view. Viewer sensitivity is high in this location because of the potentially long duration and unobstructed nature of views. Exhibit 4.1-12 depicts key view 9.

Key View 7—View north across cultural site (Topock Maze Locus A) from the location of the BLM interpretive sign. *(Photograph taken by AECOM in 2009)*

Key View 8—View east toward the compressor station from the cultural site (Topock Maze Locus A) BLM interpretive sign. *(Photograph taken by AECOM in 2009*)

Key Views **Exhibit 4.1-11**

Key View 9—View southeast toward the compressor station from the tentatively identified gathering location at the Topock Maze Locus A. *(Photograph taken by PG&E in 2010)*

Key View 10—View northeast toward the compressor station, IM-3, and the Colorado River from the hills south of the project area. *(Photograph taken by AECOM in 2009*)

Key Views **Exhibit 4.1-12**

Key View 10

Orientation: This key view looks northeast from an elevated position toward the compressor station, IM-3 Facility, and Colorado River.

Viewer Group: Recreational

Existing Visual Quality/Character: This view represents the visual experience along the hiking trails in the hills to the south of the compressor station. Views from this location are from elevated locations providing broad vistas. Landscape elements in the viewshed include the compressor station, transportation bridges, Colorado River, Havasu National Wildlife Refuge, and mountain ranges to the north and east in the distance. The elevation of this vantage point makes the topography of the river basin and the project area features highly visible. The relatively high existing visual quality, potentially long duration of views and unobstructed nature of the views makes viewer sensitivity in this location high. Exhibit 4.1-12 depicts key view 10.

Key View 11

Orientation: This key view looks southwest from the Colorado River toward the floodplain, IM-3 Facility, and compressor station.

Viewer Group: Recreational (Boat)

Existing Visual Quality/Character: Views of the project area from the Colorado River are generally obstructed by heavy vegetation in the floodplain and by elevated topography lining the river. In this view, the IM-3 Facility is completely obscured, and the compressor station is partially obscured by intervening topographic features. Existing visual quality is relatively high with natural riverine vegetation and views to the rocky hills of Chemehuevi Mountain to the south of the compressor station. The relatively high existing visual quality, long duration of views and short distance by boaters makes viewer sensitivity in this location high. Exhibit 4.1-13 depicts key view 11.

Key View 12

Orientation: This view represents a view experienced by recreational viewers on the Colorado River south of the I-40 bridge looking west toward the compressor station.

Viewer Group: Recreational (Boat)

Existing Visual Quality/Character: The compressor station is a dominant landscape feature in this view because of the proximity of the compressor station to the river and its location on a high point relative to the river. Views in this area consist of heavy vegetation along the floodplain and some steep topography along the southern bank of the river. The existing visual quality is moderate because of the disturbed, sparsely vegetated slopes and the presence of the compressor station. Despite the potentially long duration of views from the river and the proximity to existing facilities, viewer sensitivity in this location is moderate as a result of the existing developments. Exhibit 4.1-13 depicts key view 12.

Key View 13

Orientation: This view represents a view experienced by recreational viewers on the southern edge of the Colorado River south of the compressor station while looking southwest toward the existing arch bridge.

Viewer Group: Recreational (Boat)

Existing Visual Quality/Character: The existing arch bridge is a dominant landscape feature in this view because of the unique visual quality of the bridge, and boaters' access to the structure as they pass on the river. Views in this

Key View 11—View west toward the floodplain, IM-3, and compressor station.
(Photograph taken by AECOM in 2009)

Key View 12—View west toward the compressor station from the Colorado River.
(Photograph taken by AECOM in 2009)

Key Views **Exhibit 4.1-13**

area consist of sparsely vegetated steep topography along the southern bank of the river and of the bridges that cross overhead. The existing visual quality is low because of the disturbed slopes and presence of existing pipeline and utility infrastructure. Despite the potentially long duration of views from the river and the proximity to existing facilities, viewer sensitivity in this location is low due to existing development. Exhibit 4.1-14 depicts key view 13.

Key View 14

Orientation: This view represents a view experienced by recreational viewers looking west from the Colorado River.

Viewer Group: Recreational (Boat)

Existing Visual Quality/Character: Steep, heavily vegetated terrain along the banks of the river at this location frames views along the river looking west toward the compressor station. Overhead utility structures obstruct the viewshed but add unique visual interest to this view. The existing visual character of the area is moderate because of contrasts in the flat, level water and sloping topography. Despite the moderate existing visual quality, potentially long duration of view, obstructions caused by topography and overhead structures limit sensitivity to any change in existing landscape character; therefore, viewer sensitivity is low in this location. Exhibit 4.1-14 depicts key view 14.

4.1.2 REGULATORY BACKGROUND

4.1.2.1 FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Bureau of Land Management Contrast Rating System

The contrast rating system is a systematic process used by BLM to analyze visual impacts of proposed projects and activities. It is primarily intended to assist BLM personnel in the resolution of visual impact assessment. Although not a strict policy, this methodology is intended to be used as a guide in the assessment of visual impacts (BLM 1986). While this EIR has been prepared by the California Department of Toxic Substances Control (DTSC), a state agency responsible for compliance with CEQA, the contrast rating system is used here as a general guide for the analysis of visual resources.

4.1.2.2 STATE PLANS, POLICIES, REGULATIONS, AND LAWS

State Scenic Highway System

California's Scenic Highway Program was created to protect and enhance the natural scenic beauty of California highways and adjacent corridors through special conservation. An eligible highway would be designated scenic depending on how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes on the traveler's enjoyment of the view. The status of a proposed state scenic highway changes from "eligible" to "officially designated" when the local governing body applies to the California Department of Transportation for scenic highway approval, adopts a Corridor Protection Program, and receives notification that the highway has been officially designated a Scenic Highway. I-40 is an eligible highway that is not officially listed on the California Scenic Highway Mapping System.

Key View 13—View southwest from Colorado River toward the existing arched bridge and southern riverbank. *(Photograph taken by AECOM in 2009)*

Key View 14—View west toward the compressor station from the Colorado River. *(Photograph taken by AECOM in 2009)*

Key Views **Exhibit 4.1-14**

4.1.2.3 REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

County of San Bernardino 2007 General Plan

The Open Space Element and the Conservation Element of the *County of San Bernardino 2007 General Plan* (County General Plan) provide a reference to guide the protection and preservation of open space, recreation, and scenic areas, while accommodating future growth in San Bernardino County. The following goals and policies pertain directly to visual character in general and preservation of features in the Desert Region, where the project area is located, specifically (San Bernardino County 2007:VI-12,V-43)

GOAL OS 4: The County would preserve and protect cultural resources throughout the County, including parks, areas of regional significance, and scenic, cultural and historic sites that contribute to a distinctive visual experience for visitors and quality of life for County residents.

GOAL OS 5: The County would maintain and enhance the visual character of scenic routes in the County.

- **Policy OS 5.2:** Define the scenic corridor on either side of the designated route, measured from the outside edge of the right-of-way, trail, or path. Development along scenic corridors would be required to demonstrate through visual analysis that proposed components are compatible with the scenic qualities present.

GOAL D/CO 1: Preserve the unique environmental features and natural resources of the Desert Region, including native wildlife, vegetation, water and scenic vistas.

- **Policy D/CO 1.2:** Require future land development practices to be compatible with the existing topography and scenic vistas, and protect the natural vegetation.

4.1.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1.3.1 ANALYSIS METHODOLOGY

The information presented in this section is based on the analysis of the key views presented in Section 4.1.1.4, “Description of Key Views,” a review of relevant literature and adopted plans (including the County General Plan), the preparation and analysis of visual simulations, and consideration of the BLM’s contrast rating system as summarized in the *Visual Resource Contrast Rating BLM Manual 8431* (BLM 1986). Typically, BLM considers that the degree to which a management activity affects the visual quality of a landscape depends on the visual contrast created between a project and the existing landscape. The same consideration was applied by DTSC with regard to the potential for the project to affect the visual quality of the existing landscape. To begin the assessment process, a visual limit of the study area was established through the development of a project viewshed, or the extent of the areas from which the project area can be viewed. The project viewshed was determined in the field and through analysis of topography, geographical information, and aerial photographs. The existing visual quality and character of the project area were documented and evaluated through field and aerial reconnaissance, photographic record, and review of previously prepared vegetation and geological surveys. Viewer groups and key view locations were determined through field observations and review of land use maps and other planning documents. The key views encompass the most sensitive view points, typical views encountered in the existing landscape, and special project and landscape features that are of importance in evaluating the overall visual effect of the proposed project.

Visual simulations were prepared to illustrate the visual effects of the proposed projects. The simulations were created through photographing the project area and surroundings with high-resolution digital photography, developing a three dimensional topographical model that included proposed project features, and conducting viewshed analysis on the model. Project structures that are shown in the visual simulations are based on existing structures in the project area, research of similar remedial facilities, and conceptual information presented in the

Final CMS/FS. Locations of facilities shown in these simulations are provided for illustrative purposes only, to portray what the facilities could look like in the existing visual setting. Locations, quantities, and sizes of these structures are based on the conceptual illustration of where facilities could be located, as shown on Exhibit 3-4. These simulations are not intended to represent exact placement or appearance of structures, which would be established during the design phase of the proposed project. The simulations are limited in their accuracy by the present level of design detail.

The proposed project was evaluated using BLM's contrast rating system. A number of contributing factors affect the overall visibility, visual contrast, and ultimately any potentially significant impacts from implementation of the project. The visual contrast of the proposed project was identified for each key view where project features would be visible. The visual contrast rating is based on the following characteristics:

- degree of change in line, form, color, and texture a project would introduce to the existing character of the project area;
- scale, size, and location of facilities;
- distance, duration of view, and viewing angle;
- color and texture of the proposed remediation proposed projects;
- likely and accessible viewing locations;
- influences of adjacent scenery or land uses; and
- viewer sensitivity, with viewer groups being distinguished between residential, vehicular, recreation, and pedestrian groups. Residential, recreational and pedestrian viewer groups are considered to have relatively high sensitivity to change in visual quality or character, while vehicular viewer groups have a low to moderate sensitivity.

Four levels of contrast were considered: none, weak, moderate, and strong. No contrast (none) suggests the element contrast is not visible or perceived. Weak contrast suggests the element contrast can be seen but does not attract attention. Moderate contrast suggests the element contrast begins to attract attention and begins to dominate the landscape. Strong contrast suggests the element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Analysis was performed for the construction, operation and maintenance, and decommissioning phases of each proposed remediation proposed project's lifecycle. Each phase introduces unique visual effects that have been considered, including the duration of the effects. These impacts typically occur as a result of landform alteration, vegetation removal, storage structures, roadways, and other project features that would contrast in a noticeable way to the existing visual quality or character of an area, or have an adverse affect on a scenic vista. The overall degree of contrast is then compared to existing visual quality and viewer sensitivity in a particular location to determine the level of visual impact as it relates to the guidance provided in Appendix G of the CEQA Guidelines.

The following thresholds of significance are based on the guidance provided in Appendix G of the CEQA. These guidelines can be thought of as being roughly synonymous with the concept of visual resource objectives, which is a nomenclature used by BLM in the agency's contrast rating system. Because this is a CEQA analysis, the following criteria are used as a measurement of significance. However, if this analysis were being prepared using the BLM nomenclature, it could be simply stated that the visual resource management objectives of the project are to not exceed these thresholds of significance.

4.1.3.2 THRESHOLDS OF SIGNIFICANCE

Based on the CEQA Guidelines, the proposed project would have a significant impact on aesthetics if it would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, or resources designated as important by an agency with jurisdiction in the project area;
- substantially degrade the existing visual character or quality of the site and its surroundings; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the areas.

In accordance with applicable policy documents, five scenic resources have been identified within, or adjacent to the project area:

- views from I-40, an eligible scenic highway, as identified in the California State Scenic Highway Program (represented in key views 1 and 2);
- views to the "Needles" rock formation, a scenic vista, in accordance with Goal OS 4 of the County General Plan (represented in key view 4);
- views to the Topock Maze, a scenic vista, in accordance with Goal OS 4 of the County General Plan (represented in key view 6);
- views to the Mohave Valley from Chemehuevi Mountain, in accordance with Goal OS 4 of the County General Plan (represented in key view 9); and
- views from Colorado River, a scenic resources corridor, in accordance with Goal OS 5, Policy OS 5.2 of the County General Plan (represented in key view 10 and 11).

4.1.3.3 IMPACT ANALYSIS

The proposed project would involve construction and operation of structures required for remediation throughout the project area, which is shown on Exhibit 4.1-3, and could be visible by vehicular, pedestrian, and recreational viewers. Structures that are included in the proposed project and would be located within the defined project area include the components outlined in Table 4.1-2.

The visual effects of the proposed project are described below. For several of the viewpoints (key views 7, 8, 12, and 14), the project elements have been determined to not be visible through an analysis conducted using a three dimensional topographical model of the site with consideration of the project features, including their proposed size, location, and extent.

The analysis presented in this section is described for each of the key views. After this discussion is a comparison of the anticipated visual effects against the thresholds of significance, including an analysis of the various project impacts followed by proposed mitigation measures where the impacts are identified as potentially significant or significant.

Table 4.1-2
Summary of Potentially Visible Project Features

Structure Type	Quantity	Visible Size	Location[1]
Extraction Wells	Up to 110[2]	6 feet long by 8 feet wide by 8 feet deep	Likely near the Colorado River and the compressor station
Injection Wells			West and north of plume, and near the compressor station
IRZ Wells		6 feet long by 8 feet wide by 5 feet deep	Along western and eastern shoulders of National Trails Hwy
Freshwater Supply Wells	Undetermined number of wells	6 feet long by 8 feet wide by 8 feet deep	Would either be in Arizona or California within defined project area
Reductant Storage Facilities Aboveground Tanks	Total tank storage capacity of up to 100,000 gallons; number of tanks to be determined during design phase	35,000 sq. ft. maximum footprint[3] 25,000 gallon capacity/tank 12 feet wide, 24 feet long, and up to 15 feet tall	Within defined project area, likely near injection wells, at the compressor station, at MW-20 bench, or at the IM-3 Facility
Freshwater Intake Structure and Treatment System[4]	1	40,000 sq. ft. maximum footprint to include 10,000 sq. ft. maximum treatment building size up to 25 feet tall	Within project area
Monitoring Wells	Up to 60, not including replacement wells	4 sq. ft. flush-mounted concrete pad with manhole-type cover or aboveground completion consisting of steel protective casing [5]	In and around the perimeter of the plume
Water Conveyance (pipelines)	Up to 50,000 linear feet	Trenches up to 5 feet wide, 3 to 4 feet deep	Above and belowground Exact locations TBD (intent to locate main infrastructure corridors with existing utility corridors)
Utilities (electrical and conduit cable)	Up to 50,000 linear feet		
Roadways[6]	Up to 6,000 linear feet	Roadway size/width not available	Within the defined project area

Other Ancillary Structures (e.g., protective bollards around structures, electrical boxes, solar panels). These structures would be located throughout the defined project area.

Note: IRZ = in situ reactive zone; sq. ft. = square feet.

1 Refer to Chapter 3, "Project Description," Exhibit 3-4 for conceptual facility locations.

2 Includes all remediation wells—extraction, injection (including freshwater injection) and IRZ wells, but does not include replacement wells.

3 This total maximum area may consist of facilities (tanks, control buildings, and associated equipment) at multiple locations. Reductant storage/delivery area(s) would have lighting for safety and security purposes.

4 Freshwater needed for the proposed project could come from either new or existing freshwater wells in California or Arizona or from a freshwater intake structure on the Colorado River. Treatment of the freshwater may be needed prior to injection.

5 Refer to Chapter 3, "Project Description," Exhibit 3-6.

6 Roads would be either paved with asphalt or gravel or left unpaved depending on location and use. All new roads would be removed following determination that the remedial or monitoring structure is no longer needed. As such, no permanent roads are proposed.

Source: Data compiled by AECOM in 2010

Key View 1

Key view 1 represents the view experienced by the motorists traveling on I-40 toward the compressor station and Colorado River. Proposed changes to existing visual quality and character are depicted in a visual simulation in Exhibit 4.1-15.

The proposed project would introduce new injection and extraction wells, roads, and other project features as listed above to vast land areas within the project area, and the proposed project would be visible from this location. This proposed project would require drilling, trenching, grading, and installing new access roads and/or improving existing roadways and conveyance pipelines.

Temporary changes to the visual quality and character of the eligible scenic highway corridor area would occur during the construction and decommissioning of the proposed project. These changes would be visible to motorists traveling along I-40. These changes would include the presence of construction equipment and materials stockpiles and use of temporary erosion control features. The introduction of nighttime lighting for site security and construction operations would introduce a noticeable change to the existing visual setting, because no nighttime lighting exists in this area. Grading operations could be visually noticeable, but would not result in substantial alterations to existing landforms. Because construction and decommissioning operations are dynamic, they would have a limited effect on existing form, lines of sight, and textural pattern. Construction activities would be spread throughout the large project area. Additionally, views of construction activity would be of short duration. Because of these factors, construction and decommissioning activities would possess a weak degree of contrast and would be considered less than significant.

Once constructed, the proposed project would result in a low change to the existing character of the landscape because of the presence of injection and extraction facilities on the top of graded slopes and potentially in the median along I-40. The views along the highway corridor would not be substantially altered by the presence of these wells; however the views would be altered from existing conditions. The proposed project would be a dominant foreground feature, but would not be viewed on a constant basis by motorists.

Vehicular viewers are considered to have a low sensitivity to change of existing visual character because of their distance, angle, duration, and expectation of views. The visual changes associated with this proposed project would be apparent to passing motorists. Motorists traveling along I-40 would experience short-duration foreground and middle-ground views of the proposed project; however, the background view would not be altered. The introduction of the proposed project would not permanently increase glare. Implementation of the proposed project would introduce a low degree of contrast to the existing visual character within the viewshed of I-40, which is an eligible scenic highway, and would be considered less than significant.

Key View 2

Key view 2 represents the view experienced by the motorists traveling on I-40 at the crossing of Bat Cave Wash, looking south toward the compressor station. Proposed changes to existing visual quality and character are depicted in a visual simulation in Exhibit 4.1-16.

The proposed project would likely introduce new injection and extraction wells and conveyance pipelines within the topographical boundaries of Bat Cave Wash, and would be visible from this key view. The proposed project would require drilling, trenching, grading, and installing new access roads and/or improving existing roadways within this viewshed.

In addition to the temporary changes to the visual quality and character of the eligible scenic highway corridor as described in key view 1, construction and decommissioning related activities within Bat Cave Wash would be highly visible in this location because of operations taking place within as little as 50 feet of the highway. Views of the construction of wells and conveyance pipelines would be unobstructed from I-40 in this location but would

Source: AECOM 2009

Key View 1, Existing Conditions Photo and Visual Simulation of the Proposed Project **Exhibit 4.1-15**

Source: AECOM 2009

Key View 2, Existing Conditions Photo and Visual Simulation of the Proposed Project

Exhibit 4.1-16

be extremely short in duration, merely seconds. Because of these factors, construction and decommissioning activities would possess a weak degree of contrast and would be considered less than significant.

Once constructed, the proposed project would result in a moderate change of the existing character of the landscape near the compressor station. The views would be altered by the introduction of reductant storage facilities approximately 12 feet wide, 24 feet long, and up to 15 feet tall, with a capacity of 24,000 gallons, and injection and extraction wells up to 12 inches in diameter surrounding the existing compressor station. The storage tank would be a noticeable foreground feature, but would not dominate the view or be viewed on a constant basis by motorists.

While vehicular viewers are considered to have a low sensitivity to changes to existing visual character, changes to the view would be apparent to passing motorists. Motorists traveling along I-40 would experience short-duration foreground views of the proposed project; however, the middle-ground view to Chemehuevi Mountain would not be altered or substantially obstructed. The introduction of this proposed project would not permanently increase glare in this location. Implementation of the proposed project would introduce a moderate degree of contrast to the existing visual character within the viewshed of I-40, which is an eligible scenic highway and would be considered less than significant.

Key View 3

Key view 3 represents the view experienced by the motorists traveling on I-40 at the crossing of Bat Cave Wash, looking south toward the compressor station. Proposed changes to existing visual quality and character are depicted in a visual simulation in Exhibit 4.1-17.

The proposed project would likely introduce new injection and extraction wells to the floodplain and reductant storage tanks and control building to the MW-20 bench. The proposed project would require drilling, trenching, grading, and improving existing roadways within this viewshed.

In addition to the temporary changes to the visual quality and character of the eligible scenic highway corridor as described in key view 1, construction and decommissioning related activities within the floodplain and on the MW-20 bench would be highly visible in this location because of operations taking place within 600 feet of the highway. Views of the construction of wells, reagent storage and control facilities, and conveyance pipelines would be partially obstructed by the BNSF railroad bridge in this location and would be extremely short in duration. Because of these factors, construction and decommissioning activities would possess a weak degree of contrast and would be considered less than significant.

Once constructed, the proposed project would result in a moderate change of the existing character of the landscape near the compressor station. The views would be minimally altered by the introduction of reductant storage facilities approximately 12 feet wide, 24 feet long, and up to 15 feet tall, with a capacity of 24,000 gallons on the MW-20 bench. The primary focus of viewers in this location is the BNSF railroad bridge, a dominate landscape element in this location. The storage tanks and control building would be a noticeable addition to the MW-20 bench, but would not dominate the view or be viewed on a constant basis by motorists.

Vehicular viewers are considered to have a low sensitivity to change in the existing visual character because of their distance, angle, duration, and expectation of views. Motorists traveling west on I-40 would experience short-duration foreground views of the proposed project; however, the railroad bridge would remain the dominant foreground element. The proposed changes to the floodplain would not permanently increase glare in this location. Implementation of the proposed project would introduce a low degree of contrast to the existing visual character of the floodplain and would be considered less than significant.

Source: AECOM 2009

Key View 3, Existing Conditions Photo and Visual Simulation of the Proposed Project **Exhibit 4.1-17**

Key View 4

Key view 4 represents the view experienced by the motorists traveling south on National Trails Highway looking toward the floodplain and railroad bridge. Proposed changes to existing visual quality and character are depicted in Exhibit 4.1-18.

The proposed project would introduce new injection wells to the floodplain, and the proposed project would be visible from this location. This proposed project would require removing a substantial amount of vegetation and drilling, trenching, and installing new access roads and conveyance pipelines throughout the project area, including within the floodplain. In addition, a reductant storage tank may be constructed on the MW-20 Bench site and would be partially visible to motorists from this location.

Temporary changes to the visual quality and character of the floodplain area would occur during the construction and decommissioning of the proposed project. These changes would include the presence of construction equipment and materials stockpiles and the initial removal of vegetation. The introduction of nighttime lighting for site security and construction operations would introduce a noticeable change to the existing visual setting of the floodplain at large because nighttime lighting does not currently exist within the floodplain. Security lighting does currently exist on the MW-20 bench, however, and additional lighting requirements in this location would pose no substantial visual change. Grading operations and construction measures, such as erosion control features, may be visually noticeable. Because construction and decommissioning operations are dynamic, they have a limited effect on existing form, lines of sight, and textural pattern. Additionally, views of construction activity would be of short duration. Because of these factors, construction and decommissioning activities possess a weak degree of contrast and would be less than significant.

Once constructed, the proposed project would result in a substantial change to the existing character of the floodplain because of the introduction of wells, reagent storage tanks and control building, removal of existing mature vegetation, and the proposed IRZ zone along National Trails Highway. Grading would be required for the purpose of constructing the proposed project, but would not result in substantially altering landforms. The proposed project would be a dominant foreground feature, but would not be viewed on a constant basis.

Vehicular viewers are considered to have a low sensitivity to change in the existing visual character because of their distance, angle, duration, and expectation of views. Motorists traveling along National Trails Highway would experience short-duration foreground views of the proposed project; however, the middle-ground view to the transportation bridges and background view to the “Needles” rock formation would no longer be obscured by existing vegetation, improving access to this scenic vista. The proposed changes to the floodplain would not permanently increase glare in this location. Implementation of the proposed project would introduce a moderate degree of contrast to the existing visual character of the floodplain along National Trails Highway and would be considered less than significant.

Key View 5

Key view 5 represents the view experienced by pedestrian visitors to Topock Maze Locus B looking southeast toward the floodplain, railroad bridge and “Needles” rock formation. Proposed changes to existing visual quality and character are depicted in Exhibit 4.1-19.

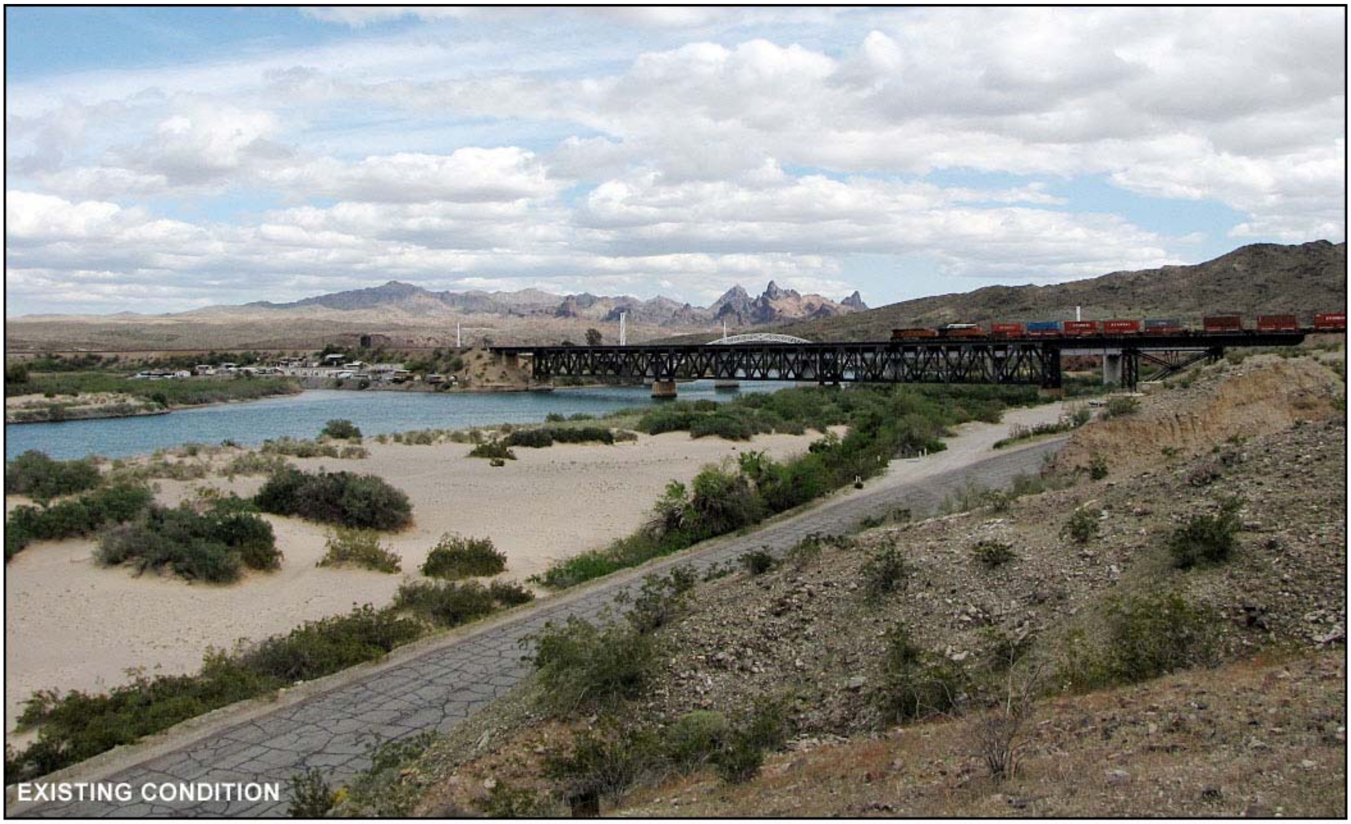
The proposed project would introduce wells to the floodplain, and the proposed project would be visible from this location. This proposed project would require vegetation removal, drilling, trenching, and installing new access roads and conveyance pipelines throughout the project area, including within the floodplain. In addition, a reductant storage tank may be constructed on the MW-20 Bench and would be partially visible to viewers from this location.

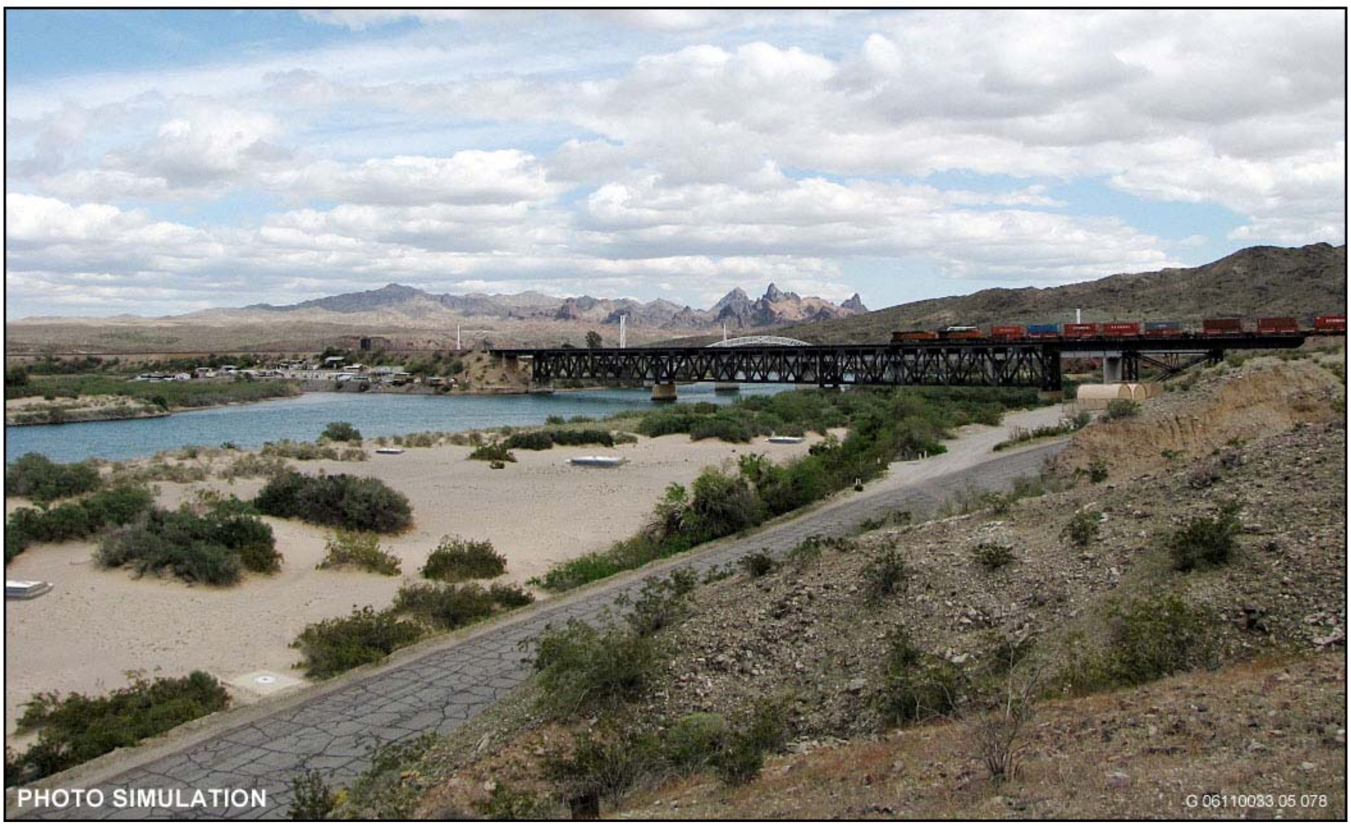
Temporary changes to the visual quality and character of the floodplain area during initial construction activity would be similar to those described under key view 4 and would be considered less than significant.

Source: AECOM 2009

Key View 4, Existing Conditions Photo and Visual Simulation of the Proposed Project

Exhibit 4.1-18





Source: AECOM 2009

Key View 5, Existing Conditions Photo and Visual Simulation of the Proposed Project

Exhibit 4.1-19

Once constructed, the proposed project would result in a change to the existing character of the floodplain because of the introduction of wells, reagent storage tanks and control building, removal of existing mature vegetation, and the proposed IRZ zone along National Trails Highway. Grading would be required for the purpose of constructing the proposed project, but would not result in substantially altering landforms. The proposed project would be a dominant foreground feature, but would not be viewed on a constant basis.

Pedestrian viewers are considered to be highly sensitive to change in existing visual character because of their distance, angle, duration, and expectation of views. Visitors to the site would experience long-duration foreground views of the proposed project but the proposed structures would not obstruct the middle-ground views of the Needles rock formation. The introduction of the proposed project would not permanently increase glare, though the increased coverage area and number of fixtures required for adequate nighttime lighting could constitute a noticeable change. The proposed changes to the floodplain would not permanently increase glare in this location. Implementation of the proposed project would introduce a strong degree of contrast to the existing visual character of the floodplain and would be considered potentially significant.

Key View 6

Key view 6 represents the view experienced by pedestrian visitors to Topock Maze Locus C looking south toward the IM-3 Facility and the compressor station. Exhibit 4.1-20 depicts the proposed changes to existing visual quality and character.

The proposed project would introduce new injection and extraction wells, reductant storage facilities, and conveyance pipelines near the existing IM-3 Facility. In addition to the wells and reductant storage structures, photovoltaic or electric generator stations that use natural gas may be visible in this location, as they may be required to supply power to the proposed wells. As a result, this proposed project would be apparent to the pedestrian visitors of Topock Maze Locus C.

Temporary changes to the visual quality and character related to construction and decommissioning are similar to those described under key view 4, and the introduction of nighttime lighting for site security and construction operations would not introduce a substantial change to the existing visual setting because of the anticipated shielding, current presence of lighting in this location, and extremely limited number of viewers. Because of these factors, construction and decommissioning activities possess a weak degree of contrast and would be less than significant.

Once constructed, the proposed project would not result in a substantial change to the existing character of the landscape in this location. Existing views would be minimally altered by the presence of a new structure for reductant storage, as large as 100,000 gallons. If multiple tanks are necessary, each tank would be approximately 12 feet wide, 24 feet long, and up to 15 feet tall, with a capacity of 24,000 gallons and would resemble those currently in this location. The proposed project would not become a more dominant foreground feature in this key view and would not be viewed on a constant basis.

Pedestrian viewers are considered to be highly sensitive to change in existing visual character because of their distance, angle, duration, and expectation of views. Visitors to the site would experience long-duration foreground views of the proposed project but the proposed structures would not obstruct the middle-ground view of Chemehuevi Mountain. The introduction of the proposed project would not permanently increase glare, though the increased coverage area and number of fixtures required for adequate nighttime lighting could constitute a noticeable change.

Due to the presence of similar existing facilities, the proposed project would introduce a low degree of contrast to the existing visual character within the viewshed of Topock Maze Locus C and would be considered less than significant.

Source: AECOM 2009

Key View 6, Existing Conditions Photo and Visual Simulation of the Proposed Project

Exhibit 4.1-20

Key View 7

Key view 7 represents a view experienced by pedestrian visitors to the BLM interpretive sign at Topock Maze Locus A. When the proposed project features were considered from this viewpoint using the three dimensional computer model, it was determined that none of the project features would be visible from this location. For this reason, no further analysis of this key view is conducted.

Key View 8

Key view 8 represents a view experienced by pedestrian visitors to the project area while looking east toward the compressor station from the informational plaque at Topock Maze Locus A. When the proposed project features were considered from this viewpoint using the three dimensional computer model, it was determined that none of the project features would be visible from this location. For this reason, no further analysis of this key view is conducted.

Key View 9

Key View 9 represents the view experienced by pedestrian visitors to Topock Maze while visiting a gathering location at Locus A. Proposed changes to existing visual quality and character are depicted in a visual simulation in Exhibit 4.1-21.

The proposed project would introduce a water treatment facility, reductant storage tanks and control building on the topographical bench below the compressor station currently occupied by scrubbing towers. If multiple tanks are necessary, each tank would be approximately 12 feet wide, 24 feet long, and up to 15 feet tall, with a capacity of 24,000 gallons. Additional ancillary structures may also be introduced under this proposed project and would consist of photovoltaic or natural gas electricity generating stations.

Temporary changes to the visual quality and character related to construction and decommissioning are similar to those described under Key View 2, and would not be considered significant.

Once constructed, the proposed component would result in a moderate change of the existing character of the landscape in the vicinity of the Station. The views would be altered by the introduction of a new structure and associated facilities but due to the collocation of existing and proposed facilities, the new facilities would be visually congruent with existing character in this location. The proposed project would be a dominant foreground feature but would not be viewed on a constant or regular basis.

Despite viewer preconditioning due to the presence of existing facilities in this location, pedestrian viewers are considered to have a high sensitivity to change in existing character due to their distance, angle, duration and expectation of views. Visitors to the site would experience long-duration foreground views of the proposed project from this location. The introduction of this component would not permanently increase glare. Due to the presence of like structures, changes to this view would be considered less than significant.

Key View 10

Key view 10 represents the view experienced by recreational viewers looking northeast toward the compressor station, IM-3 Facility, and Colorado River from the hiking trails on Chemehuevi Mountain to the south of the compressor station. Proposed changes to existing visual quality and character are depicted in a visual simulation shown in Exhibit 4.1-22.

The proposed project would introduce new injection and extraction wells, access roads, pipelines, and associated facilities, such as reductant storage facilities, throughout the project area. Reductant storage facilities could be located on the MW-20 bench, near the IM-3 Facility, at the compressor station, or in other locations around the project area. If multiple tanks are necessary, each tank would be approximately 12 feet wide, 24 feet long, and up

Source: AECOM 2009

Key View 9, Existing Conditions Photo and Visual Simulation of the Proposed Project

Exhibit 4.1-21

Source: AECOM 2009

Key View 10, Existing Conditions Photo and Visual Simulation of the Proposed Project **Exhibit 4.1-22**

to 15 feet tall, with a capacity of 24,000 gallons. Additional ancillary structures may also be introduced under this proposed project and would consist of photovoltaic or natural gas electricity generating stations.

Temporary changes to the visual quality and character related to construction and decommissioning are similar to those described under key view 6, and would be less than significant.

Up to 170 wells would be constructed over the course of implementation of the proposed project, as well as replacement of wells as necessary during operation and maintenance, and would be apparent from this unobstructed viewing location because of the elevated vantage point and land area the proposed project would occupy. Reductant storage facilities would also be visible from this location. Though visible, the proposed project would not be a dominant foreground feature due to the viewing distance, and would not be viewed on a constant basis.

Recreational viewers are considered to be highly sensitive to change in existing character because of their distance, angle, duration, and expectations of views. The proposed project could have a negative impact on the existing visual quality due to linear rows of wells visually contrasting with the geometric patterns of the Topock Maze. Hikers on Chemehuevi Mountain would experience long-duration middle ground views, but background views would remain unaffected by the implementation of this remedy. The proposed project would not permanently increase glare from this vantage point and nighttime lighting associated with any reductant storage facility would not constitute a noticeable change because lighting is currently present in these locations.

Implementation of the proposed project would introduce a weak degree of contrast to the existing visual character within the viewshed from Chemehuevi Mountain due to the elevated vantage point, presence of like structures and distance of views, and would be considered less than significant.

Key View 11

Key view 11 represents the view experienced by recreational viewers along the Colorado River looking southwest toward the floodplain, MW-20 Bench, IM-3 Facility, and the compressor station. Proposed changes to existing visual quality and character are depicted in Exhibit 4.1-23.

The proposed project would introduce up to 170 new wells, reductant storage tanks and control building, removal of vegetation, grading, and new access roads and conveyance pipelines to the floodplain. Because of the viewshed represented in this key view, the proposed project would be clearly visible from this location.

Temporary changes to the visual quality and character related to construction and decommissioning are similar to those described under key view 4, and would be considered less than significant.

Once constructed, the proposed project would result in a considerable change to the existing character of the floodplain by introducing as many as 170 new wells and related infrastructure in the project area, as well as any replacement wells that may be necessary during operation and maintenance. Additionally, though obscured by intervening topography and vegetation from this vantage point, the introduction of up to four 25,000 gallon reductant storage tanks and a control building to the MW-20 bench will be visible from other vantage points along the Colorado River. The removal of large portions of existing vegetation could substantially affect the existing character of the view corridor along the Colorado River and provide new views to vehicular traffic along National Trails Highway. The proposed project would not be viewed on a constant basis; however, these changes would be apparent to recreational viewers on the Colorado River and would become a noticeable foreground feature.

Recreational viewers are considered to have a relatively high sensitivity to visual change because of their distance, angle, duration, and expectation of views. Boaters would experience short-duration foreground views of project features that are located within the floodplain, as well as any potential freshwater intake structures. The middle-ground view of Chemehuevi Mountain would not be altered or substantially obstructed. The proposed project would not permanently increase glare from the floodplain but the finish treatment of remedial components must be carefully considered in this location because of the potential reflection of light from the surface of the

Source: AECOM 2009

Key View 11, Existing Conditions Photo and Visual Simulation of the Proposed Project

Exhibit 4.1-23

Colorado River. Implementation of the proposed project would introduce a strong degree of contrast to the existing visual character within the floodplain due to the extensive removal of vegetation, reductant storage tanks and control building, and potential alteration of the riverbank, and would be considered potentially significant.

Key View 12

Key view 12 represents the view experienced by recreational viewers along the Colorado River looking west toward the compressor station. When the proposed project features were considered from this viewpoint using the three dimensional computer model, it was determined that none of the project features would be visible from this location. For this reason, no further analysis of this key view is conducted.

Key View 13

Key view 13 represents the view experienced by recreational viewers along the Colorado River looking southwest toward the existing arched bridge. Proposed changes to existing visual quality and character are depicted in Exhibit 4.1-24.

Temporary changes to the visual quality and character related to construction and decommissioning are similar to those described under key view 4 and would be less than significant.

Once constructed, the proposed project could introduce an intake structure consisting of a pump house and intake pipe on the bridge that would be visible to recreational viewers.

Recreational viewers are considered to have a relatively high sensitivity to visual change because of their distance, angle, duration, and expectation of views. Boaters traveling along the river near the compressor station and overhead pipeline bridges would experience potentially long-duration foreground views of the proposed project. The proposed treatment structure would not permanently increase glare in this location or substantially disrupt the view corridor along the Colorado River. Implementation of the proposed project would introduce a moderate degree of contrast to the existing visual character but due to the presence of existing utilities infrastructure and the overhead visual interest provided by the arched bridge, it would be considered less than significant.

Key View 14

Key view 14 represents a view experienced by recreation viewers looking west from the Colorado River. When the proposed project features were considered from this viewpoint using the three dimensional computer model, it was determined that none of the project features would be visible from this location. For this reason, no further analysis of this key view is conducted.

4.1.3.4 SUMMARY OF IMPACTS

The following is a composite summary of visual impacts for all key views in which the proposed project is visible. Key view specific impacts are identified below in Table 4.1-3.

> Temporary Impacts on Existing Visual Quality and Character. *Construction and decommissioning activities are dynamic and would have a limited effect on existing form, lines of sight, and textural pattern. Construction and decommissioning activities would be spread throughout the large project area and views of construction activity would be of short duration. This impact would be* ***less than significant****.*

Temporary impacts on existing visual quality and character would occur during construction and decommissioning activities. These effects would occur with the presence of construction equipment (e.g., bulldozers, drill rigs, materials stockpiles), grading operations and associated temporary equipment/erosion control products, and removal of existing vegetation. They would also occur as a result of specific project

Source: AECOM 2009

Key View 13, Existing Conditions Photo and Visual Simulation of the Proposed Project **Exhibit 4.1-24**

Table 4.1-3 Summary of Key View Analysis						
Key View	Viewer Group	Threshold of Significance	Scenic Resource Representation	Proposed Project Visible?	Degree of Contrast (BLM)	Determination of Impact (CEQA)
1	**Vehicular**	**II & IV**	**Views from I-40; an eligible scenic highway**	**Yes**	**Weak**	**Less than significant**
2	**Vehicular**	**II & IV**	**Views from I-40; an eligible scenic highway**	**Yes**	**Moderate**	**Less than significant**
3	**Vehicular**	**II**	**Views from I-40; an eligible scenic highway**	**Yes**	**Weak**	**Less than significant**
4	**Vehicular**	**I**	**Views to "Needles" rock; a scenic vista**	**Yes**	**Moderate**	**Less than significant**
5	**Pedestrian**	**I**	**Views from Topock Maze; a scenic vista**	**Yes**	**Strong**	**Potentially Significant**
6	**Pedestrian**	**I & IV**	**Views from Topock Maze; a scenic vista**	**Yes**	**Low**	**Less than significant**
7	Pedestrian	None	Views to Topock Maze; a scenic vista	No	N/A	N/A
8	Pedestrian	None	None	No	N/A	N/A
9	**Pedestrian**	**III**	**Views from Topock Maze; a scenic vista**	**Yes**	**Moderate**	**Less than significant**
10	**Recreational**	**I, II, & III**	**Views from Chemehuevi Mountain; a scenic vista**	**Yes**	**Weak**	**Less than significant**
11	**Recreational**	**II, III, IV**	**Views from Colorado River; a scenic resources corridor**	**Yes**	**Strong**	**Potentially significant**
12	Recreational	None	None	No	N/A	N/A
13	**Recreational**	**II & III**	**Views from Colorado River; a scenic resources corridor**	**Yes**	**Moderate**	**Less than significant**
14	Recreational	None	None	No	N/A	N/A

Notes: BLM = U.S. Bureau of Land Management; I-40 = Interstate 40.
Bold denotes that project features are visible from that key view and that he key view was selected for analysis.
Source: Data compiled by AECOM in 2009

requirements including nighttime lighting used during construction operations and for security. Because the effects are similar, construction and decommissioning effects are considered concurrently in the analysis. Construction and decommissioning activities are dynamic and would have a limited effect on existing form, lines of sight, and textural pattern. Construction and decommissioning activities would be spread throughout the large project area and views of construction activity would be of short duration. Because of these factors, construction and decommissioning activities possess a weak degree of contrast and would be **less than significant**.

> Impacts on Scenic Vistas (Key Views 4, 6, and 10). *From key views 4, 6, and 10, the overall degree of contrast does not meet the threshold of significance. This impact would be* less than significant*.*

As described above, implementation of the proposed project would create a visual environment in weak to moderate contrast with the existing visual character through the introduction of wells, storage and water treatment structures, pipelines, and roads. Although project features would be visible in key views 4, 6 and 10, the overall degree of contrast does not meet the thresholds of significance. Therefore, these impacts would be less than significant.

IMPACT AES-1 **Impacts on Views from Topock Maze Locus B, a Scenic Vista (Key View 5).** *Views from Topock Maze Locus B toward the floodplain, Colorado River and "Needles" rock formation, a Scenic Vista (represented by key view 5) could be adversely affected by the proposed project through removal of floodplain vegetation, introduction of reagent storage tanks and control building, grading operations, and overall alteration of the foreground elements of a scenic vista. Because of the strong degree of contrast that is possible as a result of project effects in this area, this impact would be* ***potentially significant****.*

Once constructed, the proposed project would result in a substantial change to the existing character of the floodplain from key view 5 because of the introduction of wells, reagent storage tanks and control building, removal of existing mature vegetation, and the proposed in situ reactive zone along National Trails Highway. Grading would be required for the purpose of constructing the proposed project, but would not result in substantially altering landforms. The proposed project would be a dominant foreground feature, but would not be viewed on a constant basis.

Pedestrian viewers are considered to be highly sensitive to change in existing visual character because of their distance, angle, duration, and expectation of views. Visitors to the site would experience long-duration foreground views of the proposed project but the proposed structures would not obstruct the middle-ground views of the Needles rock formation. Implementation of the proposed project would introduce a strong degree of contrast to the existing visual character of the floodplain. This is considered **potentially significant**. **(Impact AES-1)**

Mitigation Measure AES-1: Impacts on Views from Topock Maze Locus B, a Scenic Vista (Key View 5).

The proposed project shall be designed and implemented to adhere to the design criteria presented below.

- Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation.

- Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.

- Plant material shall be consistent with surrounding native vegetation.

- The color of the wells, pipelines, reagent storage tanks, control structures, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.

- The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.

Timing:	Specific impact identification and adjustments to finish specifications shall occur during project design. Implementation of the revegetation plan shall occur during project construction. Maintenance and monitoring requirements shall be implemented after project construction for a period of 5 years, or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Implementation of these mitigation measures would reduce the overall change to the visual character of the view corridor along the Colorado River. Although the proposed project would still be visible, incorporating a facilities design that is aesthetically sensitive and preserving the vegetation would blend the proposed project into their visual setting within the floodplain and would reduce the overall contrast of the proposed project to a **less-than-significant** level.

Impacts on Scenic Resources (Key Views 1, 2, 10, and 13). *From key views 1, 2, 10, and 13, the overall degree of contrast does not meet the threshold of significance. This impact would be* ***less than significant****.*

As described above**,** implementation of the proposed project would create a visual environment in moderate and strong contrast with the existing visual character through the introduction of wells, storage and water treatment structures, pipelines, and roads. Project features would be visible in key views 1, 2, 10, and 13, which represent the scenic resources of I-40 (an eligible scenic highway), views from Chemehuevi Mountain, and some of the available views from the Colorado River. From these viewpoints, the overall degree of contrast does not meet the threshold of significance. Therefore, for these viewpoints and resources, impacts would be **less than significant**.

IMPACT AES-2	Impacts on Views from the Colorado River, a Scenic Resources Corridor (Key View 11). *Views from the Colorado River, a scenic resources corridor (represented by key view 11) could be adversely affected by the proposed project through removal of floodplain vegetation, grading operations, and overall alteration of a scenic view corridor. Because of the strong degree of contrast that is possible as a result of project effects in this area, this impact would be* ***potentially significant****.*

Once constructed, the proposed project would result in a considerable change to the existing character of the floodplain by introducing as many as 170 new wells and related infrastructure in the project area. Additionally, the removal of large portions of existing vegetation could substantially affect the existing character of views from the Colorado River, including providing new views to vehicular traffic along National Trails Highway. The proposed project would not be viewed on a constant basis; however, these changes would be apparent to recreational viewers on the Colorado River and would become a noticeable foreground feature.

Recreational viewers are considered to have a relatively high sensitivity to visual change because of their distance, angle, duration, and expectation of views. Boaters nearby would experience short-duration foreground views of project features that are located within the floodplain, including potential freshwater intake structures. This impact is considered **potentially significant. (Impact AES-2)**

Mitigation Measure AES-2: Impacts on Views from Colorado River, a Scenic Resources Corridor (Key View 11).

The proposed project shall be designed and implemented to adhere to the design criteria presented below.

- A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank.

- Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation.

- Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.

- Plant material shall be consistent with surrounding native vegetation.

- The color of the wells, pipelines, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete.

- The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.

Timing:	Specific impact identification and adjustments to finish specifications shall occur during project design. Implementation of the revegetation plan shall occur during project construction. Maintenance and monitoring requirements shall be implemented after project construction for a period of 5 years, or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Implementation of these mitigation measures would reduce the overall change to the visual character of the view corridor along the Colorado River. Although the proposed project would still be visible, incorporating a facilities design that is aesthetically sensitive and preserving the vegetation would blend the proposed project into their visual setting within the floodplain and would reduce the overall contrast of the proposed project to a **less-than-significant** level.

Impacts on Visual Quality and Character from Key Views 1, 2, 4, 6, 10, and 13. *From key views 1, 2, 4, 5, 9, and 13 of the project area, the overall degree of contrast does not meet the threshold of significance for visual quality and character impacts. This impact would be* ***less than significant****.*

As described above**,** implementation of the proposed project would create a visual environment in moderate to strong contrast with the existing visual character through the introduction of wells, storage and water treatment structures, pipelines, and roads. From key views 1, 2, 4, 5, 9, 11, and 13 of the project area, the overall degree of contrast does not meet the threshold of significance for visual quality and character impacts. Therefore, for these viewpoints, this impact would be **less than significant**.

IMPACT AES-3 **Impacts on Visual Quality and Character along the Colorado River (Key View 11).** *The visual quality and character along the Colorado River could be altered through the removal of floodplain vegetation and grading operations (key view 11). Because of the strong degree of contrast that is possible as a result of project effects in this area, this impact would be **potentially significant**.*

Implementation of the proposed project would result in a strong degree of visual contrast along the Colorado River from key view 11. This impact would be **potentially significant**. (**Impact AES-3)**

Mitigation Measure AES-3: Impacts on Visual Quality and Character along the Colorado River (Key View 11).

Mitigation Measure AES-1 shall be implemented. Implementation of Mitigation Measures AES-1 would reduce the overall change to the visual character of the view corridor along the Colorado River. Although the proposed project would still be visible, incorporating a facilities design that is aesthetically sensitive and preserving the vegetation would blend the proposed project into their visual setting within the floodplain and would reduce the overall contrast of the proposed project to a **less-than-significant** level.

Introduction of Light and Glare. *Views of lighting and nighttime construction activity would be of short duration and would not include features that would create glare. This impact would be **less than significant**.*

The introduction of nighttime lighting for site security and construction operations would introduce a noticeable change to the existing visual setting because no nighttime lighting exists in this area. Views of lighting and nighttime construction activity would be of short duration and would not include features that would create glare. Because of these factors, impacts associated with the project lighting would be considered **less than significant**.

4.2 AIR QUALITY

This section describes the existing air quality conditions in the project area; summarizes applicable federal, state, and local regulations and policies; and analyzes the potential air quality impacts of the proposed project. The methods of analysis for construction- and operation-related emissions of criteria air pollutants and precursors, toxic air contaminants (TACs), and odors are consistent with the local air district recommendations. Mitigation measures are recommended, as necessary and where feasible, to reduce significant impacts on air quality. The levels of greenhouse gas (GHG) emissions generated by the project are discussed in the cumulative impacts analysis provided in Chapter 6, "Cumulative Impacts," of this EIR, although background information regarding GHG emissions is set forth in this chapter.

4.2.1 EXISTING SETTING

The project site is located within the Mojave Desert Air Basin (MDAB), which comprises the eastern portion of Kern County; the northeastern portion of Los Angeles County; all of San Bernardino County; and the eastern portion of Riverside County.

The amount of emissions released by pollutant sources and the ability of the atmosphere to transport and dilute such emissions determines the ambient concentrations of air pollutants. Terrain, wind, atmospheric stability, and the presence of sunlight all affect transport and dilution. Therefore, such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources, as discussed separately below, determine the existing air quality conditions in the project area.

4.2.1.1 TOPOGRAPHY, CLIMATE, AND METEOROLOGY

The Mojave Desert Air Quality Management District (MDAQMD) covers the majority of the MDAB. The MDAB is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes. Many of the lower mountains that dot the vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest; however, prevailing winds at the project site may vary. These prevailing winds are caused by the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada to the north; air masses pushed onshore in southern California by differential heating are channeled through the MDAB. The MDAB is separated from the southern California coastal and central California valley regions by mountains (highest elevation approximately 10,000 feet), whose passes form the main channels for these westward-moving air masses.

The Mojave Desert is bordered in the southwest by the San Bernardino Mountains, separated from the San Gabriels by the Cajon Pass (4,200 feet). A lesser channel known as the Morongo Valley lies between the San Bernardino Mountains and the Little San Bernardino Mountains. The Palo Verde Valley portion of the Mojave Desert lies in the low desert, at the eastern end of a series of valleys (notably the Coachella Valley) whose primary channel is the San Gorgonio Pass (2,300 feet) between the San Bernardino and San Jacinto Mountains.

During the summer the MDAB is generally influenced by a Pacific subtropical high cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time they reach the desert. Most desert moisture arrives from infrequent warm, moist and unstable air masses from the south. The MDAB averages between 3 and 7 inches of precipitation per year (from 16 to 30 days with at least 0.01 inch of precipitation). The MDAB is classified as a dry-hot desert climate (BWh), with portions classified as dry, very-hot desert (BWhh), to indicate at least 3 months have maximum average temperatures over 100.4°F (MDAQMD 2009b:7).

4.2.1.2 Existing Air Quality—Criteria Air Pollutants

Concentrations of the following air pollutants are used as indicators of ambient air quality conditions: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter with an aerodynamic resistance diameter of 10 micrometers or less (PM_{10}), fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead. Because these are the most prevalent air pollutants known to be deleterious to human health, and because there is extensive documentation available on health-effects criteria for these pollutants, they are commonly referred to as "criteria air pollutants."

Source types, health effects, and future trends associated with each air pollutant are described below along with the most current attainment area designations and monitoring data for the project area and vicinity.

Ozone

Ozone is a photochemical oxidant, a substance whose oxygen combines chemically with another substance in the presence of sunlight, and the primary component of smog. Ozone is not directly emitted into the air, but is formed through complex chemical reactions between precursor emissions of reactive organic gases (ROG) and oxides of nitrogen (NO_X) in the presence of sunlight. ROG are volatile organic compounds (VOCs) that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that results from the combustion of fuels.

A highly reactive molecule, ozone readily combines with many different components of the atmosphere. Consequently, high levels of ozone tend to exist only while high ROG and NO_X levels are present to sustain the ozone formation process. After the precursors have been depleted, ozone levels rapidly decline. Because these reactions occur on a regional scale, ozone is a regional pollutant.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. Meteorology and terrain play a major role in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and clear skies provide the optimum conditions for formation. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry (Godish 2004:169, 170).

The adverse health effects associated with exposure to ozone pertain primarily to the respiratory system. Scientific evidence indicates that ambient levels of ozone affect not only sensitive receptors, such as asthmatics and children, but healthy adults as well. Exposure to ambient levels of ozone ranging from 0.10 part per million (ppm) to 0.40 ppm for 1–2 hours has been found to significantly alter lung functions by increasing respiratory rates and pulmonary resistance, decreasing tidal volumes (the amount of air inhaled and exhaled), and impairing respiratory mechanics. Ambient levels of ozone above 0.12 ppm are linked to such symptoms as throat dryness, chest tightness, headache, and nausea. In addition to the above adverse health effects, evidence exists relating ozone exposure to an increase in the permeability of respiratory epithelia; such increased permeability leads to an increased response of the respiratory system to challenges, and a decrease in the immune system's ability to defend against infection (Godish 2004:169, 170).

Emissions of the ozone precursors ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. The MDAQMD has experienced a substantial reduction in maximum 8-hour ozone concentrations. The air quality monitoring stations (Barstow and Twentynine Palms) in San Bernardino County closest to the project area have recorded concentrations lower than 0.090 since 2004, and are in fact recently experiencing concentrations in compliance with national standards; however, these stations are approximately 150 miles west of the project area and no recent data has been recorded for ozone in the immediate vicinity of the project area (MDAQMD 2008:8, 9).

Carbon Monoxide

CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources. In fact, 77% of the nationwide CO emissions are from mobile sources. The other 23% consists of CO emissions from wood-burning stoves, incinerators, and industrial sources.

CO enters the bloodstream through the lungs by combining with hemoglobin, which normally supplies oxygen to the cells. However, CO combines with hemoglobin much more readily than oxygen does, resulting in a drastic reduction in the amount of oxygen available to the cells. Adverse health effects associated with exposure to CO concentrations include such symptoms as dizziness, headaches, and fatigue. CO exposure is especially harmful to individuals who suffer from cardiovascular and respiratory diseases (EPA 2009a).

The highest CO concentrations are generally associated with cold, stagnant weather conditions that occur during the winter. In contrast to problems caused by ozone, which tends to be a regional pollutant, CO problems tend to be localized.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (EPA 2009a).The combined emissions of NO and NO_2 are referred to as NO_X and reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local NO_X emission sources.

Inhalation is the most common route of exposure to NO_2. Because NO_2 has relatively low solubility in water, the principal site of toxicity is in the lower respiratory tract. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. An individual may experience a variety of acute symptoms such as coughing, difficulty with breathing, vomiting, headache, and eye irritation during or shortly after exposure. After a period of approximately 4–12 hours, an exposed individual may experience chemical pneumonitis or pulmonary edema with breathing abnormalities, cough, cyanosis, chest pain, and rapid heartbeat. Severe, symptomatic NO_2 intoxication after acute exposure has occasionally been linked with prolonged respiratory impairment with such symptoms as chronic bronchitis and decreased lung function (EPA 2009a).

Sulfur Dioxide

SO_2 is produced by such stationary sources as coal and oil combustion, steel mills, refineries, and pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant; constriction of the bronchioles occurs with inhalation of SO_2 at 5 ppm or more. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources; construction operations; fires and natural windblown dust; and particulate matter formed in the atmosphere by condensation and/or transformation of SO_2 and ROG (EPA 2009a). $PM_{2.5}$ is a subgroup of PM_{10}, consisting of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less (EPA 2009a).

The adverse health effects associated with PM_{10} depend on the specific composition of the particulate matter. For example, health effects may be associated with metals, polycyclic aromatic hydrocarbons, and other toxic substances adsorbed onto fine particulate matter (referred to as the "piggybacking effect"), or with fine dust particles of silica or asbestos. Generally, effects may result from both short-term and long-term exposure to elevated concentrations of PM_{10} and may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, carcinogenesis, and premature death (EPA 2009a). $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and may contain substances that are particularly harmful to human health. Direct emissions of PM_{10} and $PM_{2.5}$ were in nonattainment for the MDAB in 1994. The MDAQMD adopted a PM_{10} attainment plan in 1995 to work toward reducing PM in the MDAB. As of this time, the attainment plan is still in effect and the MDAB is still classified as a nonattainment area (MDAQMD 1995: 1).

Lead

Lead is a metal found naturally in the environment and in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phaseout of leaded gasoline (discussed in detail below), metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the U.S. Environmental Protection Agency (EPA) set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. EPA banned the use of leaded gasoline in highway vehicles in December 1995 (EPA 2009a).

As a result of EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have declined dramatically (95% between 1980 and 1999), and levels of lead in the air decreased by 94% between 1980 and 1999. Transportation sources, primarily airplanes, now contribute only 13% of lead emissions. A National Health and Nutrition Examination Survey reported a 78% decrease in the levels of lead in people's blood between 1976 and 1991. This dramatic decline can be attributed to the move from leaded to unleaded gasoline (EPA 2009a).

The decrease in lead emissions and ambient lead concentrations over the past 25 years is California's most dramatic success story with regard to air quality management. The rapid decrease in lead concentrations can be attributed primarily to phasing out the lead in gasoline. This phaseout began during the 1970s, and subsequent California Air Resource Board (ARB) regulations have virtually eliminated all lead from gasoline now sold in California. All areas of the state are currently designated as attainment for the state lead standard (EPA does not designate areas for the national lead standard). Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose "hot spot" problems in some areas. As a result, ARB identified lead as a TAC.

4.2.1.3 EMISSIONS INVENTORY

Table 4.2-1 summarizes emissions of criteria air pollutants and precursors within San Bernardino County for various source categories. According to San Bernardino County's emissions inventory, mobile sources are the largest contributor to the estimated annual average air pollutant levels of ROG, CO, and NO_X, accounting for approximately 63%, 88%, and 73%, respectively, of the total emissions. Stationary sources of emissions account for approximately 76% of oxides of sulfur (SO_X), while areawide sources account for approximately 73% and 44% of the County's PM_{10} and $PM_{2.5}$ emissions, respectively.

Table 4.2-1 Summary of 2008 Estimated Emissions Inventory for Criteria Air Pollutants and Precursors (San Bernardino County)						
Source Type/Category	Estimated Annual Average Emissions (Tons per Day)					
	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Stationary Sources						
Fuel Combustion	1.27	9.20	24.66	1.75	5.67	4.47
Waste Disposal	4.89	0.08	0.14	0.07	0.26	0.05
Cleaning and Surface Coating	6.59	0.01	0.04	-	0.23	0.22
Petroleum Production and Marketing	5.65	0.02	0.02	0.02	-	-
Industrial Processes	4.31	10.81	39.61	2.83	26.81	14.63
Subtotal (Stationary Sources)	22.72	20.12	64.48	4.66	32.98	19.37
Areawide Sources						
Solvent Evaporation	17.21	-	-	-	-	-
Miscellaneous Processes	8.05	56.21	4.51	0.32	113.82	22.03
Subtotal (Areawide Sources)	25.26	56.21	4.51	0.32	113.82	22.03
Mobile Sources						
On-Road Motor Vehicles	34.8	350.96	126.24	0.33	6.22	4.92
Other Mobile Sources	45.08	182.67	61.74	0.8	3.96	3.44
Subtotal (Mobile Sources)	79.88	533.63	187.98	1.13	10.19	8.35
Total for San Bernardino County	**127.85**	**609.95**	256.96	6.11	156.99	49.76

Notes: ROG = reactive organic gases; CO = carbon monoxide; NO_X = oxides of nitrogen; SO_X = oxides of sulfur; PM_{10} = respirable particulate matter; $PM_{2.5}$ = fine particulate matter
Source: ARB 2010a

4.2.1.4 MONITORING STATION DATA AND ATTAINMENT AREA DESIGNATIONS

Although criteria air pollutant and precursor concentrations are measured at several monitoring stations in the MDAB, the closest monitoring station is run by the Arizona Department of Environmental Quality (ADEQ). The closest MDAQMD monitoring station is located in Twentynine Palms, which is over 100 miles to the southwest of the project site. Measurements recorded at the closest ADEQ monitoring station in Bullhead City, Arizona, located approximately 35 miles north of the project site, are considered representative of the project area. Table 4.2-2 summarizes the air quality data from this monitoring station for the most recent 3 years, 2004 through 2006. Local data for ozone, CO, and $PM_{2.5}$ are not monitored close enough to the project site to serve as relevant background information. Both ARB and EPA use monitoring data to designate areas according to attainment status for criteria air pollutants published by the agencies. The purpose of these designations is to identify areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are “nonattainment,” “attainment,” and “unclassified.” The “unclassified” designation is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California designations include a subcategory of the nonattainment designation, called “nonattainment-transitional.” The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The most recent attainment designations with respect to San Bernardino County are shown in Table 4.2-4 (see the “Regulatory Setting” section below) for each criteria air pollutant.

Table 4.2-2 Summary of Annual Ambient Air Quality Data (2004–2006)—Bullhead City, Arizona			
	2004	2005	2006
Respirable Particulate Matter (PM_{10})			
Maximum concentration ($\mu g/m^3$)	48	48#	72
Number of days state standard exceeded	0	0	0
Number of days national standard exceeded	0	0	0

Notes: # Indicates the data do not satisfy the U.S. Environmental Protection Agency's summary criteria, usually meaning less than 75% valid data recovery available in one or more calendar quarters.
Exceedances caused by natural events are excluded from annual statistics.
$\mu g/m^3$ = micrograms per cubic meter
Local data for ozone, CO, and $PM_{2.5}$ was not available for the project site at the time of this writing.
Sources: ADEQ 2005:31, 47; 2006:31, 47; 2007:31, 47

4.2.1.5 EXISTING ON-SITE EMISSIONS

The project area is currently occupied by the compressor station and IM-3 Facility. The site has an employee population of 35 employees. A traffic study analyzing the daily motor vehicle trips associated with operation of the existing facilities was prepared by Fehr and Peers, Inc. The Urban Emissions (URBEMIS 2007) model, Version 9.2.4, was used to estimate the current operational emissions (i.e., area- and mobile-source) associated with the current site use based on existing facilities and employee vehicle trips. Table 4.2-3 shows the daily operational emissions associated with the existing compressor station and IM-3.

Table 4.2-3 Summary of Modeled Emissions of Criteria Air Pollutants and Precursors Generated by Existing Site Uses					
Source	Maximum Emissions (TPY)				
	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$
Existing Topock Compressor Station and IM-3 Facility (35 employees)					
Area sources	0.1	04	0.2	0.0	0.0
Mobile sources[1]	2.2	0.6	0.3	0.3	0.1
Total Existing Operational Emissions[2]	2.3	1.0	0.5	0.3	0.1

Notes: TPY = tons per year; CO = carbon monoxide; IM-3 Facility = Interim Measure 3 Groundwater Extraction and Treatment Facility; ROG = reactive organic gases; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$ is a subset of PM_{10})
[1] Calculations assume 2.5 trips per day per employee.
[2] Emissions shown represent the maximum annual emissions.
Refer to Appendix 1 for detailed assumptions and modeling output files.
Source: Data modeled by AECOM in 2009

4.2.1.6 EXISTING AIR QUALITY—TOXIC AIR CONTAMINANTS

Concentrations of TACs are also used as indicators of ambient-air-quality conditions. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality* (ARB 2008a), most of the estimated health risk from TACs can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines (i.e., diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but a complex mixture of hundreds of substances. Diesel-fueled internal combustion engines emit diesel PM. The composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and presence or absence of an emission control system.

Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, ARB has made preliminary estimates of concentrations based on a PM exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of diesel PM. In addition to diesel PM, the TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene, none of which would be associated with the proposed project.

Diesel PM poses the greatest health risk among these 10 TACs. Based on receptor modeling techniques, ARB estimated the diesel PM health risk in California in 2000–2010 to be 300 excess cancer cases per million people. The health risk of diesel PM in California is estimated to have been reduced by 17% since 2000 and the total estimated tons per year emitted of diesel PM statewide has been reduced 51% since 1990. In that time levels of all TACs except para-dichlorobenzene, acetaldehyde and formaldehyde have declined (ARB 2008a, 2008b).

Existing Sources of TACs

The closest stationary sources of TACs to the project site include the existing compressor station, three southern California gas company locations, approximately 12–15 miles to the northwest, and Needles Desert Community Hospital, approximately 12 miles northwest, according to ARB's Community Health Air Pollution Information System (ARB 2008c, 2008d). Vehicles on Interstate 40 and U.S. Highway 95 and other roads in the vicinity are sources of diesel PM and other TACs associated with vehicle exhaust.

A rented generator is used at the site of IM-3 and is permitted as California portable equipment through the MDAQMD (CH2M Hill 2006:1-4).

Naturally Occurring Asbestos

Naturally occurring asbestos may be found in at least 44 of California's 58 counties. Asbestos is the name for a group of naturally occurring silicate minerals. Exposure to asbestos may result in inhalation or ingestion of asbestos fibers, which over time may result in damage to the lungs or membranes that cover the lungs, leading to illness or even death.

According to the *General Location Guide for Ultramafic Rocks in California—Areas More Likely to Contain Naturally Occurring Asbestos* (Churchill and Hill 2000), the project site and off-site program elements are not located in areas that are more likely to contain naturally occurring asbestos.

4.2.1.7 EXISTING AIR QUALITY—GREENHOUSE GAS EMISSIONS

Certain gases in the Earth's atmosphere, classified as GHGs, play a critical role in determining the Earth's surface temperature. Solar radiation enters the Earth's atmosphere from space. A portion of the radiation is absorbed by the Earth's surface, and a smaller portion of this radiation is reflected back toward space. The absorbed radiation is then emitted from the Earth, not as high-frequency solar radiation, but lower frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The Earth has a much lower temperature than the sun; therefore, the Earth emits lower frequency (longer wavelength) radiation. Most solar radiation passes through GHGs; however, infrared radiation is selectively absorbed by GHGs. As a result, infrared radiation released from the Earth that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on the Earth. Without the greenhouse effect, the Earth would not be able to support life as we know it.

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated compounds. Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and have led to a trend of unnatural warming of the Earth's climate, known as global climate change or global warming. It is extremely unlikely that global climate change over the past 50 years can be explained without the contribution from human activities (IPCC 2007).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and TACs, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on multiple variables and cannot be pinpointed, it is understood that more CO_2 is currently emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO_2 emissions, approximately 54% is sequestered through ocean uptake, uptake by northern hemisphere forest regrowth, and other terrestrial sinks within a year, whereas the remaining 46% of human-caused CO_2 emissions remains stored in the atmosphere (Seinfeld and Pandis 1998).

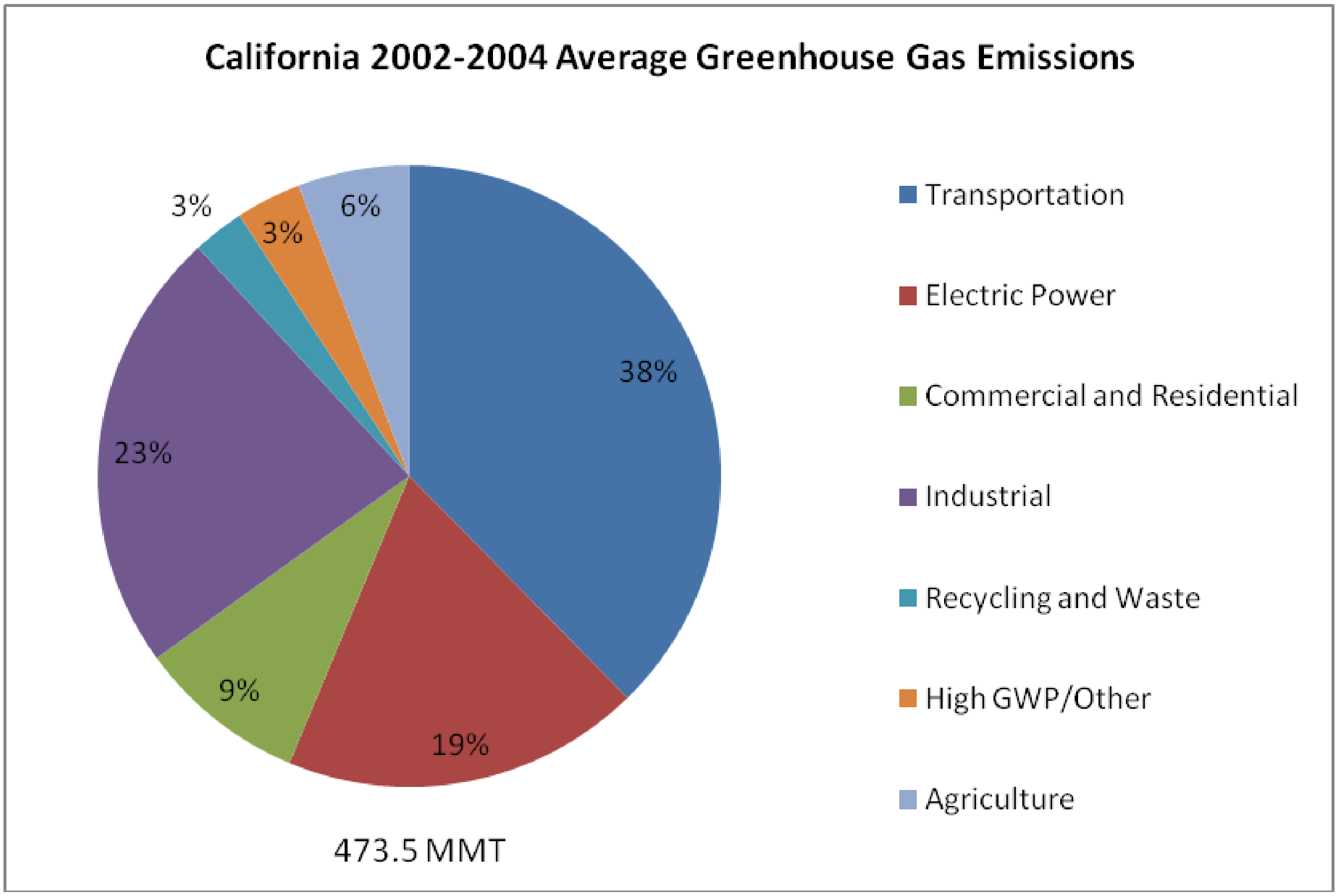
The impacts of GHGs are borne globally and the quantity of GHGs that it takes to ultimately result in climate change is not precisely known. Suffice it to say that the quantity is enormous, and no single project would be expected to measurably contribute to a noticeable incremental change in the global average temperature, or to the global, local, or microclimate.

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors (ARB 2008e). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (ARB 2008e). Emissions of CO_2 are byproducts of fossil fuel combustion. CH_4, a highly potent GHG, results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) largely associated with agricultural practices and landfills. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through photosynthesis and dissolution, respectively, two of the most common processes of CO_2 sequestration.

California is the 12th to 16th largest emitter of CO_2 in the world (CEC 2006a). California produced 484 million gross metric tons of CO_2 equivalent (CO_2e) in 2004 (ARB 2009). CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the global warming potential (GWP) of a GHG, is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, "Calculation References," of the General Reporting Protocol of the California Climate Action Registry (CCAR 2009), 1 ton of CH_4 has the same contribution to the greenhouse effect as approximately 21 tons of CO_2.

Therefore, CH_4 is a much more potent GHG than CO_2. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2004, accounting for 38% of total GHG emissions in the state (ARB 2009). This sector was followed by the electric power sector (including both in-state and out-of-state sources) (19%) and the industrial sector (23%) (ARB 2008h). See Exhibit 4.2-1 below.



Source: ARB 2008h

California's Greenhouse Gas Emissions by Economic Sector (2002-2004 Average) Exhibit 4.2-1

Climate change could affect environmental conditions in California through sea level rise. Sea level rose worldwide approximately 7 inches during the last century (CEC 2006b), and it is predicted to rise an additional 7-22 inches by 2100, depending on the future levels of GHG emissions (IPCC 2007). However, the governor-appointed Delta Vision Blue Ribbon Task Force has recommended the state plan for a scenario of 16 inches of sea level rise by 2050, and 55 inches by 2100 (CNRA 2008). Resultant effects of sea level rise could include increased coastal flooding, saltwater intrusion and disruption of wetlands (CEC 2006b). Some low-lying populated areas throughout the Central Valley and Sacramento-San Joaquin Delta inundated by sea level rise could experience population displacement and economic disruption.

As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the state if suitable conditions are no longer available. Additional concerns associated with climate change are a reduction in the snowpack, leading to less overall water storage in the mountains, the largest "reservoir" in the state, and increased risk of wildfire caused by changes in rainfall patterns and plant communities.

MDAQMD has been proactive in reducing GHG emissions. Currently, within the MDAQMD jurisdiction GHG emissions have been reduced 35% since their baseline year of 2004. In addition, CCAR has named the MDAQMD a climate action leader for the previous 4 years (MDAQMD 2009a).

4.2.1.8 EXISTING AIR QUALITY—ODORS

The project site is in an area that has very little human development. No known odor sources are in the immediate vicinity of the project. If meteorological conditions were right potential sources of odor in the project vicinity could include fumes from Interstate 40 and odors from the community of Topock (e.g., food, sewer treatment, industrial).

4.2.2 REGULATORY BACKGROUND

The project area is located in the Mojave Desert approximately 12 miles southeast of the city of Needles, California, 5 miles south of Golden Shores, Arizona, and 1 mile southeast of the Moabi Regional Park in California. The compressor station is one-half mile west of the community of Topock, Arizona, which is located across the Colorado River from the compressor station. Air quality at the project is regulated by EPA, ARB, the MDAQMD, and San Bernardino County (County). Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable legislation. Although EPA regulations may not be superseded, both state and local regulations may be more stringent. Applicable regulations associated with criteria air pollutant, TAC, and odor emissions are described separately below.

4.2.2.1 CRITERIA AIR POLLUTANTS

Federal Plans, Policies, Regulations, and Laws

EPA has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments made by Congress were in 1990.

The CAA required EPA to establish national ambient air quality standards (NAAQS). As shown in Table 4.2-4, EPA has established primary and secondary NAAQS for ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The primary standards protect the public health and the secondary standards protect public welfare. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins, as reported by their jurisdictional agencies. EPA must review all SIPs to determine whether they conform to the mandates of the CAA and its amendments, and to determine whether implementing them will achieve air quality goals. If EPA determines that an SIP is inadequate, a federal implementation plan that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may cause sanctions to be applied to transportation funding and stationary air pollution sources in the air basin.

Table 4.2-4
Summary of Ambient Air Quality Standards and Attainment Designations

Pollutant	Averaging Time	California		National Standards[1]		
		Standards[2,3]	Attainment[4]	Primary[3,5]	Secondary[3,6]	Attainment Status[7]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	N (Moderate)	–	–	–
	8-hour	0.070 ppm (137 µg/m^3)	–	0.075 ppm (147 µg/m^3)	Same as Primary Standard	N[12]
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	–	U/A
	8-hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	A	0.053 ppm (100 µg/m^3)	Same as Primary Standard	U/A
	1-hour	0.18 ppm (339 µg/m^3)		0.100 ppm	–	–
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	–	0.030 ppm (80 µg/m^3)	–	U
	24-hour	0.04 ppm (105 µg/m^3)	A	0.14 ppm (365 µg/m^3)	–	
	3-hour	–	–	–	0.5 ppm (1300 µg/m^3)	
	1-hour	0.25 ppm (655 µg/m^3)	A	–	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	N	-	Same as Primary Standard	N (Moderate)[8]
	24-hour	50 µg/m^3		150 µg/m^3		
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	N[10]	15 µg/m^3	Same as Primary Standard	U/A
	24-hour	–	–	35 µg/m^3		
Lead[9]	30-day Average	1.5 µg/m^3	A	–	–	–
	Calendar Quarter	–	–	1.5 µg/m^3	Same as Primary Standard	
Sulfates	24-hour	25 µg/m^3	A	No National Standards		
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)	U[11]			
Vinyl Chloride[9]	24-hour	0.01 ppm (26 µg/m^3)	-			

Table 4.2-4
Summary of Ambient Air Quality Standards and Attainment Designations

Pollutant	Averaging Time	California		National Standards [1]		
		Standards [2,3]	Attainment [4]	Primary [3,5]	Secondary [3,6]	Attainment Status [7]
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U		No National Standards	

Notes: $\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million.

1 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact EPA for further clarification and current federal policies.

2 California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

3 Concentration expressed first in units in which it was issued (i.e., ppm or $\mu g/m^3$). Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4 Mohave Desert Air Quality Management District (MDAQMD) portion of San Bernardino County.
Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The state standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of a state standard for that pollutant in the area.
Nonattainment/Transitional (NT) (a subcategory of the nonattainment designation): The area is close to attaining the standard for that pollutant.

5 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

6 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7 MDAQMD portion of San Bernardino County.
Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

8 Nonattainment (portion of MDAQMD in Riverside County is unclassified, and the portion in the Searless Valley is attainment).

9 ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

10 County portion of Federal Ozone Air Quality Management Area is in nonattainment; remainder of MDAQMD jurisdiction is unclassified.

11 Searless Valley portion is in nonattainment; remainder of MDAQMD jurisdiction is unclassified.

12 Antelope Valley and Western Mojave Desert portion of San Bernardino County is in nonattainment; remainder of the county is unclassified/attainment.

Sources: ARB 2008f; EPA 2009b; ARB 2010b

State Plans, Policies, Regulations, and Laws

Arizona

Air quality in the state of Arizona is regulated by the Arizona Department of Environmental Quality, Air Quality Division (DEQ). DEQ has not adopted specific state level standards and instead enforces federal EPA standards. At this time Mohave County is not currently in a nonattainment or maintenance area for any federal pollutant and does not have any additional state or federal regulatory requirements beyond those required at the federal level.

California

ARB is responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required ARB to establish California ambient air quality standards (CAAQS) (Table 4.2-4). ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources, and provides districts with the authority to regulate indirect sources.

Among ARB's other responsibilities are overseeing local air districts' compliance with California and federal laws, approving local air quality plans, submitting SIPs to EPA, monitoring air quality, determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels. There are 15 nonattainment areas for the national ozone standard and two nonattainment areas for the $PM_{2.5}$ standard. The SIP must show how each area will attain the federal standards. To do this, the SIP identifies the amount of pollution emissions that must be reduced in each area to meet the standard and the emission controls needed to reduce the necessary emissions.

ARB and local air districts are currently developing plans for meeting new national air quality standards for ozone and $PM_{2.5}$. The draft State Strategy for California's 2007 SIP was released in April 2007 and the adopted version transmitted to EPA in November 2007 (ARB 2008g).

Regional and Local Plans, Policies, Regulations, and Ordinances

Mojave Desert Air Quality Management District

MDAQMD attains and maintains air quality conditions for the desert portion of San Bernardino County and the far eastern end of Riverside County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean-air strategy of MDAQMD includes preparing plans and programs for the attainment of ambient air-quality standards, adopting and enforcing the rules and regulations concerning sources of air pollution, and issuing permits for stationary sources of air pollution. MDAQMD also inspects stationary sources of air pollution, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by the CAA, CAAA, and CCAA. Air quality plans applicable to the proposed project are discussed below and in Table 4.2-5.

Table 4.2-5 **Summary of Mojave Desert Air Quality Management District Air Quality Plans**			
Pollutant	Plan Title	Date	Status
Ozone	*2004 Ozone Attainment Plan* (State and Federal)	April 26, 2004	Adopted by MDAQMD and ARB in April 26, 2004.
	Draft 2008 Ozone Attainment Plan (Western Mojave Desert Nonattainment Area) (State and Federal)	June 9, 2008	Adopted by MDAQMD and ARB in June 9, 2008.
Nitrogen dioxide (NO_X) and volatile organic compounds (VOC)	*1991 Air Quality Attainment Plan*	August 26, 1991	Adopted by MDAQMD and ARB in August 26, 1991.
	Reasonable Further Progress Rate-Of-Progress Plan	October 26, 1994	Adopted by MDAQMD and ARB in October 26, 1994.
	Post 1996 Attainment Demonstration and Reasonable Further Progress Plan	October 26, 1994	Adopted by MDAQMD and ARB in October 26, 1994.
	Triennial Revision to the 1991 Air Quality Attainment Plan	January 22, 1996	Adopted by MDAQMD and ARB in January 22, 1996.
Respirable and fine particulate matter (PM_{10} and $PM_{2.5}$)	*Mojave Desert Planning Area Federal Particulate Matter Attainment Plan*	July 25, 1995	Adopted by MDAQMD and ARB in July 25, 1995.

Notes: ARB = California Air Resources Board; MDAQMD = Mohave Desert Air Quality Management District.
Source: MDAQMD 2009b:4–5

Air Quality Plans

MDAQMD submitted the *1991 Air Quality Attainment Plan* (AQAP) in compliance with the requirements set forth in the CCAA, which specifically addressed the nonattainment status for ozone and, to a lesser extent, CO and PM_{10}.

The CCAA also requires a triennial assessment of the extent of air quality improvements and emission reductions achieved through the use of control measures. As part of the assessment, the attainment plan must be reviewed and, if necessary, revised to correct for deficiencies in progress and to incorporate new data or projections. The requirement of the CCAA for a first triennial progress report and revision of the 1991 AQAP was fulfilled with the preparation and adoption of the Triennial *Revision to the 1991 Air Quality Attainment Plan* in 1996.

Portions of San Bernardino County not including the project site are part of a Federal Ozone Air Quality Maintenance Area. As a nonattainment area, the region is also required to submit rate-of-progress milestone evaluations in accordance with the CAAA. Milestone reports were prepared for 1994, and 1996, and most recently in 2008 for the 8-hour ozone standard. These milestone reports include compliance demonstrations that the requirements have been met for the MDAQMD. The AQAPs and reports present comprehensive strategies to reduce emissions of ROG, NO_X, and PM_{10} from stationary, area, mobile, and indirect sources. Such strategies include adopting rules and regulations; enhancing CEQA participation; implementing a new and modified indirect-source review program; adopting local air quality plans; and implementing control measures for stationary, mobile, and indirect sources.

Rules and Regulations

- **Rule 201–202: Permits to Construct.** A person shall not build, erect, install, alter or replace any equipment, the use of which may cause the issuance of air contaminants or the use of which may eliminate, reduce or control the issuance of air contaminants without first obtaining written authorization for such construction from the Air Pollution Control Officer (APCO). A permit to construct shall remain in effect until the permit to operate the equipment for which the application was filed is granted or denied, or the application is canceled.

- **Rule 203: Permit to Operate.** A person shall not operate or use any equipment, the use of which may cause the issuance of air contaminants or the use of which may reduce or control the issuance of air contaminants, without first obtaining a written permit from the APCO or except as provided in Rule 202. The equipment shall not be operated contrary to the conditions specified in the permit to operate.

- **Rule 403: Fugitive Dust.** The developer or contractor is required to control dust emissions from earthmoving activities or any other construction activity to prevent airborne dust from leaving the project site.

- **Rule 404: Particulate Matter—Concentration.** A person shall not discharge into the atmosphere from any source, particulate matter except liquid sulfur compounds, in excess of the concentration at standard conditions, shown in Table 404(a). Where the volume discharged is between figures listed in the table, the exact concentration permitted to be discharged shall be determined by linear interpolation.

- **Rule 407: Liquid and Gaseous Air Contaminants.** A person shall not discharge into the atmosphere from any source CO exceeding 2000 ppm measured on a dry basis, averaged over a minimum of 15 consecutive minutes. The provisions of this subsection shall not apply to emissions from internal combustion engines.

- **Rule 462: Organic Liquid Loading.** The purpose of this rule is to limit the emissions of VOC and TACs (such as benzene) from Organic Liquid Loading (any organic liquid, including gasoline), and in conjunction with Rules 461 and 463, limit the emissions from the storage, transfer, and dispensing of organic liquids.

- **Rule 463: Storage of Organic Liquids.** The purpose of this rule is to limit the emissions of VOCs and TACs (such as benzene) during the Storage of Organic Liquids, and in conjunction with Rules 461 and 462, limit the emissions from the storage, transfer, and dispensing of organic liquids, including bulk facilities, retail service stations, and others, the transport of fuels between these facilities and the transfer of fuel into motor vehicle tanks.

- **Rule 475: Electric Power Generating Equipment.** The purpose of this rule is to limit emissions of NO_X and PM from nonmobile, Electric Power Generating Equipment.

- **Rule 1113: Architectural Coatings.** The developer or contractor is required to use coatings that comply with the content limits for VOCs specified in the rule.

- **Rule 1300: New Source Review.** Set forth the requirements for the preconstruction review of all new or modified Facilities.

Mohave County, Arizona General Plan

The adopted *Mohave County, Arizona General Plan* includes the following applicable goals, objectives, and policies from the Natural Resources Element (Mohave County 2005:33–34):

GOAL 1: To increase County efforts to maintain or improve existing air quality.

- **Policy 1.3:** The County should encourage the siting of new industries that do not require a “major source” pollution permit from ADEQ. Major source polluters shall provide the Best Available Demonstrated Control Technology.

GOAL 2: To establish construction and development standards that maintain or improve existing air quality.

- **Policy 2.1:** The County should adopt standards for dust management at construction sites.

- **Policy 2.2**: The County should adopt urban and suburban road construction and surfacing standards that will, to the maximum feasible extent, minimize traffic related dust generation.

- **Policy 2.4:** The County shall require submittal and approval of environmental assessments for major projects with the potential for significant air pollutant discharges, including but not limited to manufacturing or other industrial developments. New proposals will be evaluated with the Arizona Ambient Air Quality Guidelines (for hazardous air pollutants) or better.

County of San Bernardino 2007 General Plan

The adopted *County of San Bernardino 2007 General Plan* includes the following applicable goals, objectives, and policies from the Conservation Element (San Bernardino County 2007:V22-V23,V24,V26):

GOAL CO 4: The County will ensure good air quality for its residents, businesses, and visitors to reduce impacts on human health and the economy.

- **Policy CO 4.1:** Because developments can add to the wind hazard (due to increased dust, the removal of wind breaks, and other factors), the County will require either as mitigation measures in the appropriate environmental analysis required by the County for the development proposal or as conditions of approval if no environmental document is required, that developments in areas identified as susceptible to wind hazards to address site-specific analysis of:

    a. Grading restrictions and/or controls on the basis of soil types, topography or season.
    b. Landscaping methods, plant varieties, and scheduling to maximize successful revegetation.
    c. Dust-control measures during grading,

- **Policy CO 4.2:** Coordinate air quality improvement technologies with the South Coast Air Quality Management District and the MDAQMD to improve air quality through reductions in pollutants from the region.

- **Policy CO 4.5:** Reduce emissions through reduced energy consumption.

    - **Program** 1**:** Implement programs to phase in energy conservation improvements through the annual budget process.

- **Policy CO 4.12:** Provide incentives to promote siting or use of clean air technologies (e.g., fuel cell technologies, renewable energy sources, UV coatings, and hydrogen fuel).

4.2.2.2 TOXIC AIR CONTAMINANTS

Air quality regulations also address TACs, known in federal parlance as hazardous air pollutants (HAPs). In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. EPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of control technologies to limit emissions. These statutes and regulations, in conjunction with additional rules set forth by MDAQMD, establish the regulatory framework for TACs.

Federal Hazardous Air Pollutant Programs

EPA has programs for identifying and regulating HAPs. Title III of the CAAA directed EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP for major sources of HAPs may differ from those for area sources. Major sources are defined as stationary sources with potential to emit more than 10 tons per year of any HAP or more than 25 tons per year of any combination of HAPs; all other sources are considered area sources.

The CAAA called on EPA to issue emissions standards in two phases. In the first phase (1992–2000), EPA developed technology-based emissions standards designed to reduce emissions as much as feasible. These standards are generally referred to as requiring maximum available control technology. For area sources, the standards may be different, based on generally available control technology. In the second phase (2001–2008), EPA is required to issue health risk–based emissions standards where deemed necessary to address risks remaining after implementation of the technology-based NESHAP standards.

The CAAA also required EPA to issue vehicle or fuel standards containing reasonable requirements that control toxic emissions of, at a minimum, benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

State and Local Programs for Toxic Air Contaminants

Arizona

On January 1, 2007, a new Arizona State HAP Program became effective. As required by Arizona Revised Statutes (A.R.S.) Section 49-426.06, the program requires certain new and modified sources of HAP emissions to install control technology in order to reduce the risk those emissions pose to human health. Sources subject to the program that are able to demonstrate through a risk management analysis (RMA) that their emissions will not adversely affect human health are eligible for an exemption from the control technology requirement.

California

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807 [Chapter 1047, Statutes of 1983]) and the Air Toxics Hot Spots Information and Assessment Act (AB 2588 [Chapter 1252, Statutes of 1987]). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs and adopted EPA's list of HAPs as TACs. Most recently, particulate matter emissions from diesel PM was added to the ARB list of TACs.

Once a TAC is identified, ARB then adopts an airborne toxics control measure for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate best available control technology (BACT) to minimize emissions; for example, the airborne toxics control measure limits truck idling to 5 minutes (Title 13, Section 2485 of the California Code of Regulations [CCR]).

The Air Toxics Hot Spots Information and Assessment Act requires that existing facilities that emit toxic substances above a specified level prepare an inventory of toxic emissions, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

ARB has adopted control measures for diesel PM and more stringent emissions standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators). In February 2000, ARB adopted a new rule for public-transit bus fleets and emissions standards for new urban buses. These new rules and standards include all of the following elements:

- more stringent emission standards for some new urban bus engines, beginning with 2002 model year engines;

- zero-emission bus demonstration and purchase requirements applicable to transit agencies; and
- reporting requirements, under which transit agencies must demonstrate compliance with the public-transit bus fleet rule.

Recent and future milestones include the low-sulfur diesel fuel requirement and tighter emissions standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide. Over time, replacing older vehicles will result in a vehicle fleet that produces substantially lower levels of TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1,3-butadiene, diesel PM) have been reduced significantly over the last decade and will be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With implementation of ARB's Risk Reduction Plan, it is expected that diesel PM concentrations will be reduced by 75% in 2010 and 85% in 2020 from the estimated year-2000 level. Adopted regulations are also expected to continue to reduce formaldehyde emissions from cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

In addition, the *Air Quality and Land Use Handbook: A Community Health Perspective* (handbook) provides guidance on land use compatibility with sources of TACs (ARB 2005). The handbook is not a law or adopted policy but offers advisory recommendations for the siting of sensitive receptors near uses associated with TACs, such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries, dry cleaners, gasoline stations, and industrial facilities, to help keep children and other sensitive populations out of harm's way.

At the local level, air pollution control or management districts may adopt and enforce ARB control measures. Under MDAQMD Rule 1300 (New Source Review), and Rule 1200 (Federal Operating Permit), all sources that possess the potential to emit TACs must obtain permits from MDAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new-source review standards and air toxics control measures. MDAQMD limits emissions and public exposure to TACs through a number of programs. MDAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

Sources that require a permit are analyzed by MDAQMD based on their potential to emit toxics. If it is determined that the project will emit toxics in excess of MDAQMDs threshold of significance for TACs, as identified below, sources have to implement the best available control technology for TACs (T-BACT) to reduce emissions. If a source cannot reduce the risk below the threshold of significance even after T-BACT has been implemented, MDAQMD will deny the permit required by the source. This helps to prevent new problems and reduces emissions from existing older sources by requiring them to apply new technology when retrofitting with respect to TACs. It is important to note that the air quality permitting process applies only to stationary sources; properties that may be exposed to elevated levels of TACs from nonstationary sources (e.g., vehicles) and the nonstationary sources themselves are not subject to this process or to any requirements of T-BACT implementation. Rather, emissions controls on nonstationary sources are subject to regulations implemented on the state and federal level.

Rule 1520: Control of Toxic Air Contaminants from Existing Sources. The purpose of this rule is to:

(a) Reduce the health risk associated with emissions of toxic air contaminants from existing Facilities; and

(b) Ensure that any new or existing Facility is required to control the emissions of Toxic Air Contaminants or Regulated Toxic Substances as required pursuant to Part 6 of Division 26 of the California Health and Safety Code (commencing with Section 44300).

4.2.2.3 ODORS

Typically odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from the psychological (i.e., irritation, anger, anxiety) to the physiological (e.g., circulatory and respiratory effects, nausea, vomiting, headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals can smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor: an odor that is offensive to one person may be perfectly acceptable to another (i.e., fast food). Also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and can recognize it again only if the intensity increases.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

MDAQMD's Rule 402 (Nuisance) addresses odor exposure in the project area. MDAQMD recommends that odor impacts be addressed in a qualitative manner. Such an analysis shall determine if the proposed project results in excessive nuisance odors, as defined under the CCR, Health and Safety Code Section 41700, air quality public nuisance.

4.2.2.4 GREENHOUSE GAS EMISSIONS

Federal Greenhouse Gas Programs

Supreme Court Ruling

The Supreme Court of the United States ruled on April 2, 2007, that CO_2 is an air pollutant as defined under the CAA, and that EPA has the authority to regulate emissions of GHGs. However, as of the date of publication of this EIR, there are no federal regulations or policies regarding GHG emissions applicable to the proposed project.

EPA Actions

In response to the mounting issue of climate change, EPA has taken actions to regulate, monitor, and potentially reduce GHG emissions.

Mandatory Greenhouse Gas Reporting Rule

On September 22, 2009, EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the United States. In general, this national reporting requirement will provide EPA with accurate and timely GHG emissions data from facilities that emit 25,000 metric tons or more of CO_2 per year. This publically available data will allow the reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. Reporting is at the facility level, except that certain suppliers of fossil fuels and industrial greenhouse gases along with vehicle and engine manufacturers will report at the corporate level. An estimated 85% of the total U.S. GHG emissions, from approximately 10,000 facilities, are covered by this final rule.

Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act

On December 7, 2009, EPA adopted its Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CCA (Endangerment Finding). The Endangerment Finding is based on Section 202(a) of the CAA, which states that the Administrator (of EPA) should regulate and develop standards for "emission[s] of air pollution from any class of classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The rule addresses Section 202(a) in two distinct findings. The first addresses whether or not the concentrations of the six key GHGs (i.e., CO_2, CH_4, N_2O, hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF_6]) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and therefore the threat of climate change.

The Administrator found that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the CCA. The evidence supporting this finding consists of human activity resulting in "high atmospheric levels" of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wild fires, droughts, sea level rise, higher intensity storms) are a threat to the public health and welfare. Therefore, GHGs were found to endanger the public health and welfare of current and future generations.

The Administrator also found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHGs fit within the CAA definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements but rather allow EPA to finalize the GHG standards proposed earlier in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation.

Arizona Climate Change Initiatives

On Sept. 8, 2006, Arizona Governor Napolitano signed Executive Order 2006-13, which established a statewide goal to reduce Arizona's future GHG emissions to the 2000 emissions level by the year 2020, and to 50% below the 2000 level by 2040. The executive order also created the Climate Change Executive Committee under the direction of the ADEQ to begin implementing action plan recommendations.

In addition to these two key actions, Executive Order 2006-13 also issued the following directives:

- ADEQ is to develop a GHG emissions reporting mechanism and establish a multi-state registry.
- ADEQ and the Arizona Department of Transportation (ADOT) are to adopt the Clean Car Program in Arizona.
- ADEQ and the Arizona Department of Weights and Measures are to develop standards for biodiesel and ethanol sold in Arizona.
- ADOT is to implement a pilot program for hybrids in High Occupancy Vehicle (HOV) lanes.
- The Arizona Department of Administration (ADOA) is to convert the state vehicle fleet to low-GHG-emissions vehicles.

California Greenhouse Gas Programs

Various statewide and local initiatives to reduce the state's contribution to GHG emissions have raised awareness that, even though the various contributors to and consequences of global climate change are not yet fully understood, global climate change is occurring, and a real potential exists for severe adverse environmental, social, and economic effects in the long term. Because every nation emits GHGs and therefore makes an incremental cumulative contribution to global climate change, cooperation on a global scale will be required to reduce the rate of GHG emissions to a level that can help slow or stop the human-caused increase in average global temperatures and associated changes in climatic conditions.

Assembly Bill 1493

In 2002, then-Governor Gray Davis signed AB 1493. AB 1493 requires that ARB develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by ARB to be vehicles whose primary use is noncommercial personal transportation in the state."

To meet the requirements of AB 1493, in 2004 ARB approved amendments to the CCR adding GHG emissions standards to California's existing standards for motor vehicle emissions. Amendments to CCR Title 13, Sections 1900 and 1961 (13 CCR 1900, 1961), and adoption of Section 1961.1 (13 CCR 1961.1) require automobile manufacturers to meet fleet-average GHG emissions limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes (i.e., any medium-duty vehicle with a gross vehicle weight rating less than 10,000 pounds that is designed primarily for the transportation of persons), beginning with the 2009 model year. For passenger cars and light-duty trucks with a loaded vehicle weight of 3,750 pounds or less, the GHG emission limits for the 2016 model year are approximately 37% lower than the limits for the first year of the regulations, the 2009 model year. For light-duty trucks with a loaded vehicle weight of 3,751 pounds to gross vehicle weight of 8,500 pounds, as well as medium-duty passenger vehicles, GHG emissions would be reduced approximately 24% between 2009 and 2016.

In December 2004, a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufacturers filed suit against ARB to prevent enforcement of 13 CCR Sections 1900 and 1961 as amended by AB 1493 and 13 CCR 1961.1 (*Central Valley Chrysler-Jeep et al. v. Catherine E. Witherspoon, in Her Official Capacity as Executive Director of the California Air Resources Board, et al.*). The auto-makers' suit in the U.S. District Court for the Eastern District of California, contended California's implementation of regulations that, in effect, regulate vehicle fuel economy violates various federal laws, regulations, and policies.

On December 12, 2007, the Court found that if California receives appropriate authorization from EPA (the last remaining factor in enforcing the standard), these regulations would be consistent with and have the force of federal law, thus, rejecting the automakers' claim. This authorization to implement more stringent standards in California was requested in the form of a CAA Section 209, subsection (b) waiver in 2005. Since that time, EPA failed to act on granting California authorization to implement the standards. Governor Schwarzenegger and Attorney General Edmund G. Brown filed suit against EPA for the delay. In December 2007, EPA Administrator Stephen Johnson denied California's request for the waiver to implement AB 1493. Johnson cited the need for a national approach to reducing GHG emissions, the lack of a "need to meet compelling and extraordinary conditions," and the emissions reductions that would be achieved through the Energy Independence and Security Act of 2007 as the reasoning for the denial (Office of the White House 2009).

The state of California filed suit against EPA for its decision to deny the CAA waiver. Then the Obama administration directed EPA to reexamine its position for denial of California's CAA waiver and for its past opposition to GHG emissions regulation. California received the waiver on June 30, 2009.

Executive Order S-3-05

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the executive order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80% below the 1990 level by 2050.

The executive order directed the Secretary of the California Environmental Protection Agency (Cal/EPA) to coordinate a multiagency effort to reduce greenhouse gas emissions to the target levels. The Secretary will also submit biannual reports to the governor and state legislature describing progress made toward reaching the emission targets; impacts of global warming on California's resources; and mitigation and adaptation plans to combat these impacts. To comply with the executive order, the Secretary of the Cal/EPA created the California Climate Action Team made up of members from various state agencies and commission. The California Climate Action Team released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

Assembly Bill 32, the California Global Warming Solutions Act of 2006

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

AB 32 Climate Change Scoping Plan

In December 2008, ARB adopted its *Climate Change Scoping Plan*, which contains the main strategies California will implement to achieve reduction of approximately 169 million metric tons (MMT) of CO_2e, or approximately 30% from the state's projected 2020 emission level of 596 MMT of CO_2e under a business-as-usual scenario (this is a reduction of 42 MMT CO_2e, or almost 10%, from 2002-2004 average emissions). The *Scoping Plan* also includes ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The Scoping Plan calls for the largest reductions in GHG emissions to be achieved by implementing the following measures and standards:

- improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2e),
- the Low-Carbon Fuel Standard (15.0 MMT CO_2e),
- energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO_2e), and

- a renewable portfolio standard for electricity production (21.3 MMT CO_2e).

ARB has not yet determined what amount of GHG reductions it recommends from local government operations; however, the *Scoping Plan* does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. (Meanwhile, ARB is also developing an additional protocol for community emissions.) ARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The *Scoping Plan* states that the ultimate GHG reduction assignment to local government operations is to be determined (ARB 2008h). With regard to land use planning, the *Scoping Plan* expects approximately 5.0 MMT CO_2e will be achieved associated with implementation of SB 375, which is discussed further below.

Executive Order S-1-07

Executive Order S-1-07, which was signed by Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, at over 40% of statewide emissions. It establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10% by 2020. This order also directed ARB to determine if this Low Carbon Fuel Standard could be adopted as a discrete early action measure after meeting the mandates in AB 32. ARB adopted the LCFS on April 23, 2009.

Senate Bill 1368

Senate Bill (SB) 1368 is the companion bill of AB 32 and was signed by Governor Schwarzenegger in September 2006. SB 1368 requires the California Public Utilities Commission (CPUC) to establish a GHG emission performance standard for base-load generation from investor-owned utilities by February 1, 2007. The California Energy Commission (CEC) must establish a similar standard for local utilities that are publicly owned by June 30, 2007. These standards cannot exceed the GHG emission rate from a base-load combined-cycle plant that is fired by natural gas. The legislation further requires that all electricity provided to California, including imported electricity, be generated from plants that meet the standards set by the California Public Utilities Commission and California Energy Commission.

Senate Bill 97

SB 97, signed August 2007, acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the California Office of Planning and Research (OPR) to prepare, develop, and transmit to the Natural Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA by July 1, 2009. The California Natural Resources Agency (CNRA) adopted those guidelines on December 30, 2009. On February 16, 2010, the Office of Administrative Law filed the Amendments with the Secretary of State. The Amendments became effective on March 18, 2010.

Generally, the new Guidelines apply CEQA's existing rules for impact analysis to the topic of GHG emissions, specifying in several instances, for example, that determinations on GHG emissions must be supported by substantial evidence, as with other CEQA determinations. The new Guidelines do not propose a particular threshold of significance to be applied in determining whether a project's contribution to global climate change is significant. Rather, they provide guidance on determining the significance of impacts resulting from a project's greenhouse gas emissions, as well as appropriate mitigation measures (new Guidelines 15064.4 and 15126.4). The new Guidelines also indicate that lead agencies have discretion to determine which type of methodology to use to evaluate greenhouse gas emissions, given that such methodologies are evolving (new Guideline 15064.4).

Senate Bills 1078 and 107 and Executive Order S-14-08

SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20% of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In November 2008 Governor Schwarzenegger signed Executive Order S-14-08, which expands the state's Renewable Energy Standard to 33% renewable power by 2020. Governor Schwarzenegger plans to propose legislative language that will codify the new higher standard (Office of the Governor 2008).

Senate Bill 375

SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's regional transportation plan (RTP). ARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every 8 years, but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

This bill also extends the minimum time period for the Regional Housing Needs Allocation cycle from 5 to 8 years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of CEQA would incentivize qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

4.2.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.2.3.1 ANALYSIS METHODOLOGY

The method of air quality analysis used in this section is consistent with recommendations of EPA, ARB, and MDAQMD. This impact analysis includes a discussion and analysis of the changes in pollutant emissions from the construction, operation, and decommissioning of the project, which is described in Chapter 3 of this EIR.

4.2.3.2 THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines and MDAQMD guidance (MDAQMD 2009b:10), implementation of the proposed project would have a significant impact on air quality if:

- short-term construction-related emissions of criteria air pollutants or precursors violate an air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations:
  - PM_{10} and $PM_{2.5}$: exceedance of the MDAQMD-recommended threshold of 15 tons per year (TPY) or 82 pounds per day (lb/day);
  - ROG and NO_X: exceedance of the MDAQMD-recommended threshold of 25 TPY or 137 lb/day;
- long-term operations-related (regional) emissions of criteria air pollutants or precursors violate an air quality standard or contribute substantially to an existing or projected air quality violation, expose sensitive receptors

to substantial pollutant concentrations, or conflict with or obstruct implementation of the applicable air quality plan:

- PM_{10} and $PM_{2.5}$: exceedance of the MDAQMD-recommended threshold of 15 TPY or 82 lb/day;
- ROG and NO_X: exceedance of the MDAQMD-recommended threshold of 25 TPY or 137 lb/day;
- CO: exceedance of MDAQMD-recommended threshold of 100 TPY or 548 lb/day;

► long-term operations-related (local) emissions of criteria air pollutants or precursors violate any air quality standard or contribute substantially to an existing or projected air quality violation or expose sensitive receptors to substantial pollutant concentrations (i.e., for CO, if emissions exceed the 20 ppm (1-hour) or 9 ppm (8-hour) standards);

► short-term construction-related or long-term operations-related emissions of TACs expose sensitive receptors to substantial pollutant concentrations (i.e., exposure to a TAC identified by ARB and/or EPA would exceed 10 persons in 1 million for excess cancer risk or one hazard index for noncancer risk at the maximally exposed individual); or

► short-term construction activities or long-term operations create objectionable odors affecting a substantial number or people; specifically, if project implementation would locate sensitive receptors near an existing odor source where there has been either one confirmed or three unconfirmed complaints per year, averaged over 3 years, from existing receptors that are as close to the odor source as the project; or from existing receptors near a similar facility known to produce objectionable odors and considering distance, frequency, and odor control, where there is currently no nearby development.

It should be noted that by using the above-listed thresholds of significance, the project would comply with California's regulations and no violation of Arizona air quality regulations would occur because California regulations currently are stricter for all pollutants than those of Arizona, which are consistent with federal standards.

4.2.3.3 ASSESSMENT OF GREENHOUSE GAS EMISSIONS

The MDAPCD has not adopted a significance threshold for analyzing GHG emissions generated by a proposed project for land use development or a methodology for analyzing impacts related to GHG emissions or global climate change. Though, by adoption of AB 32 and SB 97, the state of California has identified GHG reduction goals and that the effect of GHG emissions as they relate to global climate change is inherently an adverse environmental impact issue. While the emissions of one single project will not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative impact with respect to global climate change. For this reason, the project's impact on global climate changes is addressed in Chapter 6, "Cumulative Impacts."

To meet AB 32 goals, California would need to generate less GHG emissions than current levels. It is recognized, however, that for most projects there is no simple metric available to determine if a single project would substantially increase or decrease overall GHG emission levels.

OPR has provided proposed amendments to the CEQA Guidelines, including Appendix G, to address impacts of GHG emissions, as directed by SB 97 (2007). These proposed amendments were approved by the California Natural Resources Agency on December 30, 2009, and became effective March 18, 2010. The Guidelines do not set specific quantitative thresholds, rather, the Guidelines identify items that an agency may consider when making a significance determination on the impact of the project's GHG emissions. Such considerations might include, but are not limited to, the extent to which a project would result in an increase or decrease in GHG emissions or the extent to which a project is consistent with a plan for reduction of GHGs. The amendments include the following additions to Appendix G. An impact related to global climate change is considered significant if the proposed project would:

- generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment or
- conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

For the purposes of this EIR, DTSC has decided to quantify total GHG emissions from the proposed project and determine whether the associated emissions would substantially help or hinder the state's ability to attain the goals identified in AB 32 (i.e., reduction of statewide GHG emissions to 1990 levels by 2020).

4.2.3.4 IMPACT ANALYSIS

IMPACT AIR-1 Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors. *Construction of the proposed project would result in emissions that do not exceed MDAQMD's thresholds for ROG, NO_X, and $PM_{2.5}$, but that do exceed MDAQMD's threshold of significance for PM_{10} (82 lb/day). As a result, this impact would be* ***significant****.*

Construction-related emissions, which would be short-term or temporary in duration, have the potential to cause a significant air quality impact. Project construction would result in emissions of criteria air pollutants (e.g., PM_{10}) and precursors (e.g., ROG and NO_X). Emissions of ROG and NO_X associated with project construction and operations and maintenance were modeled using the ARB-approved URBEMIS 2007 Version 9.2.4 computer program (Rimpo and Associates 2008) as recommended by MDAQMD. URBEMIS is designed to model construction emissions for land use development projects and allows for the input of project-specific information.

To provide an assessment of potential air quality impacts during construction activity, construction of the proposed project was considered in two phases: well construction and water conveyance/utilities/roadways construction. Each phase is composed of a number of elements. Well construction would include site preparation (e.g., grading, clearing) of approximately one-half acre per well (up to 170 wells) and installation of each well. Well construction would take approximately 1 day to 5 weeks per well depending on depth and soil content (2 1/2 weeks was assumed for modeling purposes). Equipment needed for well installation would include a drilling auger, support truck, forklift, graders, bulldozers, excavators, backhoes, cranes, man-lifts, compressors, trucks, and pickups. If construction occurs at night, consistent with the restrictions proposed in Section 4.9, "Noise," generators and temporary light plants may be employed to provide safe working conditions. Linear features such as pipelines for water conveyance and electric lines/utility poles would consist of approximately 50,000 linear feet. The additional roadway network would be approximately 6,000 linear feet.

Land-disturbing activities (e.g., grading, earth movement) would occur during construction, which would include wells, roads, pipelines, utility installations, and other associated infrastructure. Construction of the proposed facilities is estimated to take approximately 3 years to complete. BMPs, such as watering for dust suppression, would be employed in the staging areas as necessary to control materials, dust, stormwater, erosion, construction vehicles, and equipment.

Emissions of Ozone Precursors

Emissions of NO_X would be associated primarily with exhaust from off-road construction equipment (e.g., gas and diesel). Secondary sources of NO_X emissions would include on-road trucks for import and export of materials and worker commuting. Worker commute trips in gasoline-fueled vehicles and application of architectural coatings would be the principal sources of ROG, with additional ROG coming from off- and on-road construction equipment. Please see Appendix AQ for detailed modeling assumptions and inputs.

Emissions of Fugitive Dust

Emissions of fugitive PM dust (e.g., PM_{10} and $PM_{2.5}$) are associated primarily with ground disturbance occurring during site preparation (e.g., demolition, remediation, and grading). The amount of fugitive dust emitted depends on such factors as soil silt content, soil moisture, wind speed, acreage of disturbance area, and vehicle miles traveled on- and off-site. Exhaust emissions from diesel equipment and worker commute trips also contribute to short-term increases in PM_{10} and $PM_{2.5}$ emissions, but to a much lesser extent (i.e., less than 1%).

Table 4.2-6 summarizes the modeled emissions of criteria air pollutants and ozone precursors from project construction. Construction-related air quality impacts were determined by comparing these modeling results with applicable MDAQMD significance thresholds.

Table 4.2-6
Summary of Modeled Annual Emissions of Criteria Air Pollutants and Precursors
Construction of the Proposed Project

Phase/Year	Emissions (lb/day)			
	ROG	NO_X	PM_{10}	$PM_{2.5}$
Total Unmitigated Emissions—2011	10.5	79.5	**218.1**	48.7
Total Unmitigated Emissions—2012	9.9	73.9	**217.7**	48.4
Total Unmitigated Emissions—2013	5.5	43.0	**215.8**	46.6
Total Unmitigated Emissions—2014	5.2	39.0	**215.5**	46.4
MDAQMD Significance Threshold	137.0	137.0	82.0	82.0

Notes:
NO_X = oxides of nitrogen; $PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; ROG = reactive organic gases; MDAQMD = Mojave Desert Air Quality Management District; lb/day= pounds per day
Bold indicates a value greater than the significance threshold.
Refer to Appendix AQ for detailed assumptions and modeling output files.
Source: Data modeled by AECOM in 2010

As shown in Table 4.2-6, construction-related activities during 2010 -2014 would not generate daily unmitigated ROG, NO_X, or $PM_{2.5}$ emissions that exceed the applicable MDAQMD threshold of 137, 137, or 82 lb/day, respectively. Please see Appendix AQ for detailed assumptions regarding construction equipment and material hauling. However, construction activities would be anticipated to exceed the applicable MDAQMD threshold of 82 lb/day of PM_{10}.

Construction-related impacts would also occur during the operational phase. Specifically, ongoing maintenance activities would occur, which could include replacement of wells that are no longer functioning adequately. The emissions from these activities under the operational phase of the proposed project would be less intense than those of the construction phase of the proposed project. Emissions related to the further long-term maintenance and replacement of wells would be related to heavy-duty equipment activity and hauling of debris from the project site. The magnitude of construction-related impacts during operations and maintenance would be less than those related to initial construction of the project and therefore emissions would also be below MDAQMD significance thresholds (see Table 4.2-6 below and Appendix AQ for modeling results).

The decommissioning phase of facilities would be less intense than the initial construction phase. Emissions related to the decommissioning would be related to heavy-duty equipment activity and hauling of debris from the project site. The magnitude of decommissioning operations would be less than those related to construction and therefore emissions would also be below MDAQMD significance thresholds (see Table 4.2-6 above and Appendix AQ for modeling results).

Based on the modeling results for the project, project construction, operations and maintenance, and decommissioning activities would not generate emissions of ROG, NO_X, and $PM_{2.5}$ that exceed MDAQMD's thresholds of significance. However, project construction would result in emissions that exceed MDAQMD's threshold of significance for PM_{10} (82 lb/day). Fugitive dust (i.e. PM_{10}) control measures (e.g., watering for dust suppression) would need to be implemented for any construction and demolition activity. Project-generated emissions of criteria air pollutants and ozone precursors could violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, and/or conflict with air quality planning efforts. As a result, this impact would be **potentially significant (Impact AIR-1)**.

Mitigation Measure AIR-1: Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors.

PG&E shall implement the fugitive dust control measures below for any construction and/or demolition activities:

- Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient;
- Cover loaded haul vehicles while operating on publicly maintained paved surfaces;
- Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;
- Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours; and
- Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.

Timing:	During all construction and demolition activities in the project area.
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC shall be responsible for ensuring compliance.
Significance after Mitigation:	The above-identified measures would be anticipated to reduce fugitive dust (PM_{10}) emissions by a minimum of 75%. Thus, postmitigation, PM_{10} emissions would be substantially reduced to below MDAQMD's threshold of 82 lb/day. The significance of compliance with required fugitive dust controls after mitigation is **less than significant** on the air quality of the project area.

Long-Term Operations-Related (Regional) Emissions of Criteria Air Pollutants and Precursors. *To receive a permit, stationary sources must meet applicable standards. Mobile sources would be well below applicable standards. Therefore, mobile and stationary operation-related activities would not result in project-generated emissions of criteria pollutants and ozone precursors that exceed the applicable thresholds. As a result, this impact would be less than significant.*

The proposed project consists of installing, operating, maintaining, and decommissioning groundwater extraction and injection wells, conveyance piping and utilities, and monitoring. New or improved existing roadways would also be constructed and maintained to provide access to the various elements (wells, conveyance piping, and treatment plant).

Emissions associated with operations and maintenance, decommissioning activities, and from mobile sources present the potential for a long-term air quality impact.

Mobile-Source Emissions

Project-generated, regional area and mobile source emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ were modeled using the URBEMIS 2007 Version 9.2.4 computer program. URBEMIS allows land use selections that include project-specific location and trip generation rates. URBEMIS accounts for mobile source emissions that are associated with vehicle trip generation for the facility staff, material delivery, and other trips associated with the project (e.g., removal of waste to off-site facilities). Trip generation data is taken from the project description and the traffic analysis conducted for this project. Full project operations were analyzed for the year 2011 as the first year of operation, even though the project would not likely become fully operational until 2014. Mobile-source mission factors would be lower in 2014 because of more stringent emissions control technologies for motor vehicles and fleet turnover. Thus, the model results summarized in Table 4.2-7 are considered worst case.

Table 4.2-7 summarizes the modeled operations-related emissions of criteria air pollutants and ozone precursors associated with operation of the new wells and treatment facilities. The significance of operations-related air quality impacts was determined by comparing these modeling results with applicable significance thresholds.

Table 4.2-7
Operations-Related Regional Emissions of Criteria Air Pollutants

Source	Emissions			
	ROG (TPY)	NO_X (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
Mobile Sources	0.1	0.1	0.0	0.0
Total Unmitigated Emissions—2011	0.1	0.1	0.0	0.0
MDAQMD Threshold of Significance	**25 TPY**	**25 TPY**	**15 TPY**	**15 TPY**

Notes: NO_X = oxides of nitrogen; $PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; ROG = reactive organic gases; MDAQMD = Mojave Desert Air Quality Management District; lb/day= pounds per day; TPY = tons per year.
Totals may not add up due to rounding.
Refer to Appendix AQ for detailed assumptions and modeling output files.
Source: Data modeled by AECOM 2010.

As shown in Table 4.2-7, operation-related activities would not result in project-generated emissions of criteria air pollutants or ozone precursors that exceed MDAQMD's applicable thresholds of significance. In addition, MDAQMD relies, to a certain degree, on land use designations contained in general plan documents applicable to its jurisdiction. MDAQMD refers to the contents of approved general plans in order to forecast, inventory, and allocate regional emissions from land use and development-related sources. These emissions budgets are used in statewide air quality attainment planning efforts and in the development of project level mass emissions thresholds. Because the proposed project is consistent with the land use designations contained in the *County of San Bernardino 2007 General Plan*, (See Section 4.8, "Land Use and Planning") emissions associated with the proposed land uses would have been accounted for in regional air quality planning efforts.

Stationary-Source Emissions

The proposed project would include stationary sources of pollutants that would be required to obtain permits to operate under MDAQMD Regulation 203 (Permit to Operate) and 1300 (New Source Review). These sources would include, but not be limited to, pumps and generators.

The permit process would assure that all project-related stationary sources would be equipped with the required emission controls including approved BACT, and that, individually; these sources would not cause a significant environmental impact. The emissions from these sources would be additive to the estimated nominal mobile-source emissions discussed above. Based on the fact that in order to receive a permit, stationary sources must meet applicable standards and the fact that mobile sources would be well below applicable thresholds (see Table 4.2-7); mobile and stationary operation-related activities would not result in project-generated emissions of criteria pollutants and ozone precursors that exceed the applicable thresholds. Thus, the proposed project would not violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, or conflict with air quality planning efforts. As a result, this impact would be **less than significant**. No mitigation would be required.

> Long-Term Operations-Related (Local) CO Emissions. *At this time no ambient CO monitoring data is available for the project area, however it is expected that the 1-hour ppm of CO in the project area would be less than 3 ppm/1-hr, based on typical concentrations in outlying areas (SMAQMD 2004). The anticipated 1-hour and 8-hour CO concentrations would be less than CAAQS and NAAQS. As a result, this impact would be less than significant.*

CO concentration is a direct function of motor vehicle activity (e.g., idling time and traffic flow conditions); particularly during peak commute hours, and local meteorological conditions. Under specific meteorological conditions (e.g., stable conditions that result in poor dispersion of pollutants), CO concentrations may reach unhealthy levels with respect to local sensitive land-uses such as residential areas, schools, and hospitals. As a result, MDAQMD recommends analysis of CO emissions at a local rather than a regional level. Because the proposed project would not involve the addition of traffic to congested intersections operating at poor level of service (LOS), localized CO concentrations are expected to be well-below the AAQS.

CO concentrations tend to be higher in urban areas where there are many mobile-source emissions. CO hotspots, or pockets where the CO concentration exceeds the NAAQS and/or CAAQS, have been found to occur only at signalized intersections that operate at or below LOS E during peak-hours (Garza et. al 1997). The project site is located in a remote area that is not affected by heavy traffic or long idling times that are typically associated with CO hotspots. In addition, project-generated traffic would not substantially affect any signalized intersections that operate at LOS E or LOS F under cumulative conditions with and without the project (see Table 4.10-11 in Section 4.10, “Transportation”).

Thus, long-term operation of the proposed project would not result in the generation of local CO emissions that violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, or conflict with air quality planning efforts. As a result, this impact would be **less than significant**. No mitigation would be required.

> Short-Term Construction-Related and Long-Term Operations-Related Emissions of TACs. *The project construction period of approximately 3 years would be much less than the 70-year period used for risk determination, and the equipment would be located at distances greater than 1,000 feet from the sensitive receptors as recommended by MDAQMD for significance determination. This would be less than significant. During the permitting process MDAQMD would analyze such sources (e.g., by preparing a health risk assessment) based on their potential to emit TACs. If it is determined that the sources would emit TACs in excess of MDAQMD’s applicable significance threshold, MACT or T-BACT would be implemented in order to reduce emissions. If the implementation of MACT or T-BACT would not reduce the risk below the*

applicable threshold, the MDAQMD would deny the operating permit. This impact would be ***less than significant****.*

Diesel PM was identified as a TAC by ARB in 1998. The potential cancer risk from the inhalation of diesel PM, as discussed below, outweighs the potential for all other health impacts (ARB 2003). At this time, MDAQMD has not adopted a methodology for analyzing such impacts and does not recommended the completion of health risk assessments for construction-related emissions of TACs, with a few exceptions (e.g., where construction is the only phase of a project) (Reed, pers. comm., 2007).In January 2001, EPA promulgated a Final Rule to reduce emission standards for 2007 and subsequent model year heavy-duty diesel engines. These emission standards represent a 90% reduction in NO_X, 72% reduction of nonmethane hydrocarbon emissions, and 90% reduction of PM emissions in comparison to the 2004 model year emission standards.

More specifically, the dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to HAP emission levels that exceed applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the maximally exposed individual. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to HAP emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project (Salinas, pers. comm., 2004).

The project construction period of approximately 3 years would be much less than the 70-year period used for risk determination, and the equipment would be located at distances greater than 1,000 feet from the sensitive receptors as recommended by MDAQMD. Because diesel PM disperses to negligible levels within 500 feet of the source (Zhu and Hinds 2002), and the use of off-road heavy-duty diesel equipment would be temporary, construction-related emissions would not expose sensitive receptors to substantial concentrations of TACs and there would be no associated impact.

The proposed project could include stationary sources of TACs, such as pumps and generators. These types of stationary sources would be subject to MDAQMD's rules and regulations, including Regulations 201-202 (Permits to Construct System), 203 (Permit to Operate), 475 (Electric Power Generating Equipment), and 1300 (New Source Review); and MACT and T-BACT requirements. Thus, during the permitting process MDAQMD would analyze such sources (e.g., health risk assessment) based on their potential to emit TACs. If it is determined that the sources would emit TACs in excess of MDAQMD's applicable significance threshold, MACT or T-BACT (e.g., diesel particulate filters) would be implemented in order to reduce emissions. If the implementation of MACT or T-BACT would not reduce the risk below the MDAQMD's threshold, the MDAQMD would deny the operating permit. Thus, operational-related emissions would not expose sensitive receptors to substantial concentrations of TACs and this impact would be **less than significant.** No mitigation would be required.

Short-Term Construction Activities or Long-Term Operations Create Objectionable Odors. *The proposed project would not introduce new, permanent odor-generating facilities close to existing or planned sensitive receptors. Short-term odors sources would be intermittent and would dissipate rapidly from the source. As a result, this impact would be* ***less than significant****.*

The occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. While offensive odors rarely cause any physical harm, they still can be very unpleasant, and can generate citizen complaints to local governments and regulatory agencies.

Construction and decommissioning of the project would result in odors from exhaust emissions from on-site diesel equipment and asphalt paving. Such emissions would be intermittent in nature and would dissipate rapidly from the source. Odors related to construction equipment would disperse in a manner similar to diesel PM (see TAC discussion above); therefore odors would be expected to be negligible beyond 500 feet of any active construction activities (Zhu and Hinds 2002). The nearest sensitive receptors (residences) to the proposed project are located 1,800 feet east in Topock, AZ and would not be exposed to substantial odor concentrations.

Operational odor sources would include exhaust from pumps and the treatment facilities. As with construction emissions, it is unlikely that odors from these sources would travel beyond a few hundred feet and therefore would not expose the nearest sensitive receptors to substantial odor concentrations.

The proposed project would not introduce new, permanent odor-generating facilities close to existing or planned sensitive receptors. Short-term odors sources would be intermittent and would dissipate rapidly from the source. Thus, short-term construction activities and long-term operations would not create objectionable odors. As a result, this impact would be **less than significant**. No mitigation would be required.

4.3 BIOLOGICAL RESOURCES

This section provides a discussion of terrestrial and aquatic biological resources in the project area and surrounding areas; describes the applicable federal, state, regional, and local regulations and policies related to biological resources; and analyzes the potential temporary, short-term, and long-term impacts of the proposed project on terrestrial biological resources. A discussion of cumulative impacts on biological resources is provided in Chapter 6 of this EIR.

The information presented in this section is based on the results of biological studies conducted in support of the project between 2004 and 2010. Information reviewed includes documents that discuss biological resources in the region, including the *Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (PBA) (CH2M Hill 2007a, included as Appendix BIO to this EIR), numerous baseline biological reports as cited below, and annual monitoring reports for presence or absence of southwestern willow flycatcher and desert tortoise (CH2M Hill 2005a; GANDA 2008a, 2008b, 2009a, 2009b), among others. In addition to surveys conducted for the proposed project, the U.S. Fish and Wildlife Service (USFWS) provided information to PG&E's biological resource consultants regarding annual Yuma clapper rail surveys.

The project area is located primarily within California along the Lower Colorado River; however, a portion of the project area includes land within Arizona (Exhibit 4.3-1). Biological resource surveys conducted on behalf of PG&E were performed within a 1,528-acre area originally delineated by the U.S. Bureau of Land Management (BLM) to facilitate a cultural resources assessment for the project. Since completion of the biological surveys, the project area boundaries have been revised based on updated information regarding the actual extent of the area needed for remediation activity. Although the overall footprint of the area needed for remediation activity has been reduced, the project area has been expanded at one location along the northern boundary and at a second location along the eastern boundary, to account for the options to locate freshwater wells needed for the freshwater flushing portion of the proposed project. Although these areas increase the overall size of the footprint, facilities that could be located in these areas would be limited to freshwater well(s) and a pipeline delivering the water to the project On March 29, 2010, CH2M Hill biologist Robert Hernandez performed a reconnaissance-level biological resources survey within the three areas outside the 1,528-acre surveyed area. Windshield and pedestrian surveys were used for this reconnaissance survey. The focus of the survey was to document any potentially sensitive biological receptors (e.g., sensitive plant and wildlife species, nests, or burrows) and wetland areas (i.e. jurisdictional waters) (CH2M Hill 2010).

4.3.1 EXISTING SETTING

Regional and local settings for terrestrial biological resources were developed primarily from existing documents, including information from the Resource Conservation and Recovery Act (RCRA) Facility Investigation/ Remedial Investigation (RFI/RI) (Volumes 1 and 2) (CH2M Hill 2007b, 2009) and the biological surveys conducted in the project area by CH2M Hill and Garcia and Associates (GANDA), who were contracted by PG&E to conduct various environmental services on its behalf.

CH2M Hill and GANDA biologists conducted numerous studies throughout the project area. Reconnaissance and targeted surveys conducted by CH2M Hill were primarily to facilitate implementation of the existing Interim Measure 3 (IM-3). The CH2M Hill and GANDA survey areas included lands in both California and Arizona (Exhibit 4.3-1). Before conducting surveys, CH2M Hill performed background research of databases, literature, and technical reports and consultation with the agencies or firms regarding federally listed species in the area, including BLM, U.S. Bureau of Reclamation (Reclamation), USFWS, California Department of Fish and Game (DFG), Arizona Game and Fish Department, and Steven W. Carothers and Associates for guidance on listed species. Several sensitive biological resources were identified as potentially occurring in the project area including wetlands, waters of the United States, and federally listed wildlife species.

No federally listed plant species were identified during the background search as potentially occurring in the project area. Federally listed wildlife species potentially occurring within the project area were surveyed for by following USFWS standard protocols for southwestern willow flycatcher and desert tortoise by GANDA (2008a, 2008b, 2009a, 2009b). As directed by USFWS, surveys for Yuma clapper rail and fish species were not conducted as part of this project, so that there would not be a duplication of USFWS Havasu National Wildlife Refuge (HNWR) survey efforts for these species (CH2M Hill 2007a:5-1, included as Appendix BIO to this EIR). USFWS provided data from its annual rail survey efforts to CH2M Hill for incorporation into the PBA and other project-related documents.

4.3.1.1 PROJECT SETTING

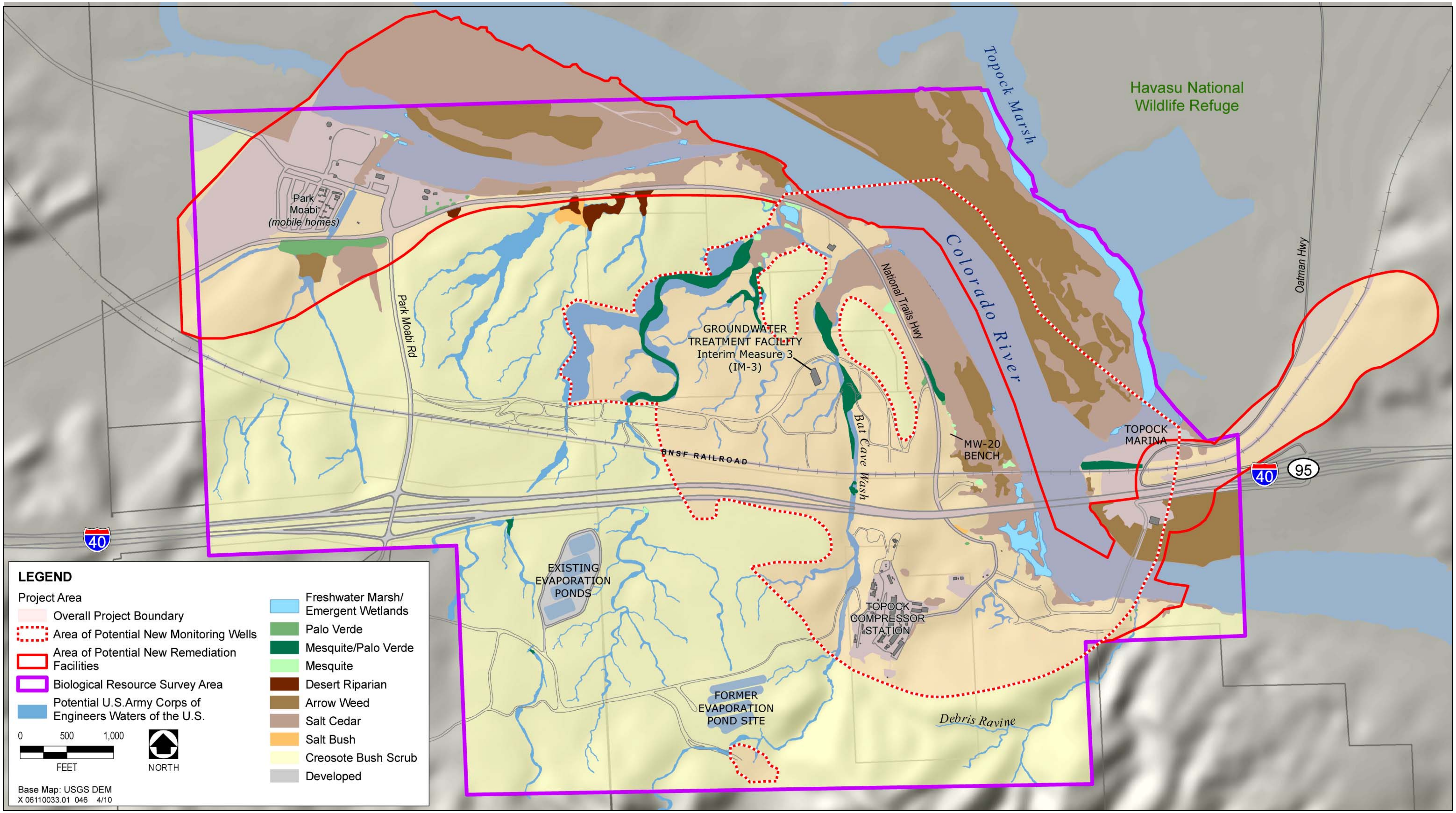
The project area is located at the boundary of two desert systems: Mojave and Colorado. The terrain in the project area includes sparsely vegetated desert, unvegetated desert pavement, numerous shallow to deep ephemeral washes, and gently rolling hills. The base of the Chemehuevi Mountains is located at the southeastern edge of the project area. The elevation within the project area ranges from roughly 400 to 600 feet above mean sea level (msl). Human-made facilities occur throughout the project area and include the PG&E Topock Compressor Station, the IM-3, paved and unpaved access roads, four evaporation ponds, a rock quarry, two water tanks, historic U.S. Highway ("Route") 66, numerous groundwater wells, and six natural gas pipelines that run partially above and partially below ground. Interstate 40 (I-40) and the Burlington Northern Santa Fe (BNSF) Railway cross the project area in an east-west direction.

The Colorado River runs through the eastern portion of the project area. West of the Colorado River, the topography is abrupt, rising from around 450 feet msl at the river to over 1,200 feet msl within 1 mile to the south and southwest. Slopes encountered west of the Colorado River reflect a series of ancient river terraces. East of the Colorado River and within the HNWR in Arizona, dredge spoils from channel improvements rise approximately 30 feet above the river surface, forming a mound of sand covered by tamarisk. This mound gradually slopes back to water level and the emergent vegetation at the Topock Marsh farther to the east (CH2M Hill 2007a:4-1-4-3, included as Appendix BIO to this EIR).

Lower Colorado River

Starting in the 1930s, federal actions in the region consisted of the construction of several dams, including Hoover Dam and Parker Dam. Construction of Hoover Dam, located 108 miles upstream of Topock, was completed in 1936. Completion of Parker Dam, located 42 miles downstream of Topock, occurred in 1938. The changes that resulted from dam construction to the natural river flows substantially altered available fish habitats and reduced the river's ability to meander and create or destroy backwaters and marshes. Alleviating the threat of floods also allowed for conversion of riparian areas to agricultural uses.

The accumulation of sediment in the river channel from Topock to Needles increased rapidly after the completion of Parker Dam. By 1944, the aggradation of the river channel caused elevated groundwater levels and flooding in low-lying areas. In response to this condition, Reclamation conducted dredging of the river channel to maintain channel geometry. According to Metzger and Loeltz (1973) (as cited in CH2M Hill 2007b:3-10), the substantial dredging and channel improvement work in Mohave Valley was completed by July 1960. As part of the channel improvements conducted by Reclamation, riprap embankments were added to stabilize the shoreline on the Arizona side, immediately east and northeast of the compressor station. Historical aerial photographs for the project area (CH2M Hill 2007b:Section 3.3) provide information on the general time frames and locations of dredging, as evidenced by the extensive sand dune areas present in the historical photographs on both the western and eastern shorelines of the Colorado River (CH2M Hill 2009:Appendix A1). Reclamation's damming and channelization of the Colorado River have substantially altered the aquatic, marsh, and riparian habitats associated with the river. As part of the mitigation for the various river control projects, Reclamation has agreed to improve backwater and marsh areas, thus enhancing areas such as the Topock Marsh (CH2M Hill 2007a:3-25).



Source: CNDDB 2008, adapted by AECOM in 2008

Habitat and Wetlands Map **Exhibit 4.3-1**

The Colorado River within the project area is 700–900 feet wide and 8–15 feet deep. The adjacent Colorado River floodplain averages about 500 feet in width but narrows at the Topock Gorge, which is approximately 4 miles south of the project area (CH2M Hill 2007a:3-2).

Topock Marsh

The 4,000-acre Topock Marsh is managed by USFWS as part of the HNWR. The marsh was created as mitigation for prior impacts on the Colorado River and was developed within a historical river meander in 1966 when a dike outlet structure was constructed. Presently, the marsh represents more than 40% of the remaining backwaters of the Colorado River. The marsh serves as a critical resting place for migratory waterfowl and a home to resident songbirds, waterbirds, and other wildlife (USFWS 2008).

Water levels in the marsh are manipulated through closing and opening the gates at the South Dike outlet structure. Levels are increased during the early spring to benefit the nesting southwestern willow flycatcher and then slowly drawn down over the fall to maximize the availability of submerged aquatic vegetation for water birds (USFWS 2008).

4.3.1.2 General Biological Resources

Information on general biological resources was developed from the following existing documents and a reconnaissance-level survey:

- Final Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System (CH2M Hill 2004);
- Biological Resources Survey Report for the Area of Potential Effect (APE) Topock Compressor Station Expanded Groundwater Extraction and Treatment System (CH2M Hill 2005b);
- Final Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions (CH2M Hill 2007a, included as Appendix BIO to this EIR);
- Southwestern Willow Flycatcher Presence/Absence Surveys for the PG&E Compressor Station Expanded Groundwater Extraction and Treatment System (GANDA 2008b, 2009a);
- Desert Tortoise Presence/Absence Surveys for the PG&E Compressor Station Expanded Groundwater Extraction and Treatment System (GANDA 2008a, 2009b);
- species list for the HNWR (USFWS 2007); and
- Biological Reconnaissance Survey in Additional Minor Portions of Project Area Outside of the Expanded Area of Potential Effects (CH2M Hill 2010).

Vegetation and Habitat

Terrestrial habitats within the project area are typical of Mojave Desert uplands, which consist of creosote bush scrub, saltbush scrub, mesquite, palo verde, mesquite/palo verde, salt cedar/mesquite, arrow weed, and salt cedar. Aquatic habitats associated with the Colorado River include freshwater marsh and emergent wetlands. (See Table 4.3-1 for the approximate acreages of each habitat type within the project area.) The dominant habitat is creosote bush scrub with sparsely vegetated and widely distributed creosote (*Larrea tridentata*). Other plant species include burrobush (*Ambrosia dumosa*), allscale (*Atriplex polycarpa*), split grass (*Schismus* sp.), spineflower (*Chorizanthe* sp.), desert trumpet (*Eriogonum inflatum*), beavertail cactus (*Opuntia basilaris*), golden cholla (*Opuntia echinocarpa*), brittlebush (*Encelia farinosa*), dalea (*Dalea mollisma*), red barrel cactus

Table 4.3-1
Habitat Types in the Project Area

Habitat Type	Approximate Acreage
Creosote Bush Scrub	355.5
Saltbush Scrub	0.1
Arrow Weed	94.0
Salt Cedar	89.7
Riverine (Colorado River)	117.9
Freshwater Marsh/Emergent Wetland	5.0
Mesquite	1.3
Palo Verde	3.7
Mesquite/Palo Verde	11.4
Salt Cedar/Mesquite	0.8
Landscaped	8.2
Developed	99.2

Sources: CH2M Hill 2007a, AECOM 2009

(*Ferocactus cylindraceus*), sweetbush (*Bebbia juncea*), and ratany (*Krameria erecta*) (CH2M Hill 2007a:Section 4.0). The creosote bush scrub habitat covers the majority of the project area (Exhibit 4.3-1).

West of the Colorado River, Bat Cave Wash and the other unnamed washes include mesquite, palo verde, and mesquite/palo verde habitat types. Bat Cave Wash is an ephemeral drainage that extends from the Chemehuevi Mountains and enters the Colorado River approximately 3,500 feet north of the compressor station. Although this wash may periodically flood during stormwater runoff events, it remains dry throughout most of the year (CH2M Hill 2007a:4-2). The wash floor is relatively barren of vegetation and consists of sand, gravel, and cobblestone substrate. Although the drainages occur within the creosote bush scrub plant community, several native tree species are associated with the washes, including palo verde (*Cercidium* sp.), acacia (*Acacia greggii*), mesquite (*Prosopis* sp.), and smoke tree (*Psorothamnus spinosus*).

As depicted in Exhibit 4.3-1, salt cedar/mesquite vegetation is primarily present at the confluence of washes west of Bat Cave Wash and the Colorado River (CH2M Hill 2007a:Section 4.0). This habitat is similar to the mesquite community but with the addition of tamarisk (*Tamarix* sp.), also known as salt cedar. Tamarisk is an invasive, exotic plant species that develops into dense monotypic stands commonly growing with a sparse understory of native arrow weed (*Pluchea sericea*) and is associated with wetter environments.

The California side of the Colorado River floodplain provides limited wetland habitat because of little to no emergent vegetation occurring within the river. Arrow weed and slat cedar are the co-dominant habitat along the Colorado River floodplain. Small patches of emergent vegetation, which are present along the banks where drainages converge or other buffer landforms occur, are composed of common reed (*Phragmites communis*), cattails (*Typha* sp.), sedges (*Carex* sp.), and rushes (*Scirpus* sp.) (CH2M Hill 2007a:Section 4.0). The Arizona side of the river provides significant emergent wetland habitat within the Topock Marsh, which is separated from the river by levees.

East of the Colorado River, in Arizona, vegetation is dominated by areas of salt cedar and arrow weed that are very similar to those found of the floodplain on the California side. North of the Topock Marina is an approximately 120-acre peninsula bordered by water to the west, south, and east (Exhibit 4.3-1). This area, which is located within the HNWR, includes the southern portion of the Topock Marsh. The Topock Marsh is an extensive wetland community that extends from approximately the railroad tracks northward for about 10 miles beyond to the Fort Mojave Indian Reservation. South of the Topock Marsh and the HNWR are the Topock Marina and other private property, with extensive development in infrastructure bisecting the habitat. The habitat ranges from riverine to dry. A majority of the habitat within the Arizona portion of the survey area has been previously disturbed by historic land practices in the area. The area has been significantly fragmented and is located in a heavily disturbed area bound on the northwest by Topock Marsh and on the southeast by a dirt access road. The BNSF railroad tracks, buried natural gas pipelines, and a water supply pipeline also bisect the area. Vegetation communities in this area consist primarily of creosote bush scrub and salt cedar.

Jurisdictional Wetlands and Waters of the United States

CH2M Hill ecologists conducted wetland delineations within the project area in December 2004 and January 2005. Several jurisdictional wetlands were delineated along the Colorado River (Exhibit 4.3-1), as well as waters of the United States. Jurisdictional wetlands include freshwater marsh and emergent wetlands associated with the Colorado River. The Colorado River and all intermittent drainages across the project area were mapped as potential waters of the United States. (See Table 4.3-2 for the acreages of freshwater marsh and emergent wetlands, and the Colorado River.) Wetland vegetation consists primarily of common reed (*Phragmites communis*), cattails (*Typha* sp.), sedges (*Carex* sp.), and bulrush (*Scirpus* sp.). Several of these wetland patches are located at the confluence of Bat Cave Wash, near Moabi Regional Park, and below the I-40 overcrossing. A number of intermittent drainages connect to the Colorado River (Exhibit 4.3-1) and near their confluence with the Colorado River these drainages include tamarisk, cat-claw acacia, honey mesquite (*Prosopis glandulosa*), and screwbean mesquite (*P. pubescens*). These drainages have bed and bank connection to jurisdictional waters of the United States; therefore, the intermittent drainages may fall under the jurisdiction of the U.S. Army Corps of Engineers (USACE) (CH2M Hill 2005b:8).

Table 4.3-2
Jurisdictional Wetlands and Waters of the United States in the Project Area

Wetland Type	Approximate Acreage
Freshwater Marsh/Emergent Wetlands	5.0
Colorado River	117.9

Source: CH2M Hill 2005b:8-9

A large marsh also exists along the eastern bank of the peninsula near the Topock Marina in Arizona. The Topock Marsh, located northeast of the project area in the HNWR, provides important aquatic marsh and riparian habitat in the region (USFWS 2008). These wetland features have not been verified by USACE.

Wildlife

The project area provides habitat for a variety of arid-adapted wildlife species. Common vertebrates found in the Mojave Desert include reptiles such as western whiptail (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert horned lizard (*Phrynosoma platyrhinos*), and western diamond-backed rattlesnake (*Crotalus atrox*). Avian species include turkey vulture (*Cathartes aura*), common raven (*Corvus corax*), Gambel’s quail (*Callipepla gambelii*), Inca dove (*Columbina inca*), greater roadrunner (*Geococcyx californianus*), black-chinned hummingbird (*Archilochus alexandri*), ash-throated flycatcher (*Myiarchus cinerascens*), western kingbird (*Tyrannus verticalis*), great-tailed grackle (*Quiscalus mexicanus*), and black-tailed gnatcatcher (*Polioptila melanura*). Mammalian species include black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), Merriam kangaroo rat (*Dipodomys merriami*), antelope ground squirrel (*Ammospermophilus leucurus*), bobcat (*Felis rufus*), pocket mice (*Perognathus* spp.), desert bighorn sheep (*Ovis canadensis nelsoni*), and coyote (*Canis latrans*).

The Colorado River and surrounding wetland features provide habitat for other species, such as mallard (*Anas platyrhynchos*), least bittern (*Ixobrychus exilis*), great blue heron (*Ardea herodias*), Clark's grebe (*Aechmophorus clarkia*), marsh wren (*Cistothorus palustris*), cliff swallow (*Petrochelidon pyrrhonota*), and foraging habitat for bat species such as California myotis (*Myotis californicus*) and western pipistrelle (*Pipistrellus hesperus*).

Aquatic Wildlife

The Colorado River flows southeast between California and Arizona and provides the primary aquatic habitat within the project area. The aquatic habitat of the Colorado River supports several game fish species, including striped bass (*Morone saxatillis*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), white crappie (*Pomoxis annularis*), flathead catfish (*Pylodictis olivaris*), and channel catfish (*Ictalurus punctatus*) (CH2M Hill 2007a:4-3).

4.3.1.3 SENSITIVE BIOLOGICAL RESOURCES

Information regarding sensitive biological resources was developed from existing documents, such as the PBA, the Lower Colorado River Multi-Species Conservation Program (LCR MSCP), California Natural Diversity Database (CNDDB) data queries, targeted species surveys, and preconstruction surveys conducted on-site.

Special-Status Species

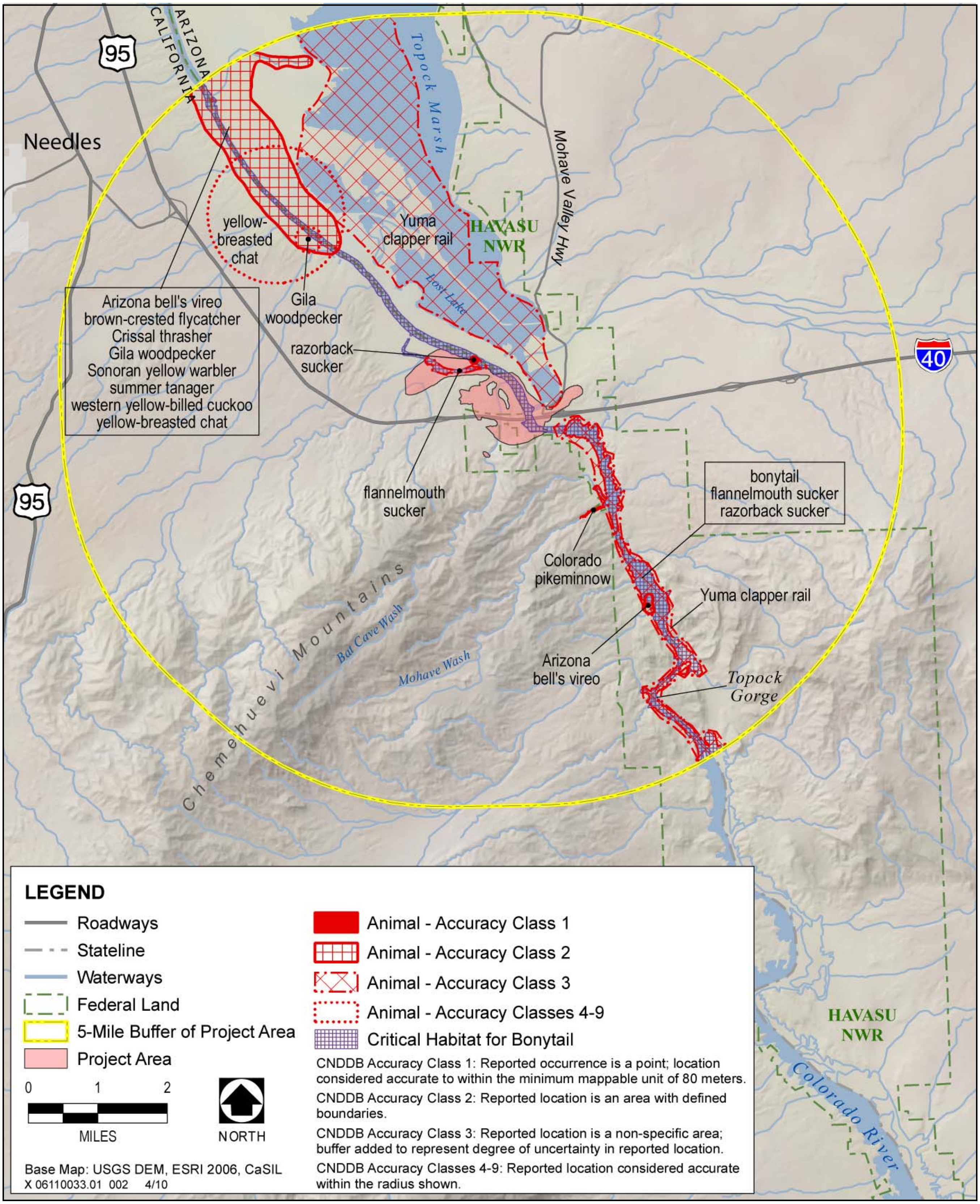
For purposes of this evaluation, special-status species are plants and animals that are legally protected or otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations, including:

- plant and wildlife species that are listed under the federal Endangered Species Act (ESA) and/or the California Endangered Species Act (CESA) as rare, threatened, or endangered;
- plant and wildlife species considered candidates for listing or proposed for listing;
- wildlife species identified by DFG as fully protected and/or species of special concern;
- plants considered by the California Native Plant Society (CNPS) to be rare, threatened, or endangered (i.e., CNPS List 1A, 1B, and 2 species are recognized by the DFG as potentially qualifying for listing, and therefore DTSC considers these species as sensitive for purposes of this EIR); and
- plants and animals covered by the LCR MSCP.

DFG applies the term "California Species of Special Concern" to animals that are not listed under ESA or CESA but that are nonetheless declining at a rate that could result in listing, or that historically existed in low numbers and currently face known threats to their persistence. Both USFWS and DFG use CNPS designations when they consider formal species protection under ESA and CESA, respectively.

The CNDDB (2008) and targeted species surveys conducted by GANDA from 2005 to 2008 were used as the primary sources to identify previously reported occurrences of special-status species in the project vicinity (Exhibit 4.3-2). Species identified by the LCR MSCP (Reclamation 2004a:Table 1-2, page 1-10) as having potentially suitable habitat within this reach of the Colorado River were also included in the species list. Topographic quadrangles included in the CNDDB query were Needles NW, Needles NE, Needles, Needles SE, Whale Mountain, Topock, Chemehuevi Peak, and Castle Rock. Although the CNDDB is a useful tool for tracking occurrences of special-status species, it contains only those records that have been reported to DFG. Therefore, special-status species that have not been reported to the CNDDB may occur in the project area.

Twenty-nine special-status fish and wildlife species, one insect, and one special status-plant species were evaluated for their potential to occur in the project area. The regulatory status and habitat association are



Source: CNDDB 2008, adapted by AECOM in 2008

Known Locations of Special-Status Wildlife **Exhibit 4.3-2**

Table 4.3-3
Special-Status Species Potentially Occurring in the Project Area

Species	Status[1]	Habitat	Potential for Occurrence[2]
Plants			
Matted cholla *Grusonia parishii*	CNPS 2.3	Joshua tree woodland, Mojave desert scrub, Sonoran desert scrub/sandy, rocky. 300–1,524 meters.	Unlikely to occur; suitable habitat is not present due to low elevation.
Invertebrates			
MacNeill's sootywing skipper *Hesperopsis gracielae*	LCR MSCP	This small skipper is found along the Colorado River. Only known larval host plant is quail bush (*Atriplex lentiformus*), which occurs along the subriparian edge of the river. Nectar plants include honey mesquite, alfalfa, and tamarisk.	Unlikely to occur; *Atriplex* species occur in low densities within the site; however, no CNDDB occurrences have been recorded near the project area (CNDDB 2008). This species in California has been documented near Blythe (Reclamation 1996:Chapter 4, Table 15).
Fish			
Colorado Pikeminnow *Ptychocheilus lucius*	Fed: E State: E	Historically widespread in the Colorado River; now native populations restricted to the upper basin.	Unlikely to occur; extirpated from Lower Colorado.
Bonytail chub *Gila elegans*	Fed: E State: E LCR MSCP	Within the lower Colorado River system, occupies reach from Davis Dam to Lake Havasu and artificial impoundments.	Known to occur; the Lower Colorado River supports the largest remaining population of bonytail chub. Has been documented near Park Moabi (CH2M Hill 2007a:5-24, included as Appendix BIO to this EIR).
Humpback chub *Gila cypha*	Fed: E LCR MSCP	Historically, inhabited canyons of the Colorado River and four tributaries: the Green, Yampa, White, and Little Colorado Rivers in canyons with swift currents and whitewater.	Unlikely to occur; river alterations have dwindled the populations to a handful of sites, none of which are in the Lower Colorado River.
Razorback sucker *Xyrauchen texanus*	Fed: E State: E/FP LCR MSCP	A variety of riverine habitat types from mainstem channels to slow backwaters of medium and large streams, sometimes around cover elements. In impoundments prefers depths of 1 meter or more over sand, mud, or gravel substrates.	Known to occur; documented occurrences at Park Moabi Lagoon and Topock Marina; documented near Needles in Colorado River (CNDDB 2008).
Flannelmouth sucker *Catostomus latipinnis*	LCR MSCP	Uses backwaters for juvenile rearing and main channel habitats for spawning and adult rearing.	Known to occur; river and backwaters provide habitat. CNDDB records indicated flannelmouth in the lagoon at Park Moabi (CNDDB 2008).
Reptiles			
Desert tortoise *Gopherus agassizii*	Fed: T LCR MSCP	The desert tortoise is widely distributed throughout the Mojave, Sonoran, and Colorado Deserts. The Mojave population of desert tortoise prefers open valleys containing creosote bush scrub, avoiding steep rocky sites. The species also requires friable soils for burrow and nest construction.	Could occur; the project area contains marginal habitat, and targeted surveys conducted from 2004–2008 have not encountered live desert tortoise (CH2M Hill 2004:5-3, GANDA 2008a:4).

Table 4.3-3
Special-Status Species Potentially Occurring in the Project Area

Species	Status[1]	Habitat	Potential for Occurrence[2]
Flat-tailed horned lizard *Phrynosoma mcalli*	State: CSC LCR MSCP	This lizard is restricted to areas of fine sand and sparse vegetation in desert scrub, wash, succulent shrub, and alkali scrub and is probably most abundant in areas of creosote bush.	Unlikely to occur; the site contains marginally suitable but highly fragmented/disturbed habitat with little suitable soil substrate. No CNDDB accounts for this species within 25 miles of project area (CNDDB 2008).
Amphibians			
Colorado River (Sonoran) toad *Bufo alvarius*	State: CSC LCR MSCP	Prefers damp areas near permanent springs or human-made watering holes, but may be found in arid grasslands and woodlands.	Unlikely to occur; this species is likely extirpated in California; however, in Arizona it occurs in isolated waters notably absent of predators (CNDDB 2008).
Lowland leopard frog *Rana yavapaiensis*	LCR MSCP	This species inhabits slackwater aquatic habitats dominated by bulrushes, cattails, and riparian grasses near or under an overstory of Fremont's cottonwoods and willows.	Unlikely to occur; this species is presumed extirpated in California and in Arizona has not been detected along the Colorado River (CNDDB 2008, AZGF 2008).
Birds			
Burrowing owl *Athene cunicularia*	State: CSC	Burrow sites in open, dry annual or perennial grasslands, deserts, and scrublands with low-growing vegetation and burrowing mammal populations.	Unlikely to occur; site provides little suitable habitat of suitable burrows and burrowing species. Known to occur near Needles (CNDDB 2008).
Yuma clapper rail *Rallus longirostris yumanensis*	Fed: E LCR MSCP	Only along the Lower Colorado River (from Topock Marsh southward) and around the Salton Sea. It occupies heavily vegetated freshwater.	Could occur; however, the project area adjacent to the river provides little suitable habitat on the California side. This species has been documented in the Topock Marsh and the Topock Gorge (CNDDB 2008, GANDA 2009a:6).
Southwestern willow flycatcher *Empidonax traillii extimus*	Fed: E LCR MSCP	Dense riparian habitats along streams, rivers, and other wetlands, and breeds in stands of dense cottonwood, willow, and tamarisk thickets.	Could occur; the project area provides little suitable habitat. This species has been documented in riparian areas around the site, primarily at Topock Marsh, and has been detected near Park Moabi Lagoon (GANDA 2009a:Figure 5, page 7).
Western least bittern (*Ixobrychus exilis hesperis*	State: CSC LCR MSCP	Freshwater marshes with dense vegetation.	Could occur; known to occur at Topock Marsh (Reclamation 2004a). Along the Lower Colorado River, documented occurrences are all in Arizona.
Yellow-breasted chat *Icteria virens*	State: CSC	Riparian areas with dense woody vegetation bordering open areas.	Could occur; known to occur near Needles and at Topock Marsh (CNDDB 2008).

Table 4.3-3
Special-Status Species Potentially Occurring in the Project Area

Species	Status[1]	Habitat	Potential for Occurrence[2]
California black rail *Laterallus jamaicensis corturniculus*	State: T and FP LCR MSCP	Habitat includes shallow freshwater and brackish marshes dominated by bulrush species.	Could occur; potentially suitable habitat within the Topock Marsh, but no CNDDB records near area; documented at delta of Colorado River.
Elf owl *Micrathene whitneyi*	State: E LCR MSCP	Cottonwood willow riparian forests and other desert woodlands with snags.	Unlikely to occur; however, the cottonwood forests of Topock Marsh provide potentially suitable habitat. Recorded north of Needles and south in HNWR (CNDDB 2008).
Gilded flicker *Colaptes chrysoides*	State: E LCR MSCP	Cottonwood riparian forests, orchards, landscape trees, and mesquite stands are used for nesting; but is strongly associated with saguaros for nesting.	Unlikely to occur; cottonwood forests of Topock Marsh provide potentially suitable foraging habitat. Nearest CNDDB record 50 river miles south.
Gila woodpecker *Melanerpes uropygialis*	State E LCR MSCP	Mature cottonwood riparian forests and mesquite groves with snags and large trees for nesting.	Unlikely to occur; documented near Needles, but project area provides little suitable nesting habitat and low-quality foraging habitat.
Summer tanager *Piranga rubra*	State: CSC	Strongly associated with cottonwood-willow forests.	Unlikely to occur; project area provides little suitable nesting habitat and low-quality foraging habitat. Documented near Needles (CNDDB 2008).
Vermilion flycatcher *Pyrocephalus rubinus*	State: CSC LCR MSCP	Nests in cottonwood or other large desert riparian trees. Forages in riparian, irrigated fields, pastures, or other open mesic sites.	Unlikely to occur; suitable habitat does not occur in the project area. Foraging habitat present along river but project area provides little suitable nesting habitat. Historic documentation near Needles (CNDDB 2008).
Brown-crested flycatcher *Myiarchus tyrannulus*	State: CSC	Occur in riparian woodland or forest dominated by cottonwoods and willows, usually in a climax stage; along the Colorado River, has also bred in residential areas with tall, planted trees. The presence of woodpeckers or other cavity-excavating species is important.	Unlikely to occur; suitable habitat does not occur in the project area, though foraging habitat does. Documented within HNWR near Needles (CNDDB 2008).
Crissal thrasher *Toxostoma crissale*	State: CSC	Nests within desert riparian and wash habitats.	Could occur; documented along river on Arizona side near Needles and within HNWR (CNDDB 2008, GANDA 2008b:B-1), but project area provides little suitable nesting habitat.
Arizona Bell's vireo *Vireo bellii arizonae*	State: E LCR MSCP	Associated with willow thickets with baccharis.	Could occur; documented in Arizona near Needles and the Topock Marsh (CNDDB 2008, GANDA 2008b:5-1), but project area provides little suitable nesting habitat.

Table 4.3-3
Special-Status Species Potentially Occurring in the Project Area

Species	Status[1]	Habitat	Potential for Occurrence[2]
Sonoran yellow warbler *Dendroica petechia sonorana*	State: CSC LCR MSCP	Historically nesting in riparian forests associated with open water but along the LCR; tamarisk is a habitat component.	Could occur; documented along river near Needles (CNDDB 2008), but project area provides little suitable nesting habitat.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	State: E Fed: C LCR MSCP	Riparian forest nester in flood bottoms of larger river systems. Requires multistory habitat for foraging.	Unlikely to occur; project area provides little suitable nesting and foraging habitat. Documented within the Topock Marsh (CNDDB 2008, GANDA 2009a:6).
Mammals			
Pallid bat *Antrozous pallidus*	State: CSC	Occurs in a variety of sites; most common in open dry habitats. Roosts in undisturbed rocky sites.	Could occur; potentially suitable habitat available in the project area. Historic CNDDB record near Needles (CNDDB 2008).
Colorado River cotton rat *Sigmodon arizonae plenus*	State: CSC LCR MSCP	Occupies narrow band of grassy, riparian, and cultivated vegetation along banks of Colorado River.	Unlikely to occur; little suitable habitat in area only documented CNDDB record is near Parker, more than 50 miles downriver (CNDDB 2008).
Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*	State: CSC LCR MSCP	Variety of habitats, including oak savanna, riparian, and grassland; roosts in mines, caves, and buildings.	Unlikely to occur; suitable foraging habitat present but marginally suitable roosting habitat present. No CNDDB records in area. Documented near Lake Mead and near Blythe (Reclamation 2008:316).
California leaf-nosed bat *Macrotus californicus*	State: CSC LCR MSCP	Habitat includes temperate deserts. Does not migrate or hibernate but finds warm daytime roosts in caves, mines, or buildings. Generally forages only 2 hours at night.	Unlikely to occur; foraging habitat exists; however, few suitable roosting sites in vicinity. Recorded in a mine near Lake Havasu (CNDDB 2008).

[1] **Legal Status Definitions**

U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories
E = Endangered (legally protected)
T = Threatened (legally protected)
C = Candidate proposed for listing (legally protected)

California Department of Fish and Game (DFG) State Listing Categories
E = Endangered (legally protected)
T = Threatened (legally protected)
FP = Fully Protected (legally protected, no take allowed)
CSC = California Species of Concern (no formal protection)

California Native Plant Society (CNPS) Categories
2 = Plant species considered rare or endangered in California but more common elsewhere (but not legally protected under the federal and California Endangered Species Acts

Lower Colorado River Multi-Species Conservation Program (LCR MSCP) species covered under the plan.

[2] **Potential for Occurrence Definitions**

Unlikely to occur: Potentially suitable habitat present but species unlikely to be present in the project area because of current status of the species and very restricted distribution.

Could occur: Suitable habitat is available in the project area; however, there are few or no other indicators that the species might be present.

Likely to occur: Habitat conditions, behavior of the species, known occurrences in the project vicinity, or other factors indicate a relatively high likelihood that the species would occur in the project area.

Known to occur: The species, or evidence of its presence, was observed in the project area during reconnaissance-level surveys or was reported by others.

Sources: CNDDB 2008, CNPS 2008, Reclamation 2004a summarized for each species in Table 4.3-3. Thirteen of the 29 fish and wildlife species were determined to have potential to occur in the project area during at least part of the year, and are further discussed below. The remaining 17 animal species included in Table 4.3-3 are not addressed further in this section because the project area either does not support the habitats in which they occur or is outside of the species' range.

Special-Status Plants

Based on literature and database searches and habitat suitability, no special-status plant species have the potential to occur in the project area.

Special-Status Wildlife

Southwestern Willow Flycatcher

The southwestern willow flycatcher is a federally listed and state-listed endangered species and is a covered species in the LCR MSCP. Several factors have caused the decline in populations. Extensive areas of suitable riparian habitat have been lost due to river regulation and channelization, agricultural and urban development, mining, road construction, and overgrazing, resulting in the displacement of native riparian vegetation and allowing the invasion of invasive tamarisk (CH2M Hill 2007a:5-2, included as Appendix BIO to this EIR). Additionally, habitat fragmentation is thought to increase nest parasitism from the cowbird (*Molothrus ater*). Despite the invasion of tamarisk, southwestern willow flycatcher nesting has been documented in tamarisk stands along the Colorado River (USFWS 2002a:13).

Management units and designated critical habitat for the southwestern willow flycatcher along the Colorado River is broken into segments, and the Hoover to Parker Management Unit includes the project area. The segment from Davis Dam to Parker Dam (including the HNWR) was identified as having features essential to the southwestern willow flycatcher and proposed as critical habitat. Six breeding sites are known from this segment, with the largest at Topock Marsh having 34 territories in 2004. As a result of the completion of the LCR MSCP, USFWS management of HNWR for riparian habitat, and implementation of southwestern willow flycatcher management plans by the Chemehuevi and Fort Mohave Tribes, this entire river segment was excluded from critical habitat designation. The closest designated critical habitat is located 50 miles east at Big Sandy River in Arizona.

GANDA has surveyed the project area annually for the presence of the southwestern willow flycatcher, following USFWS survey protocols, since 2005 (CH2M Hill 2005a, GANDA 2009a). In 2005, numerous fixed survey points were established at six sites (covering 80 acres), using USFWS protocols. These survey points encompass all potentially suitable habitats, namely tamarisk or other riparian thickets adjacent to open water, on both sides of the river. The largest site and the majority of the points are in the HNWR in Arizona, some of which lie beyond the project area in areas deemed to have the best potential for detecting the birds. The other six sites are located in California: one under I-40 and the railroad, one at the confluence of Bat Cave Wash and the Colorado River, and two at isolated wetlands and two sites in the Moabi Regional Park. Twelve call points were eliminated in 2008 because of vegetation (tamarisk) removal at Moabi Regional Park (GANDA 2008b:4-1).

In 2005, 2007, 2008, and 2009, biologists detected the bird, primarily by song, in varying locations but primarily in Arizona. No detections were made during the 2006 surveys. All detections have been determined to be migratory or transient birds and no nests, or nesting activity, have been observed (GANDA 2009a:8). The first round of surveys in 2008 produced five southwestern willow flycatcher detections. Subsequent surveys did not detect the bird during the rest of the survey season (GANDA 2008b:5-1). Surveys conducted in 2009 detected one pair of southwestern willow flycatchers. It was determined that this detection was most likely of a transient pair because there were no additional detections during subsequent surveys. Had these southwestern willow flycatchers been breeding in the area, additional detections would have been made during subsequent surveys as the pair of birds would have established a territory and proceeded with the nesting cycle (GANDA 2009a:8). Nesting territories do occur within the general area as documented nesting activities have been reported along the northeastern portion of Topock Marsh. This area supported 34 territories in 2004 and all nest locations are documented within tamarisk thickets (Reclamation 2008:28). The discerning feature between Topock Marsh territories and the project area is the lack of open water among large expanses of riparian habitat. The project site, while having tamarisk thickets, does so along a relatively narrow band of the floodplain.

Mojave Desert Tortoise

The desert tortoise is a federally listed and state-listed threatened species and is a covered species in the LCR MSCP. The project area does not include designated critical habitat, and the nearest is located in the Chemehuevi Valley, 9 miles west of the project area. The decline in the desert tortoise population is primarily caused by habitat loss, degradation, and fragmentation resulting from increased human population and urbanization. The increase in urbanization, collection of tortoises for pets, overgrazing, landfills, predation, highway mortality, vandalism, agriculture, fire, drought, and off-road vehicle use all have contributed to the decline of the tortoise in the wild. Another important reason for the tortoise decline in the western Mojave Desert is the introduction of an upper respiratory tract disease into many of the wild populations (USFWS 1994a:i).

From 2004 through 2009, PG&E contracted with CH2M Hill and GANDA to perform USFWS protocol presence/absence surveys for the desert tortoise. Although the USFWS revised the desert tortoise survey protocol starting with the 2009 survey season, projects conducting repeated surveys that were initiated prior to 2009 were allowed to use the older protocols. No live desert tortoises were detected in the survey area; however, one desert tortoise carcass and four sets of highly deteriorated bone shell fragments were discovered during these surveys. Two sets of highly deteriorated bone shell fragments were located in ephemeral drainages, indicating that they may have washed in from outside the survey area during a rainstorm. This interpretation is based on the location of the finds, surrounding topography, and the lack of any other desert tortoise sign in the survey area (GANDA 2009b:6-9).

One set of remains discovered in 2004 was not relocated during the 2009 surveys, but all other previously discovered remains were found. The remains discovered since 2004 are all very old, disarticulated, and weathered. GANDA estimated that the bones have been exposed (i.e., out on the ground) for at least 10 years, probably much longer, and that the remains predate the degraded habitat conditions currently observed on the survey area (GANDA 2009b:9). The desert tortoise carcass and four sets of highly deteriorated bone shell fragments may indicate historical use of the area; however, no live desert tortoises, scats, tracks, or other evidence of recent use was observed (CH2M Hill 2005b:9, 2007a:5-10, 5-11; GANDA 2008a:5, 2009b: 7-8). Limited burrows with entrances large enough to accommodate a desert tortoise were also observed during surveys. However, these burrows had no typical indicators of desert tortoise use and were likely created by burrowing mammal species (GANDA 2009b:7-8). Annual surveys have been conducted by GANDA since 2005, without positive detections of desert tortoise.

Based on the survey results, desert tortoises were concluded to be absent in the project area (CH2M Hill 2007a:5-11, included as Appendix BIO to this EIR, and GANDA 2009b:9-10). Despite the absence of live tortoise observations, there is a possibility that desert tortoises could enter the area from the west. However, the habitat on-site was deemed to be of poor quality, lacking annual vegetation for forage and burrows for shelter. Other conditions contribute to poor habitat quality, such as steep rocky slopes and drainages, the Chemehuevi Mountains, and the project area being highly fragmented by pipeline corridors, roads, I-40, U.S. Highway 95, the railroad, and the Station (GANDA 2009b:9; CH2M Hill 2007a:5-13, included as Appendix BIO to this EIR).

Yuma Clapper Rail

The Yuma clapper rail was federally listed as endangered and state-listed as threatened and fully protected. It also is a species covered under the LCR MSCP. Critical habitat has not been designated for this species, but the HNWR is considered an important population area for the Yuma clapper rail (USFWS 2006:8-9). Yuma clapper rails prefer dense stands of emergent vegetation found in marsh habitats. Much of the decline of the species can be attributed to altered seasonal flow regimes and lost marsh habitat caused by the construction of dams and dredging on the Lower Colorado River. Additionally, mosquito abatement programs and erosion control efforts have all reduced nesting habitat. Recent studies are also looking at selenium contamination as a potential cause of reduced reproductive success (USFWS 2006:11).

Most available habitat in the project area occurs in isolated locations, within emergent wetland habitat. Before construction of the dams along the Lower Colorado River, few emergent wetlands occurred along the river because of spring high flows and flood events (Reclamation 2008:13). However, marsh habitats benefit from flushing events because those events reduce the buildup of dead plant materials, preventing the eventual conversion of the marsh to dry land. Dam-controlled rivers require active management to maintain the marshes in place of the natural cycle of river flows. Other threats to the species have included increased development along the Lower Colorado River near occupied habitats (USFWS 2006:6).

Several "call stations" have been surveyed annually for Yuma clapper rail by the USFWS along the South Dike (near the Topock Marina), which is located within the HNWR on the Arizona side of the river. Call stations or call points are fixed locations that are generally revisited annually to take a census of a particular species. In past years, this species has been detected south of the new South Dike and north of the Topock Marina (USFWS 2005:45). In 2005, seven Yuma clapper rails were detected along the South Dike transect in areas of dense emergent vegetation. No reports of rails have been documented on the California side of the Colorado River in the project area (CH2M Hill 2007a:5-15, included as Appendix BIO to this EIR).

Other Avian Species

Several bird species identified in Table 4.3-3 have the potential to nest in or adjacent to the project area. Species associated with riparian and other wetland habitats, such as western least bittern and California black rail, are most likely to nest in emergent wetlands along the Colorado River and Topock Marsh (Exhibit 4.3-1). Other birds, such as Arizona Bell's vireo, Sonoran yellow warbler, yellow-breasted chat, and crissal thrasher, could nest in remnant riparian woodland and suitable trees outside the project area but within the HNWR.

Both California black rail and western least bittern have the potential to occur on the Arizona side of the project area, in areas of emergent wetland and freshwater marsh habitats containing dense cattails and bulrush stands. Their habitats are similar to that of the Yuma clapper rail, although the California black rail may prefer shallower marshy habitats. No California black rails have been detected during surveys and the CNDDB reports no occurrences of this rail within the project area; however, literature suggests that the species may occur within the HNWR (Reclamation 2008:137-138) in Arizona. CNDDB records indicate western least bittern occurring in the Topock Marsh, where they are suspected to nest (Reclamation 2008:127-128) and along the river north of the project area (CNDDB 2008).

Arizona Bell's vireo has a limited distribution in California, occurring along the lower Colorado River. The species occurs primarily throughout Arizona, Utah, Nevada, and Sonora, Mexico. Early to midsuccessional riparian habitat is typically used for nesting by the Bell's vireo because it supports the dense shrub cover required for nest concealment, as well as a structurally diverse canopy for foraging. Arizona Bell's vireos have been detected within the Topock Marsh in CNDDB records. Additionally, they have been detected during the project-related surveys for southwestern willow flycatcher in Arizona. Nesting was not confirmed but is possible due to the consistent detections throughout the breeding season (GANDA 2008b:5-1, 5-2).

Sonoran yellow warblers typically nest in willow thickets with cottonwood overstory, and yellow-breasted chats typically nest in riparian habitats with a dense shrub layer. Yellow warblers are relatively uncommon along the Lower Colorado River and were once thought to have been extirpated as a breeder along the river. Recent breeding bird surveys have detected Sonoran yellow warblers at Topock Marsh (Reclamation 2008:226).

In desert areas of California, the yellow-breasted chat requires dense riparian thickets of willows, cottonwood, arrow weed, and tamarisk associated with rivers, swampy ground, and the borders of small ponds. Most breeding sites in Arizona comprise mature willow thickets. Once thought to be a common breeder along the Colorado River, the yellow-breasted chat is now uncommon, like most other riparian-dependent species. Little documentation exists related to its breeding within the HNWR, but chats are documented in the CNDDB near Needles.

Western yellow-billed cuckoos are thought to require structurally complex riparian vegetation with tall trees and a dense woody vegetative understory (RHJV 2004:57). They breed in large blocks of riparian vegetation, particularly woodlands populated by cottonwoods and willows. Four sites within the HNWR were monitored for cuckoos in 2006 and 2007. Cuckoos were detected at three of the sites but were not confirmed as breeding in the Havasu NWR sites (Johnson et al. 2008:17). Additionally, the 2008 southwestern willow flycatcher surveys detected a cuckoo during one round on the Arizona side of the project area, indicating this species might find foraging habitat in the riparian areas, although nesting habitat is nonexistent in the project area.

The project area is within the westernmost extent of the range of the crissal thrasher. This species is present in most riparian woodlands, favoring those areas with sandy soils. Honey mesquite habitats support the largest populations throughout the year, and the bird is rarely found far away from dense cover, usually nesting in mesquite trees, but also tamarisk and quailbush (Reclamation 1996:Chapter 4, Section z). The project area provides marginally suitable habitat in California and Arizona, particularly in the tamarisk thickets of the Arizona side. The species was documented north of the project area, along the river, during the southwestern willow flycatcher surveys of 2008 and 2009 (CNDDB 2008, GANDA 2009a:B-1).

Bat Species

One species of special-status bat has been documented near the project area. The pallid bat is a widely distributed species generally occurring in lower elevation sites, most often in dry rocky habitats. Little is known and scant documentation exists regarding the pallid bat within the Lower Colorado River. Bat surveys were not conducted as part of the project and no documented surveys have been conducted in the HNWR. The river and the Topock Marsh could provide suitable foraging habitat for a number of migratory and resident bat species and the rocks of Topock Gorge to the south of the project area may provide limited roost sites.

Special-Status Aquatic Species

Bonytail Chub

The bonytail chub is federally listed and state-listed as endangered and is covered under the LCR MSCP. Critical habitat in relation to the project area includes the Colorado River and the 100-year floodplain (Exhibit 4.3-2), from Parker Dam to the northern boundary of the HNWR just south of Needles. The single major factor contributing to the decline of bonytail and other large-river fishes has been the construction of mainstem dams and the resultant cool tailwaters and reservoir habitats that replaced once-warm, riverine environments (USFWS 2002b:18-21, 2005:50).

The bonytail chub was once widely distributed throughout the Colorado River and its main tributaries. This species is found only in isolated populations through the historic range and in the lower basin, as well as in Lake Mohave, with possible individuals between Parker Dam and Davis Dam (USFWS 2005:50-51). The trend for the bonytail chub is for a continued rangewide decrease in wild populations caused by a lack of sufficient recruitment of young adults, along with the loss of old adults to natural mortality. The primary limiting factor for bonytail appears to be nonnative fish predation of the early life stages (USFWS 2005:50-51). Extinction of this fish in the wild throughout its historic range is being forestalled by the stocking of subadult fish into the Upper Colorado River Basin and Lakes Mohave and Havasu in the Lower Colorado River (USFWS 2005:50-51). These stockings are intended to create populations of young adults that may be expected to persist for 40 to 50 years. The Lower Colorado River supports the largest remaining populations of bonytail chub. The populations consist primarily of subadults (CH2M Hill 2007a:5-23, 5-24; included as Appendix BIO to this EIR). The CNDDB and the PBA indicate reports of bonytail chub occurring in the river adjacent to the project area (Exhibit 4.3-2).

Razorback Sucker

The razorback sucker is federally listed and state-listed as endangered, as well as state fully protected, and is covered under the LCR MSCP. As with the bonytail chub, dam construction and subsequent habitat degradation have led to the substantial decline of the razorback sucker. The trend for the razorback sucker is for a continued rangewide decrease in wild populations caused by a lack of sufficient recruitment of young adults, along with the loss of old adults to natural mortality. The primary limiting factor for the razorback sucker appears to be nonnative fish predation of the early life stages (USFWS 2005:56).

The razorback sucker is endemic to large rivers of the Colorado River Basin, from Wyoming to Mexico. Present distribution of natural populations is limited to Lake Mohave, Green River Basin, and the Upper Colorado River Basin. Presently, natural adult populations exist only in Lake Mohave, Lake Mead, and Lake Havasu. This species uses a variety of habitat types, from mainstem channels to slow backwaters of medium and large streams and rivers, sometimes around cover. In impoundments they prefer depths of 1 meter or more, over sand, mud, or gravel substrates (CH2M Hill 2007a:5-19, included as Appendix BIO to this EIR).

The Lower Colorado River supports the largest remaining populations of razorback sucker. The population consists primarily of subadults as a result of the stocking efforts directed at forestalling extinction. In 2005, razorback suckers were documented near Needles. In 2006, 236 suckers were captured and released at that spawning site (CH2M Hill 2007a:56, included as Appendix BIO to this EIR). This species has been documented just downriver of the project area (CNDDB 2008) (see Exhibit 4.3-2).

Flannelmouth Sucker

The flannelmouth sucker is covered under the LCR MSCP but has no other legal designations. The flannelmouth sucker is native to the Colorado River system and was once considered extirpated from the lower Colorado River; they were reintroduced in the late 1970s (Moyle 2002:179). Flannelmouth suckers are benthic (bottom-dwelling) fish that primarily eat algae, although invertebrates and many types of plant matter are also consumed. The flannelmouth sucker inhabits larger streams and rivers in all habitat types, including riffles, runs, eddies, and backwaters. The species spawns in streams over gravelly areas during spring and early summer. The CNDDB indicates flannelmouth occurring in the Park Moabi Lagoon (CNDDB 2008) near the project area.

Sensitive Habitats

Sensitive habitats are those of special concern to resource agencies or that are afforded specific consideration through CEQA, Section 1602 of the California Fish and Game Code, or Section 404 of the Clean Water Act (CWA), as discussed below in Section 4.3.2, “Regulatory Setting.”

The Colorado River is considered a water of the United States and subject to regulation under CWA Section 404. Other waters of the United States may also include ephemeral drainages as shown on Exhibit 4.3-2. Other permanently or seasonally wet habitats, such as freshwater marsh or emergent wetland, would qualify as wetlands subject to Section 404 regulation if they are either adjacent or connected to waters of the United States (Colorado River). A wetland delineation was completed in 2005 by CH2M Hill, but verification by USACE has not been completed because no project impacts were anticipated in wetland areas. All of these aquatic habitats are also anticipated to qualify as waters of the state and regulation under the Porter-Cologne Water Quality Control Act. In addition, waterways and associated riparian habitats are likely subject to regulation under Section 1600 et seq. of the California Fish and Game Code.

Other habitats considered sensitive by DFG include those identified as “rare and worthy of consideration” in natural communities recognized by the CNDDB. These sensitive communities provide essential habitat to special-status species that are often restricted in distribution or decreasing throughout their range. Some riparian patches mapped as desert wash and desert riparian within the project area may be considered as sensitive by DFG.

4.3.2 REGULATORY BACKGROUND

Biological resources in California are protected and/or regulated by a variety of federal and state laws and policies. Key regulatory and conservation planning issues applicable to the proposed project are discussed below.

4.3.2.1 FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Federal Endangered Species Act

Pursuant to the ESA, generally, USFWS has regulatory authority over federally listed species. Under the ESA, a permit is required for any federal action that may result in “take” of a listed species. Section 9 of the ESA defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Under federal regulations, take is further defined to include the modification or degradation of habitat where such activity results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Section 7 of the ESA outlines procedures for federal interagency cooperation to protect and conserve federally listed species and designated critical habitat. Critical habitat identifies specific areas that have the physical and biological features essential to the conservation of a listed species and that may require special management considerations or protection. Section 7(a)(2) requires federal agencies to consult with USFWS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroying or adversely modifying designated critical habitat.

For projects where federal action is not involved and take of a listed species may occur, the project proponent may seek an incidental take permit under Section 10(a) of the ESA. Section 10(a) of ESA allows USFWS to permit the incidental take of listed species if such take is accompanied by a habitat conservation plan that ensures minimizing and mitigation of impacts associated with the take.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (Title 16, United States Code [USC] Sections 661–666c), as amended, requires federal agencies to consult with USFWS, the National Marine Fisheries Service, and state fish and wildlife resource agencies, as appropriate, before undertaking or approving projects that control or modify surface water. The recommendations made by these agencies must be fully considered in project plans by federal agencies.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) implements domestically a series of international treaties that provide for migratory bird protection. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds; the act provides that it shall be unlawful, except as permitted by regulations, “to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird” (16 USC 703). This prohibition includes both direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes almost all bird species that are native to the United States. Permits for take of nongame migratory birds can be issued only for specific activities, such as scientific collection, rehabilitation, propagation, education, taxidermy, and protection of human health and safety and personal property.

Clean Water Act, Section 404

Section 404 of the CWA requires project proponents to obtain a permit from USACE before performing any activity that involves any discharge of dredged or fill material into waters of the United States. Waters of the United States include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Many surface waters and wetlands in California meet the criteria for waters of the United States.

Clean Water Act, Section 402

CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program, which is administered by the U.S. Environmental Protection Agency (EPA). In California, the State Water Resources Control Board is authorized by EPA to oversee the NPDES program through the regional water quality control boards (RWQCBs), in this case, the Colorado River (Region 7) RWQCB.

Clean Water Act, Section 401

CWA Section 401(a)(1) specifies that any applicant for a federal license or permit to conduct any activity that may result in any discharge into navigable waters shall provide the federal licensing or permitting agency with a certification that any such discharge will not violate state water quality standards. The RWQCBs administer the Section 401 program with the intent of prescribing measures for projects that are necessary to avoid, minimize, and mitigate adverse effects on water quality and ecosystems.

Rivers and Harbors Appropriations Act, Section 10

Section 10 of the Rivers and Harbors Appropriations Act of 1899 relates to the protection of navigable water in the United States and regulates any construction affecting navigable waters and any obstruction, excavation, or filling. Section 10 requires permits for all structures, such as riprap, and activities, such as dredging, in navigable waters of the United States. Navigable waters are defined as those subject to the ebb and flow of the tide and susceptible to use in their natural condition or by reasonable improvements as means to transport interstate or foreign commerce. USACE grants or denies permits based on the effects on navigation. Most activities covered under this act are also covered under Section 404 of the CWA. All activities involving navigable waters of the United States require a Section 10 permit. Projects must obtain approval of plans for construction, dumping, and dredging. Agencies involved in the coordination of the Rivers and Harbors Appropriations Act include the U.S. Coast Guard, USACE, EPA, and state and local agencies.

Federal Land Management Policy Act

Congress established the Federal Land Management Policy Act of 1976 to direct federal agencies to manage public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values; and that, where appropriate, will preserve and protect certain public lands in their natural condition, provide food and habitat for fish and wildlife and domestic animals, and provide for outdoor recreation and human occupancy and use.

U.S. Bureau of Land Management Resource Management Plan

The Arizona BLM Lake Havasu Field Office administers portions of land adjacent to the project site. *The BLM Lake Havasu Resource Management Plan* (BLM 2007), which covers a portion of the project area, guides management of public lands and their resource values for multiple use and sustained yield to ensure they are utilized in a manner that will best meet the present and future needs of the public. As required by the Federal Land Management Policy Act and current BLM policy, BLM established management directions for the balanced use of such renewable and nonrenewable resources as rangeland, wildlife, wilderness, recreation, cultural resources, and other natural, scenic, scientific, and historical values within the planning area.

U.S. Fish and Wildlife Service National Refuge System—Havasu National Wildlife Refuge

Established in 1941 with the signing of Executive Order 8647 by President Franklin D. Roosevelt, the HNWR encompasses 37,515 acres in California and Arizona. The majority of the HNWR is located in Arizona.

The overarching goal of the USFWS Refuge System is to conserve a diversity of fish, wildlife, plants, and their habitats for the benefit of current and future generations. By fulfilling this goal, the Refuge System can maintain the biological integrity, diversity, and environmental health of each refuge with a focus on native species and contribute to the conservation, and, where appropriate, restoration of representative ecosystems and ecological processes in the United States. A variety of management plans are developed for refuges, which include habitat management plans, comprehensive conservations plans, and annual habitat management plans. These plans focus on maintaining the refuge system for the conservation of migratory birds, anadromous and interjurisdictional fish, and marine mammals. The HNWR is primarily managed to maintain and enhance riparian and wetland habitat (USFWS 1994b:30) adjacent to the Colorado River. Refuges are also managed for recreation and public interaction. Refuges have regulations that limit or define the amount of recreation use in the refuge. Pertaining to the HNWR, regulations focus primarily on the types and timing of particular recreation uses.

4.3.2.2 State Plans, Policies, Regulations, and Laws

California Endangered Species Act

Pursuant to the CESA, a permit from DFG is required for projects that could result in take of a plant or animal species that is state-listed as threatened or endangered. The CESA defines “take” as an activity that would directly or indirectly kill an individual of a species. Authorization for take of state-listed species can be obtained through a California Fish and Game Code Section 2080.1 consistency determination or a Section 2081 incidental take permit.

California Fish and Game Code—Fully Protected Species

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take of fully protected species. DFG has informed nonfederal agencies and private parties that their actions must avoid take of any fully protected species.

California Fish and Game Code Section 1602—Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFG under Section 1602 of the California Fish and Game Code. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying DFG:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or

- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

“Stream” is defined as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. DFG’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A DFG streambed alteration agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

California Fish and Game Code Sections 3503 and 3503.5—Protection of Bird Nests and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

California Fish and Game Code Sections 5980–5993—Fish Screen Requirements

Section 5980–5993 of the California Fish and Game Code states that any screen installed under any of the provisions of this article shall be reasonably adequate to prevent fish from passing into the conduit and not unnecessarily impede the flow of water or prevent the owner from diverting the amount of water he is legally entitled to divert. This section specifies requirements for installation, inspections, and division of responsibilities between the conduit owner and DFG. In some cases, DFG defers to the National Marine Fisheries Service for fish screening criteria.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act, waters of the state fall under the jurisdiction of the appropriate RWQCB. The RWQCB must prepare and periodically update water quality control plans (basin plans). Each basin establishes numerical or narrative water quality objectives to protect established beneficial uses, which include wildlife, fisheries, and their habitats. Projects that affect wetlands or waters of the state must meet discharge requirements of the RWQCB, which may be issued in addition to a water quality certification or waiver under Section 401 of the CWA.

4.3.2.3 REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Lower Colorado River Multi-Species Conservation Program

Implemented in 2005, the LCR MSCP is intended to balance the use of water resources in the Lower Basin of the Colorado River with the conservation of native species in compliance with the ESA. The LCR MSCP outlines a 50-year effort to conserve 26 federally listed and state-listed candidate and sensitive species along the Lower Colorado River, including birds, fish, small mammals, bats, reptiles, amphibians, insects, and plants. The program area covers more than 400 miles of the Lower Colorado River from Lake Mead to the southernmost border with Mexico, and includes Lakes Mead, Mohave, and Havasu, as well as the historic 100-year floodplain along the main stem of the Lower Colorado River. The LCR MSCP provides ESA compliance for current and future operations, including water diversions and hydroelectric power generation in this area.

The MSCP outlines general and species-specific measures to conserve species and their habitats. Primary components of the plan include native fish augmentation, species research, species and ecosystem monitoring, conservation area development, protection of existing habitat, and adaptive management.

Critical to the Lower Colorado River system are the unique habitats that support a huge number of resident and migratory species. Native riparian habitat has declined from historical acreage because of factors such as dam construction, river channelization, conversion to irrigated agriculture, urbanization, wildfire, and invasive species. In most areas along the Lower Colorado River, overbank flooding that native plant species need to reproduce no longer occurs. The LCR MSCP requires the creation and management of more than 8,100 acres of riparian, marsh, and backwater habitat for the targeted species, including 5,940 acres of cottonwood/willow, 1,320 acres of honey mesquite, 512 acres of marsh, and 360 acres of backwaters.

County of San Bernardino 2007 General Plan

The *County of San Bernardino 2007 General Plan* outlines conservation and regulatory guidelines for natural resources. The Conservation Element of the plan provides direction regarding the conservation, development, and utilization of the San Bernardino County's natural resources. Its objective is to prevent the wasteful exploitation, destruction, and neglect of resources. Sensitive biological features are floral or faunal species of rare and/or endangered status, depleted or declining species, and species and habitat types of unique or limited distribution including alkali wet meadows, pebble plains, limestone substrate, walnut woodland, Joshua tree woodland, perennial springs, and riparian woodlands. The Conservation Element is oriented primarily toward natural resources (San Bernardino County 2007:V-1).

The Conservation Element includes regions within the county. The project falls within the desert region habitat of the Conservation Element, covering roughly 93% of the county land area (San Bernardino County 2007:V-5).

Goals and policies of the conservation element include programs incorporating resource agencies, nonprofit conservation groups, as well as the application of technological tools such as GIS to assist in coordinating and implementing the conservation of sensitive biological features.

Pertinent goals and policies include:

GOAL CO 1: The County will maintain to the greatest extent possible natural resources that contribute to the quality of life within the County.

GOAL CO 2: The County will maintain and enhance biological diversity and healthy ecosystems throughout the County.

- **Policy CO 2.1:** The County will coordinate with state and federal agencies and departments to ensure that their programs to preserve rare and endangered species and protect areas of special habitat value, as well as conserve populations and habitats of commonly occurring species, are reflected in reviews and approvals of development programs.

GOAL D/CO 1: Preserve the unique environmental features and natural resources of the Desert Region, including native wildlife, vegetation, water and scenic vistas.

4.3.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.3.3.1 ANALYSIS METHODOLOGY

Analysis of impacts on biological resources, including terrestrial and aquatic resources, was based on consideration of construction activities and the anticipated footprint of areas potentially disturbed, operations and maintenance activities, existing habitat conditions in the project area, and the known or presumed occurrence of special-status species near the project area. Table 4.3-4 summarizes the elements of the proposed project that may affect biological resources.

Table 4.3-4
Summary of Infrastructure Elements

Wells		Infrastructure				Lifetime (Years)
Remediation	Monitoring	Pipeline	Utilities	Roads	Buildings	
110	60	50,000	50,000	6,000	75,000 square feet	Up to 110 years (29 years likely)

Source: Data compiled by AECOM in 2010.

Under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations, DTSC would not be required to apply for or obtain federal, state, or local permits as long as the project actions are implemented in compliance with the substantive elements of the guiding principles associated with those permit processes. However, the project is also subject to compliance with RCRA regulations. RCRA requires that all necessary permits be obtained from the applicable agency. Therefore, the analysis contained in this section considers federal, state, and local permit requirements as part of the evaluation of significant impacts.

4.3.3.2 THRESHOLDS OF SIGNIFICANCE

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the CEQA Guidelines. The proposed project would cause a significant impact on biological resources if it would:

- have a substantial adverse effect on waters, riparian, or sensitive habitat protected by federal or state regulations, including federal wetlands (as defined by Section 404 of the CWA), riparian habitats, or other sensitive natural community identified in any local or regional plans, policies, or regulations, or by DFG or USFWS;
- have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- have the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife species to drop below self-sustaining levels, reduce the number or restrict the range of a rare or endangered plant or animal; or
- conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, other approved local, regional, or state habitat conservation plans, or other local policies or ordinances protecting biological resources.

4.3.3.3 IMPACT ANALYSIS

IMPACT BIO-1 **Potential Fill of Wetlands and Other Waters of the United States and Disturbance or Removal of Riparian Habitat.** *Implementation of the proposed project could result in fill of wetlands and other waters of the United States under USACE and DFG jurisdiction, as well as potential disturbance or removal of riparian vegetation along the Colorado River. This impact would be* ***potentially significant****.*

Project activities could occur in areas that qualify for USACE jurisdiction and are protected under Section 404 of the CWA and in areas subject to DFG jurisdiction under Section 1600 of the California Fish and Game Code, and/or areas considered sensitive natural communities (potential waters of the state) by DFG. Freshwater wells or intake structures and monitoring wells may be located in areas outside of the biological survey area. Construction of freshwater facilities or monitoring wells outside the biological survey area could adversely affect areas that have not been surveyed but that qualify for USACE jurisdiction and are protected under Section 404 of the CWA, areas subject to DFG jurisdiction under Section 1600 of the California Fish and Game Code, and/or areas considered sensitive natural communities by DFG.

Sensitive riparian habitats that are located along the Colorado River and along the confluence of washes could also be affected by project activities. Wells, pipelines, roads, and other infrastructure could be located along the bank of the Colorado River and in Bat Cave Wash, which contain riparian habitats. Although the ultimate amount and location of infrastructure is not known at this time, riparian habitat is located within the project boundary. Because of the possibility of disturbance to or removal of vegetation constituting riparian habitat, this impact would be **potentially significant**. **(Impact BIO-1)**

Mitigation Measure BIO-1: Potential Fill of Wetlands and Other Waters of the United States and Disturbance or Removal of Riparian Habitat.

Areas of sensitive habitat in the project area have been identified during project surveys. These areas include floodplain and riparian areas, wetlands, and waters of the United States. Habitats designated by DFG as sensitive, including desert washes and desert riparian, are also included. To the extent feasible, elements of the project shall be designed to avoid direct effects on these sensitive areas. During the design process and before ground disturbing activities, a qualified biologist shall coordinate with PG&E to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats to the extent feasible. DTSC shall be responsible for enforcing compliance with design and all preconstruction measures.

If during the design process it is shown that complete avoidance of habitats under USACE jurisdiction is not feasible, the Section 404 permitting process shall be completed, or the substantive equivalent per CERCLA Section 121(e)(1). In either event, the acreage of affected jurisdictional habitat shall be replaced and/or rehabilitated to ensure “no-net-loss.”

Before any ground-disturbing project activities begin in areas that contain potentially jurisdictional wetlands, the wetland delineation findings shall be documented in a detailed report and submitted to USACE for verification as part of the formal Section 404 wetland delineation process and to DTSC. For all jurisdictional areas that cannot be avoided as described above, authorization for fill of wetlands and alteration of waters of the United States shall be secured from USACE through the Section 404 permitting process before project implementation. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods agreeable to USACE and consistent with applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented.

Alternately, if USACE declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the substantive equivalent of the Section 404 permitting process shall be complied with by ensuring that the acreage of jurisdictional wetland affected is be replaced on a “no-net-loss” basis in accordance with the substantive provisions of USACE regulations. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods consistent with USACE methods, and consistent with the purpose and intent of applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. In any event, a report shall be submitted to DTSC to document compliance with these mandates.

If during the design process it is shown that complete avoidance of habitats under DFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, a Section 1602 streambed alteration agreement shall be obtained from DFG and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a no-net-loss basis in accordance with DFG regulations and, if applicable, as specified in the streambed alteration agreement, if needed. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to DFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve “no-net-loss” of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to DFG, BLM, and USFWS that is agreeable to these agencies, or, alternately, through the implementation of a habitat restoration plan consistent with the substantive policies of

DFG, BLM, and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.

Alternately, if DFG declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, and during the design process it is shown that complete avoidance of habitats under DFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, the substantive mandates of a streambed alteration agreement shall be implemented, and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a "no-net-loss" basis in accordance with DFG regulations and, if applicable. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to DFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan developed consistent with the substantive policies of DFG, BLM and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.

Timing:	Specific impact identification and project design adjustments shall occur during project design. All required permits from the appropriate agencies shall be obtained prior to construction, or alternately, if a permit is not required pursuant to CERCLA, the substantive requirements of each agency shall be complied with prior to construction. Implementation of permit requirements shall occur as specified in the permit, or consistent with the agencies' substantive requirements, and as early in the construction process as possible.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Developing and following avoidance and minimization measures for unavoidable impacts to identified sensitive habitats to assure, at a minimum, not net loss, as well as obtaining appropriate permits from appropriate agencies and implementing permit conditions would reduce impacts on sensitive habitats to a **less-than-significant** level.

IMPACT BIO-2 **Direct Disturbance of and Loss of Habitat for Special-Status Birds and Desert Tortoise.** *Implementation of the proposed project could affect avian and terrestrial species, specifically special-status birds and desert tortoise, either directly or through habitat modifications. This impact would be* ***potentially significant*** *for special-status birds and desert tortoise.*

Disturbance of Special-Status Birds and Loss of Habitat

The project area provides foraging and/or nesting habitat for a variety of special-status bird species. Many of the special-status bird species listed in Table 4.3-3 have potential to nest in the project area, including crissal thrasher, Sonoran yellow warbler, Arizona Bell's vireo, California black rail, Yuma clapper rail, western least bittern, and yellow-breasted chat. Project construction and operation would result in temporary and long-term disturbance in the project area, which includes habitat for sensitive species. Grading, clearing, and drilling in upland areas could result in disturbance or loss of foraging and nesting habitat, and construction of wells, roads, pipelines, staging areas, and buildings could adversely affect other habitat areas. Because these construction effects would be largely temporary and limited given the overall foraging habitat within the general area, this loss of foraging habitat would not substantially affect any special-status birds.

Removal or disturbance of active nests and impacts to nesting habitat of both sensitive species and other common nesting birds could result during construction-related and operational activities. Visual or noise disturbance of active nests could result in nest abandonment and loss for various special-status bird species. Loss of occupied habitat (including foraging and nesting habitat) and active nests of special-status birds could result in a substantial adverse effect on local populations of the affected species. Although construction and operational noise has the potential to affect nesting behavior and nesting success, there are currently no regulations that identify noise thresholds for determining a significant impact. On occasion, the USFWS has used a noise level of 60 A-weighted decibels (dBA) at an energy-equivalent noise level (L_{eq}) (or ambient noise levels, whichever is loudest) at the outer edge of habitat for federally listed threatened or endangered species, as the point at which construction noise may affect a listed bird species.

Of particular note, Yuma clapper rails is known to inhabit portions of the Topock Marsh, and annual surveys conducted by USFWS biologists have indicated that both the Topock Marsh and the Topock Gorge support relatively steady populations (Reclamation 2008:9). Road and pipeline construction and well development could occur within 300 feet of marsh habitat occupied by Yuma clapper rails. Direct and indirect effects could occur, such as dewatering of freshwater marsh habitat resulting in habitat loss, stranding of active nests (usually built at edge of water), and increasing predation and nest failure. Construction-related disturbance from traffic or noise during the rail’s breeding season could cause rails to have nest failures and/or abandon nesting territories. Implementation of freshwater flushing associated with the proposed project could result in disturbance to Yuma clapper rail during construction-related drilling if wells are located within 300 feet of occupied marsh habitat. Direct and indirect effects could also occur to the other special status bird species, such as Arizona Bell’s vireo, California black rail, other species shown in Table 4.3-3, and the nests of species covered under the federal Migratory Bird Treaty Act, through habitat loss, impacts to nests, and construction and traffic noise potentially resulting in nest abandonment.

In summary, nesting special-status birds in Table 4.3-3, including the Yuma clapper rail, and their habitats could be adversely affected by project implementation. This impact would be **potentially significant. (Impact BIO-2a)**

Disturbance of Desert Tortoise and Loss of Habitat

Desert tortoise may have historically used the project area, but no evidence of current use has been documented during the protocol-level surveys conducted yearly since 2004 (CH2M Hill 2005b:9, 2007a:5-10, 5-11; GANDA 2008a:5, 2009b:7-8). The PBA stated that although it is possible that the desert tortoise could enter the project from the west, the quality of the present creosote scrub habitat is poor, typically lacking annual vegetation for foraging and burrows for shelter (CH2M Hill 2007a:5-11 to 5-12, included as Appendix BIO to this EIR). The project area is also highly fragmented by steep rocky slopes of the Chemehuevi Mountains, deep drainages, pipelines, roads, and rail lines. These conditions make permanent occupation of the survey area unlikely. Removal of upland habitat through clearing to install wells, pipelines, or roadways during implementation of the proposed project could result in disturbance and loss of marginal desert tortoise habitat, but these effects would be relatively minor in terms of potential acres disturbed. However, since there is a slight potential for the desert tortoise to enter the project area, the species could be directly impacted by the implementation of the project. This impact would be **potentially significant (Impact BIO-2b)**.

Disturbance of Special-Status Species and Loss of Habitat Caused by Decommissioning

Potential project-related impacts on sensitive species could occur through removal and capping of wellheads, and through the decommissioning of other project features such as roadways, utilities, and pipelines. Project-related decommissioning would likely result in minimal effects on special-status species and their habitats. These effects might be similar to the effects of construction; however, the duration would likely be shorter and cover a smaller footprint. This impact would be **potentially significant.** (**Impact BIO-2c**)

Mitigation Measure BIO-2a: Disturbance of Special-Status Birds and Loss of Habitat.

To the extent feasible, the project implementation plans shall be designed to minimize removal of habitat for special-status birds. During the design process and before ground disturbing activities, a qualified biologist shall coordinate with PG&E to ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on habitat and nesting habitat for other special-status species, to the extent feasible. DTSC shall guarantee compliance with all preconstruction and construction phase avoidance measures identified during this process and included in any design plans. Vegetation removal and other activities shall be timed to avoid the nesting season for special-status bird species that may be present. The nesting cycle for most birds in this region spans March 15 through September 30.

Preconstruction Measures

Preconstruction breeding season surveys shall be conducted during the general nesting period, which encompasses the period from March 15 through September 30, if the final design of the project could result in disturbance or loss of active nests of special-status bird species. If vegetation removal or other disturbance related to project implementation is required during the nesting season, focused surveys for active nests of special-status birds shall be conducted before such activities begin. A qualified biologist shall conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected. For the Yuma clapper rail, the preconstruction surveys shall specifically identify habitat within 300 feet of construction areas, in accordance with substantive policies of USFWS including those set out in USFWS protocols.

Construction Measures

Before the initiation of project elements that could result in disturbance of active nests or nesting pairs of other special-status birds, a qualified biologist shall be consulted to identify appropriate measures to minimize adverse impacts during the construction phase of the project. If deemed appropriate for the final project design because of the potential for impacts, minimization measures will include focusing construction activities that must be conducted during the nesting season to less-sensitive periods in the nesting cycle, implementing buffers around active nests of special-status birds to the extent practical and feasible to limit visual and noise disturbance, conducting worker awareness training, and conducting biological monitoring (including noise monitoring to determine if construction noise at the edge of suitable nesting habitat is elevated above 60 dBA L_{eq} or ambient levels).

An avoidance and minimization plan for special status bird species, as defined in Table 4.3-3 and those species protected under the federal Migratory Bird Treaty Act, including the Yuma clapper rail, shall be developed and implemented in consultation with USFWS, and agreed upon by DTSC. Avoidance and impact minimization measures, such as prohibiting construction near or in sensitive bird habitat, limiting construction during breeding seasons, and requiring an on-site biological monitor, shall be included in the design plan and implemented to the extent necessary to avoid significant impacts on sensitive bird species.

Timing:	Before and during construction.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Conducting preconstruction surveys for special-status birds and nesting birds, developing and following avoidance and minimization measures, and

	establishing buffers or construction outside the nesting cycle would reduce the impact on nesting special-status birds to a **less-than-significant** level.

Mitigation Measure BIO-2b: Disturbance of Desert Tortoise and Loss of Habitat.

Preconstruction Measures

In areas where impacts to potential desert tortoise habitat are unavoidable, measures outlined in the Programmatic Biological Agreement (PBA) and in the USFWS letter concurring with the PBA, shall be implemented, as described below. To the extent feasible, project construction shall be designed to minimize removal of habitat for the desert tortoise. Before any ground-disturbing project activities begin, a USFWS-authorized desert tortoise biologist shall identify potential desert tortoise habitat in areas that could be affected by the final project design. Through coordination with the authorized biologist, PG&E shall ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on potential desert tortoise habitat to the extent feasible. These measures include the presence of a USFWS-authorized desert tortoise biologist on-site who will examine work areas and vehicles for the presence of desert tortoises, and who will conduct preconstruction desert tortoise surveys in areas where unavoidable impacts to tortoise habitat would occur. If feasible, the preconstruction desert tortoise surveys would coincide with one of the two peak periods of desert tortoise activity (i.e., if feasible, the surveys should be conducted in either the period from April through May, or from September through October). The preconstruction surveys shall be in full accordance with the substantive requirements of USFWS protocols.

Construction Measures

Before the initiation of project elements that could result in disturbance of desert tortoises or desert tortoise habitat, a USFWS-authorized desert tortoise biologist shall be consulted to identify appropriate measures to minimize adverse impacts. Minimization measures are likely to include micro-siting structures, pipelines, and access roads in previously disturbed areas or in areas with sparse scrub vegetation, conducting worker awareness training, and conducting biological monitoring.

Timing:	Before and during construction.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Conducting preconstruction surveys for desert tortoises, developing and following avoidance and minimization measures, and implementing the desert tortoise provisions of the PBA, would reduce the impact on the species to a **less-than-significant** level.

Mitigation Measure BIO-2c: Disturbance of Special-Status Species and Loss of Habitat Caused by Decommissioning.

To avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities, an avoidance and minimization plan shall be developed and implemented through consultation with DFG, BLM, and USFWS. These measures shall be based on surveys conducted prior to decommissioning, and during the breeding season (as previously defined in this EIR for each species or suite of species). Restoration of any disturbed areas shall include measures to achieve no net loss of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to DFG, BLM, and USFWS that is agreeable to these agencies. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.

Timing:	Specific impact identification, application for necessary permits, and project design adjustments shall occur during the design and planning of decommissioning activities. The measures addressing restoration shall be designed and approved by DTSC, DFG, BLM, and USFWS prior to any decommissioning activities that have the potential to result in ground disturbance. Implementation of the habitat compensation measures shall occur as dictated by the restoration and/or rehabilitation plan, but as early in the construction process as possible.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Achieving no net loss of habitat values through a restoration plan and restoration implementation, consulting with the appropriate agencies, developing and following avoidance and minimization measures, and/or obtaining appropriate permits from agencies and implementing permit conditions would reduce the impact on biological resources to a **less-than-significant** level.

IMPACT BIO-3

Fish Mortality, Interference with Spawning Habitat, and Other Adverse Aquatic Effects. *If selected as part of the final remedy, construction of the freshwater intake structure element of the proposed project could prevent fish from accessing spawning habitat or interfere with preferred habitat. In addition, operation of the water intake structure within the Colorado River could cause mortality to fish, including special-status species. Increased sedimentation and turbidity, the release of contaminants, and standing during construction activities could also adversely affect fish habitat and movement in the Colorado River. This impact would be* ***potentially significant****.*

Construction activities associated with the proposed project could result in increases in sediments, turbidity, and contaminants that could adversely affect fish and their habitat immediately adjacent to and downstream of construction activities. In addition, installing the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. Construction activities conducted near the Colorado River including well development, road construction, pipeline alignment, and utility construction would disturb soils that could enter water bodies and result in increased turbidity and sedimentation adjacent to and downstream of the disturbed areas.

The proposed project would likely not involve in-water work or well development within the floodplain. However, the project footprint could allow wells or other facilities near the river; therefore, effects could occur but would likely be small. Additionally, wells, roads, and pipelines could be placed in Bat Cave Wash or other drainages, which could convey sediments or contaminants during a flash flood.

Fish population levels and survival have been linked to levels of turbidity and siltation in a watershed. Prolonged exposure to high levels of suspended sediment could create a loss of visual capability in fish, leading to a reduction in feeding and growth rates; a thickening of the gill epithelia, potentially causing the loss of respiratory function; clogging and abrasion of gill filaments; and increases in stress levels, reducing the tolerance of fish to disease and toxicants.

Also, high levels of suspended sediments would cause the movement and redistribution of fish populations and could affect physical habitat. Once suspended sediment is deposited, it could reduce water depths in pools, decreasing the water's physical carrying capacity for juvenile and adult fish. Increased sediment loading could also degrade food-producing habitat downstream of the project area. Sediment loading could interfere with photosynthesis of aquatic flora and displace aquatic fauna.

Avoidance is the most common fish response to increases in turbidity and sedimentation. Fish will not occupy areas unsuitable for survival unless they have no other option. Some fish, such as bluegill and bass species, will not spawn in excessively turbid water. Therefore, construction activities could cause fish habitat to become limited if high turbidity caused by construction-related erosion were to preclude a species from occupying habitat required for specific life stages.

In addition, the potential exists for contaminants such as fuels, oils, and other petroleum products used in construction activities to be introduced into the water system directly or through surface runoff. Contaminants may be toxic to fish or may alter oxygen diffusion rates and cause acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival.

Additional effects could result from the construction of water intake structures. Construction of the intake would occur within a cofferdam, which contributes substantially to reduction and avoidance of potential construction-related adverse effects on water quality and fishery habitat. However, installation of the cofferdam and excavation as part of site preparation would result in temporary localized increases in turbidity and concentrations of suspended sediment. Installing and dewatering the cofferdam would also increase risks that fish may be trapped and stranded within the cofferdam during dewatering. As water is lowered from the pool behind the cofferdam, the trapped fish and macroinvertebrates would have no opportunity to escape. Without mitigation, all aquatic fish and most macroinvertebrates would be stranded and fish mortality would be 100%.

Sedimentation and increased turbidity or other contamination could degrade water quality and adversely affect fish habitat and fish populations in the Colorado River, and could result in fish mortality through stranding during construction. As a result, this impact would be **potentially significant.** (**Impact BIO-3a**)

Potential Loss of Aquatic Habitat during Operation of the Intake Structure

A typical intake system would consist of several belowground perforated or solid pipes (or rectangular channels) extending into the river. The pipes are usually fitted with one or more fixed or moving screens to prevent large objects (e.g., refuse) or fish from entering the intake. The intake pipes lead to pumps that pump the water to the desired location. The pumps are typically fitted with trash and fish screens.

Operation of the intake structure is anticipated to result in long-term, localized changes in fish habitat in the affected area. The fish screen and intake structure would exclude fish from a small area of existing habitat or modify existing habitat. The proposed intake structure would be located at the arch or in the immediate vicinity of the bridge. Migration habitat would likely be unaffected because the extent of habitat disturbed would be small, and effects would be minimal because screening would be installed to assist fish in avoiding the intake and using adjacent migration habitat. The intake structure would not affect the channel cross section and would not be likely to create a physical barrier or impediment to migration. The intake structure would not be likely to cause velocity changes or changes to current patterns that would result in a barrier to either upstream or downstream migration of fish within the Colorado River.

Changes in hydrologic conditions may result from water diversions, and these changes could result in flows and other hydrologic conditions that would affect the quality and availability of habitat for fish and other aquatic resources near the structure. Preferred spawning and rearing habitat could be affected by the intake structure(s). Therefore, the impact on special-status fish spawning habitat during operation of the proposed project would be **potentially significant.** (**Impact BIO-3b**)

Potential Fish Entrainment and Impingement during Operation of the Intake Structure

If a surface water source is required, operations of the intake structure element of the proposed project in the Colorado River could cause mortality to special-status fish species. The following analysis is provided in the event that the option for utilizing a surface water source (instead of a groundwater source) is necessary. The razorback sucker and bonytail chub are two special-status fish species with the potential to occur in the Colorado River near the potential intake structures. Entrainment losses of these adult and juvenile fish species can be minimized by installing a fish screen. However, even with a fish screen, the intake structure could affect fish through entrainment and impingement of fish eggs and larvae not effectively excluded from the diversion by the fish screen. In addition, the timing of diversions can have varying effects on early life stages of fish. For example, adverse effects on early life stages of bonytail chub could occur if diversions were to coincide with planktonic larval life stages that occur during summer months, a period of high entrainment vulnerability.

The LCR MSCP biological assessment (Reclamation 2004b) includes the following relevant information relative to diversions:

> The amount of incidental take for bonytail, razorback sucker, and flannelmouth sucker related to movement of water through the LCR and associated risk of entrainment, stranding, or desiccation, cannot be determined with any reasonable certainty; however, we do not believe this amount of take would be significant over the term of the consultation and permit. This determination is based on the limited risk identified for individuals, and that with the augmentation programs, many more fish will be in the system than could, we believe, ever be lost from the system due to entrainment or desiccation due to stranding caused by fluctuating water levels. During the life of this consultation and permit, as long as the Conservation Plan is being properly implemented, specifically the avoidance and minimization measures for covered species and the proposed mitigation, the Federal agencies and permittees may, in carrying out the actions described in the BA and HCP, incidentally take within the LCR planning area in the form of harm or harassment from all types of intakes, an unspecified number of individuals of covered species due to covered actions and implementation of the Conservation Plan. The amount of such take is not expected to be significant over the 50-year term and because it will be offset by proposed mitigation measures, including augmentation, monitoring, and management actions developed as a result of monitoring, leading to a net benefit for covered species.

The proposed intake would be operated consistent with the LCR MSCP (Reclamation 2004a) and other diversions that are required to minimize the potential for entrainment and impingement of fish. The project may result in the loss of individual fish species in the form of larvae or egg impingement on the fish screen; however, loss would be limited to those individuals drifting past the point of diversion and in close proximity to the intake structure. Diversions are expected to be small relative to river flow; therefore, potential individual entrainment losses would be low. Based on this expected limited amount of impact, and conclusions reached for the LCR HCP regarding intake structures in general, impacts would not be substantial or significant. Nevertheless, fish eggs and larvae could be affected if the intake structure were to be poorly designed and diversions were to take place during high entrainment-vulnerability periods for early life stages of special-status fish, which is generally April through June, corresponding to the period when the majority of larvae hatch. Therefore, this operational impact would be **potentially significant**. (**Impact BIO-3c**)

Mitigation Measure BIO-3a: Potential Impacts to Aquatic Habitat Related to Turbidity, Erosion, Sedimentation, and Overall Water Quality during Construction of the Intake Structure.

Hydrology & Water Quality Mitigation Measure **HYDRO-1** shall be implemented in order to reduce water quality impacts related to erosion and pollutant runoff through implementation of BMPs. In addition, installing the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. PG&E and its contractor shall coordinate with a qualified fisheries biologist to develop and implement a fish rescue plan. The fish rescue effort would be implemented during the dewatering of the area behind the cofferdam and would involve capturing those fish and returning them to suitable habitat within the river.

The fish rescue plan shall identify and describe the following items: collection permits needed, fish capture zones, staffing, staging areas, fish collection and transport methods, species prioritization, resource agency contacts, fish handling protocols, fish relocation zones, site layout and progression of dewatering and fish rescue, and records and data. To ensure compliance, a fisheries biologist shall be present on-site during initial pumping (dewatering) activities and to oversee the fish rescue operation.

Timing:	During construction activities.
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC shall be responsible for ensuring compliance.
Significance after Mitigation:	Implementation of these measures would minimize impacts on water quality by controlling potential pollutants, including sediment, and runoff discharges from the project site. Consequently, any impacts associated with pollutants resulting from alterations of drainage and water quality would be reduced to a less-than-significant level. In addition, the proper implementation of a fish rescue plan would prevent substantial fish mortality, which would reduce this impact to a less-than-significant level.

Mitigation Measure BIO-3b: Potential Loss or Degradation of Aquatic Habitat.

To restore, replace, or rehabilitate habitat impacted by the intake structure, PG&E shall implement the measures described below. Unless as provided below, PG&E shall confer with DFG regarding potential disturbance to fish habitat and shall obtain a streambed alteration agreement, pursuant to Section 1602 of the California Fish and Game Code, for construction work associated with intake structure construction; PG&E shall also confer with DFG pursuant to the CESA regarding potential impacts related to the loss of habitat or other operational impacts on state-listed fish species, respectively. PG&E shall comply with all requirements of the streambed alteration agreement and any CESA permits to protect fish or fish habitat or to restore, replace, or rehabilitate any important habitat on a “no-net-loss” basis.

Alternatively, if DFG declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the project proponent shall consult with DFG regarding potential disturbance to fish habitat and shall meet the substantive policies of a streambed alteration agreement and of the CESA for construction work associated with intake structure construction and operations. PG&E shall comply with all substantive requirements of the streambed alteration agreement and CESA to protect fish and fish habitat or to restore, replace, or rehabilitate any important habitat on a “no-net-loss” basis and to operate the facility in accordance with CESA to ensure no net loss of habitat function.

Additionally, PG&E shall consult with USACE regarding the need to obtain permits under section 404 of the CWA and section 10 of the Rivers and Harbors Act. In conjunction with these permitting activities, the USACE must initiate consultation with USFWS under Section 7 of the Federal ESA regarding potential impacts of the proposed project on federally listed fish species due to the loss of habitat on federally listed fish species. PG&E shall implement any additional measures developed through the ESA Section 7 processes, or its equivalent, to ensure “no-net-loss” of habitat function.

Alternatively, if USACE and/or USFWS decline to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, PG&E shall confer with USFWS regarding potential disturbance to federally listed fish species and federally listed fish species habitat and shall meet the substantive mandates under Section 7 of the Federal ESA regarding potential impacts to fish or to habitat of federally listed fish species. PG&E shall implement any additional measures developed through that processes, including compliance with the substantive requirements of all of what would be permit conditions if not exempt pursuant to CERCLA, and to ensure “no-net-loss” of habitat function.

Because the type and extent of habitat potentially affected is unknown, PG&E shall have an instream habitat typing survey conducted in the area potentially affected by the intake construction. Further, cooperation with USFWS and other fisheries biologists shall determine suitable and acceptable location(s) for the intake structure(s) to avoid the spawning habitat of special-status fish species. PG&E shall avoid habitat modifications, especially to habitat that is preferred by native fishes for spawning or rearing including side channels, cobble or gravel bars, and shallow backwaters. If these habitat types cannot be avoided, any disturbed habitat will be restored or replaced to achieve “no-net-loss” of habitat types and values as described above.

Timing:	Before operation of the intake structure.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Implementation of these measures would minimize adverse effects associated with entrainment and impingement, most specifically to fish eggs and larvae, by ensuring that the positive barrier fish screen is properly designed and operating effectively and efficiently. Impacts would be less than significant with mitigation.

Mitigation Measure BIO-3c: Potential Fish Entrainment and Impingement during Operation of the Intake Structure.

Both screened and unscreened diversions can entrain larval life stages of fish. For example, adverse effects to early life stages of fish could occur if diversions coincide with planktonic larval life stages that occur during summer months, a period of high entrainment vulnerability. Prior to operation of the intake structure, PG&E shall consult with USFWS and DFG to determine the most vulnerable time of the year for entrainment or impingement of razorback sucker and bonytail chub eggs or larvae.

PG&E shall install a state-of-the-art positive-barrier fish screen that would minimize fish entrainment and impingement at the intake structure. The fish screen shall be designed in accordance with DFG and the National Marine Fisheries Service criteria, with specific consideration given to minimizing harm to fish eggs and other early life stages.

To ensure that the fish screen operates as intended and reduce the risk of impacts, long-term monitoring of the operations and maintenance of the positive-barrier screen shall be conducted. Monitoring at the onset of diversions through the intake shall include approach velocity measurements immediately after the positive-barrier screen operations begin, with fine-tuning of velocity control baffles or other modifications as necessary, to achieve uniform velocities in conformance with the screen criteria established by regulatory agencies.

Timing:	During design and operation of the intake structure.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Implementation of these measures would minimize adverse effects associated with entrainment and impingement, most specifically to fish eggs and larvae, by ensuring that the positive barrier fish screen is properly designed and operating effectively and efficiently. Impacts would be less than significant with mitigation.

Consistency with Regional and Local Plans. *Implementation of the proposed project would not have substantial adverse effects on the viability of populations of species covered in the LCR MSCP, the effectiveness of the LCR MSCP's conservation strategy, and attainment of the goals and objectives of the LCR MSCP. Additionally, the project would not conflict with resource management goals of USFWS, BLM, or DOI. This impact would be* ***less than significant****.*

Regional and local plans include the LCR MSCP, *County of San Bernardino 2007 General Plan*, BLM *Lake Havasu Resource Management Plan*, and *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan*.

The LCR MSCP focuses primarily on river flows including diversions, discharges, hydroelectric facilities, return flows, and water quality within the three states through which the river flows: Nevada, California, and Arizona. The project would affect upland and potentially riparian habitat, but the overall scale of the proposed activities is small, given the landscape. The one element of the project that is more related to the LCR MSCP is the potential water intake structure within the Colorado River. If selected as part of the final remedy, it is anticipated that the proposed intake would be operated consistent with the LCR MSCP (Reclamation 2004a) and other diversions that are required to minimize the potential for entrainment/impingement of fish. Diversions are expected to be small relative to river flow; therefore, potential individual entrainment losses would be low. Two biological goals of the LCR MSCP include the conservation and the assistance in the recovery of the razorback sucker and the bonytail. The LCR MSCP has incorporated the stocking of these two species in the river to offset impacts associated with entrainment and impingement resulting from the operation of water intake structures within the LCR. The LCR MSCP has identified the Metropolitan Water District of Southern California and Central Arizona Water Conservation District efforts as the two largest water diversions out of the LCR, and the other diversions are considered relatively small, and minimally contributing to impacts to aquatic resources (Reclamation 2004a:Chapter 1). Thus, the project would likely have little effect on the attainment of the LCR MSCP goals and objectives, the conservation strategy of the LCR MSCP, or the viability of the covered species.

BLM's *Lake Havasu Land Management Plan* outlines guidance for managing habitat, fish, wildlife, and special-status species. The plan also requires BLM to protect water quality or other potentially harmful conditions for resident wildlife, fish, and human populations. The project area is located within an Area of Critical Environmental Concern (ACEC), designated the Beale Slough Riparian and Cultural ACEC. This area is designated to protect both cultural and natural resources. This large ACEC contains regional rare riparian resources and wildlife habitat at Beale Slough to the north of the project area (BLM 2007:106, Map 28), but the project area contains the cultural element of the ACEC. No conflicts with BLM's management plan are anticipated with implementation of the proposed project. The proposed project does not fall within a prohibited activity and the project activities would not degrade the biological resources element of the ACEC. Actions associated with cleanup of the contaminated groundwater would not conflict with management goals because these actions would reduce the potential for long-term adverse effects on sensitive resources.

The *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan* for HNWR offers guidance for managing habitat, fish, wildlife, and special-status species and is similar to the BLM plan in the protection of resident wildlife and fish. The plan also delineates sensitive and important habitats, or areas of substantial biodiversity into Special Project and Protection Areas (USFWS 1994b). These areas have defined management goals and objectives assigned to them within the plan. USFWS lands in the project area are not delineated into Special Project/Protection Areas and therefore do not have more specific management goals. The project would not conflict the overall management goals of the HNWR and would not be a prohibited activity under the plan. The proposed project would clean up contaminated groundwater that may be harmful to refuge resources in the future. Although the physical implementation of project activities (i.e., drilling wells, installing pipes and a treatment plant) may not be compatible with the purposes of the refuge, reducing the potential for long-term harm from contaminated groundwater would be compatible and could be permitted.

The goals and policies for the *County of San Bernardino 2007 General Plan* are not in conflict with implementation of the project. The proposed project would not affect substantial areas of habitat and would not substantially diminish habitat values because the project would have a small overall footprint and would not occur within pristine habitat. Because of the relatively small area affected, the area disturbed by the proposed project would not substantially diminish habitat values. This impact would be **less than significant**. No mitigation would be required.

> Substantial Interference with Fish or Wildlife Movement Corridors or Nursery Sites. *Implementation of the proposed project would not substantially interfere with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. This impact would be* less than significant*.*

Interference with Fish and Wildlife Movement Corridors or Nursery Sites

Wildlife movement corridors or linkages are a concern to local, state, and federal resource and conservation agencies because these corridors allow wildlife to move between adjoining open space areas that are becoming increasingly isolated as open space becomes increasingly fragmented from urbanization, rugged terrain, or changes in vegetation. However, corridors mitigate the effects of this fragmentation by (1) allowing wildlife to move between remaining habitats, thereby permitting depleted populations to be replenished and promoting genetic exchange; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk of catastrophic events (such as fire or disease) on population or local species extinction; and (3) serving as travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other needs (Noss 1983:704; Simberloff and Cox 1987:63-65).

Wildlife movement activities typically fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas, or individuals extending range distributions); (2) seasonal migration; and (3) movements related to home range activities (foraging for food or water, defending territories, searching for mates, breeding areas, or cover). A wildlife corridor is defined as a piece of habitat, usually linear in nature that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bounded by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to as “habitat or landscape linkages”) can provide both transitory and resident habitat for a variety of species.

Within the aquatic environment of the river, the project would not interfere with the upstream and downstream movement of any fish or wildlife species. If the water intake structure is required for the project, the river is wide enough so that the structure would not adversely interfere with movements along the river corridor. In the terrestrial setting, the project would not adversely interfere with any wildlife movement through the project site, or through the region. Project components such as monitoring wells or other structures would be relatively widely distributed across the project area, and would therefore not present a barrier to wildlife movement. Pipelines would be suspended over drainages, which typically represent preferred movement routes for wildlife, due to the protective cover that they afford. Additionally, any proposed access roads associated with the project would likely be utilized by wildlife species as local movement routes. The dispersed nature of the project components would result in the site retaining relatively large, contiguous, and intact areas of wildlife habitat within the project area, which would remain as viable areas for use by wildlife. Therefore, this impact would be **less than significant**. No mitigation would be required.

4.4 CULTURAL RESOURCES

This section details the existing historical, archaeological, and paleontological resources within the project area; the variety of resources in the project area and surrounding vicinity; and the relevant federal, state, and local regulations and policies. This section also provides an analysis of the proposed project. The proposed project is intended to remediate contaminated groundwater based on available information, with the understanding that implementation of the final remedy will involve refinements in the technical methods described in Chapter 3 of this EIR. Specifically, after a remedy concept is selected and approved, a Corrective Measures Implementation Workplan, followed by design plans for facility siting and operation and maintenance activities, will be prepared. Accordingly, this section provides a program-level analysis of the potential for the construction of physical facilities that would be necessary to implement the proposed project to result in significant impacts on cultural and paleontological resources.

4.4.1 EXISTING SETTING

4.4.1.1 HISTORICAL CONTEXT OF PROJECT AREA

The Colorado River passes through the eastern portion of the project area and separates the portion of the project area that is located in California from the portion that is located in Arizona. From the earliest times, the lower Colorado River offered a "linear oasis" through an extremely dry environment and was a magnet for wildlife and humans (Stone 1991:5). The river and its environs were, and continue to be, of high importance to many Native American tribes. This importance continued into the historic period with the Colorado River serving first as a transportation corridor and then as a source of water for agricultural practices. The Colorado River also became a source of hydro-electric power for the rapidly urbanizing southwestern United States.

Archaeological Setting

The project site is located at the boundary between the Mojave Desert and the Sonora Desert biotic zones, each of which has a somewhat distinct prehistory. Three broad prehistoric periods can be identified for the California deserts (CH2M Hill 2004:3-2) and are discussed below.

Paleoindian or Paleoarchaic

Archaeologists refer to the earliest established period of human occupation of the desert west as the Paleoindian or Paleoarchaic period. In the Mojave Desert the Lake Mojave complex (ca. 12,000 to 7,500 years "Before Present" [B.P.]) is the local manifestation of this broad cultural period (CH2M Hill 2004: 3-2). In California's Sonoran Desert, Paleoindian-Paleoarchaic sites are often placed within the San Dieguito complex, which shares many characteristics with the Lake Mojave complex. Lake Mojave artifact assemblages are marked by various artifact types, including long-stemmed and leaf-shaped points, and occasional fluted points that may be related to assemblages associated with the Clovis culture. Also present are crescents, domed scrapers, and heavy core tools. While Warren and Crabtree (1986:184) believe that ground stone artifacts are rare or absent in the complex, occasional milling tools have been found in the Lake Mojave period contexts (Grayson 1993:273). Some researchers have argued that certain intaglios, rock rings, and trails date as early as the San Dieguito complex in the Sonoran Desert (Hayden 1982:582), but these features are extremely difficult to date accurately.

Because sites of the Lake Mojave period are often found in association with the shorelines of ancient lakes and outwash drainages, some researchers have argued that Lake Mojave peoples focused their subsistence pursuits on lacustrine resources; in contrast, other archaeologists suggest that grasslands suitable for the grazing of large game would have surrounded the lakes, and that these were the primary subsistence focus of Lake Mojave period groups. Relatively few robust faunal assemblages have been recovered from Lake Mojave sites, but investigations of Lake Mojave sites at Fort Irwin (Basgall and Hall 1994:76) and elsewhere provide some evidence for the exploitation of a broad range of fauna including freshwater mollusks, fish, and large and small game animals.

Hence, a relatively broad-spectrum subsistence strategy, rather than a narrow focus on large game or lacustrine resources, may be suggested.

To date no evidence of Lake Mojave period sites have been reported in the Topock area, but it is possible that such sites could be present on stable surfaces such as well-developed desert pavements. Additionally, Lake Mojave period sites could occur in depositional environments along the Colorado River floodplain but would be very deeply buried within Holocene alluvial sediments.

Archaic

The Archaic period (ca. 7,500 to 1,500 B.P.) in the desert west was a time when humans were becoming increasingly adapted to a variety of local conditions. During this period, the lands in the southwest were transformed into the deserts seen in the region today. Early archaic peoples (7,500 to 6,800 B.P.) followed a highly mobile hunter-gatherer lifestyle, moving through various procurement grounds where subsistence resources were located (CH2M Hill 2004:3-3). This largely nomadic existence led to a large sphere of interaction.

There is evidence that the Middle Archaic period in this region, which began around 6,800 B.P. and lasted until 3,500 B.P., was substantially drier and more arid than in previous times (Grayson 1993:215). This phase is contemporaneous with the Pinto period (Warren and Crabtree 1986:184). Pinto period sites are characterized by assemblages containing the diagnostic Pinto point type, as well as a conspicuous rarity of grinding tools, suggesting that seed processing was not common. Other tools common in the assemblages of Middle Archaic sites include Elko point types, large and small leaf-shaped points and knives, keeled scrapers, and well-made flake scrapers (CH2M Hill 2004:3-4).

The Late Archaic period, which began around 3,500 B.P. and lasted until 1,500 B.P., shows evidence of a gradual cultural shift for those cultures within the region. Settlement patterns during the Late Archaic period begin to show evidence of a more localized way of life, with evidence suggesting the increased importance of agriculture, wild-plant horticulture, and regional trade networks that spanned from the Pacific coast to the Southwest. Sites from this time period exhibit evidence of semi-permanent pit-houses, increased economic importance of seeds, and the introduction of the bow and arrow (CH2M Hill 2004:3-4).

Archaic period sites could be present in the project area on stable surfaces such as well-developed desert pavements, or in depositional environments along the Colorado River floodplain. If present, materials associated with this time period could be deeply buried within Holocene alluvial sediments.

Late Prehistoric

During the Late Prehistoric period (1,500 B.P. to 150 B.P.), floodplain agriculture became firmly established along the Lower Colorado River and pottery production was introduced. The term “Patayan” is typically used to describe the particular Late Prehistoric cultural manifestation that is found in the region of the project area (McGuire and Schiffer 1982:216). The Patayan period is typically divided into three main phases: Patayan I (1,500 to 1,000 B.P.), Patayan II (1,000 B.P. to 500 B.P.) and Patayan III (500 B.P. to historic times). Within these phases are two culturally distinct regions included in the Patayan period, the “Upland Patayan” and “Lowland Patayan.” Evidence suggests the Upland Patayan had contact with and influence from the Anasazi of the Colorado Plateau. Lowland Patayan sites also exhibit evidence of influence from the Hohokam of central southern Arizona. Sites along the Colorado River in proximity to the project location are considered Lowland Patayan.

The Patayan period is characterized by evidence of large-scale trade networks and travel, including shells from the coast of California and ceramics from southeastern Nevada. It is believed that this period also marks the beginning of focused agriculture along this area of the Colorado River because of the presence of ceramics in many assemblages. Archaeological evidence in this region suggests a gradual evolution of agricultural behavior that likely began with wild-plant horticulture, transitioning through the seeding of untended plots to augment a hunting-and-gathering lifestyle, and eventually resulting in intensive agriculture with irrigation strategies and substantial dietary shifts. Archaeological evidence of this shift is seen in the establishment of increased use of storage pits, increased population, and domesticate varieties of plants, including corn, becoming more common in the assemblage over time.

Discovery of Patayan sites near the project area have not typically resulted in a clear subsistence history. However, one site identified by Geib and Keller in 2002 (CH2M Hill 2004:3-6), Bighorn Cave, suggests a rich plant-based diet that complemented hunting and gathering expeditions. The earliest components of the Bighorn Cave site include agave parts, cactus stems, screwbean mesquite pods, juniper bark, and goosefoot or pigweed greens. Domesticated corn kernels, squash rinds, and a bean were also found, although in small quantities in the earliest components of the site (CH2M Hill 2004:3-6).

Population increases during the Patayan II and III phases occurred in conjunction with increases in cultural complexity and differentiation, including the adoption of some ceramic decorative styles (recurved rims, stucco finishes) and the abandonment of others (incised decoration). Increased complexity and regional differentiation appears to be related to increases in migration of people from the Lake Cahuilla area sometime near 600 B.P., with ceramic traditions such as Colorado Buff, Palomas Buff, and Parker Buff found at Patayan sites and throughout the region (CH2M Hill 2004:3-6).

Ethnographic Setting

Several culturally distinct Native American groups have long-standing historical and cultural ties to the project area and the surrounding region. The following section contains ethnographic information regarding these cultural groups, including the Mojave, Chemehuevi, Hualapai, Quechan, Cocopah, Halchidoma, Maricopa, Serrano, Cahuilla, Yavapai, and Havasupai peoples.

Mojave

The Mojave, or Aha Makav, are a Yuman-speaking people whose territory, according to the ethnographic literature, included both riverine and inland areas; their riverine settlement area was mainly north of the Bill Williams River up to the present Nevada border. This main area of Mojave occupation extended on both sides of the lower Colorado River from south of Davis Dam to Topock (Stewart 1983:55). At one time, however, they also occupied Cottonwood Island farther to the north, and the Chemehuevi and Colorado valleys to the south (Stewart 1969:257–276). The historical record indicates that the Mojave were encountered by the Juan de Onate Spanish expedition as far south as the present Colorado River Indian Reservation in 1604 (Stewart 1969:257-276) and that they intermittently controlled areas as far south as Palo Verde valley. Sherer (1965:5) describes their settlement area thusly:

> Their river holdings stretched from Black Canyon, where the tall pillars of First House of *Mutavilya* loomed above the river, past *Avi kwame* or Spirit Mountain, the center of spiritual things, to the Quechan Valley, where the lands of the Indians began. Translated into present landmarks, their lands began in the north at Hoover Dam and ended about one hundred miles below Parker Dam. Their tribal name was *Aha macave*, meaning the people who lived along the water (the river).

In addition to the Mojave occupation of the river, there are ethnographic accounts and archaeological evidence that groups of Mojave also occupied interior regions in both California and Arizona for extended periods of time. Habitation patterns and types during the ethnographic past typically consisted of flat-topped shade structures during the summer months and low, rectangular, sand-covered structures during the winter months. The roofs were typically covered with arrowweed thatch, upon which a thick layer of muddy sand was created for insulation (Kroeber 1925:731–735).

Subsistence for the Mojave was dependent partially on agriculture, with crops such as maize, tepary beans, pumpkins, and melons forming the foundation of their diet. Maize was by far the most principal of all the crops, however, with a family typically clearing between 1 and 2 acres. Silt deposited by river overflows fertilized the fields, while women did most of the planting and cultivation (Stewart 1983:58). Wild plant gathering augmented agriculture production, with women gathering cactus, wild seeds, and screwbean. Fish was the most important protein source for the Mojave, with dip nets, drag nets, traps, and large basketlike scoops used to catch fish out of the river.

The Mojave religion placed special emphasis on the experience of and interpretation of dreams, with dreams affecting nearly all facets of life and behavior. Stewart (1983:65) states:

> Mohave religion featured an unusual conception of dreaming, which was in fact a pivotal concept in their culture as a whole, permeating almost every phase of Mohave thought and endeavor. All special talents and skills, and all noteworthy successes in life, whether in warfare, lovemaking, gambling, or as a shaman, were believed to be dependent upon proper dreaming.

Kroeber (1925:754) noted that dreams often were experienced in close connection with tribal history and mythological traditions.

Oral traditions of the Mojave people are generally rich with detail, with mythical occurrences commonly associated with identifiable places and landmarks. Mojave stories typically recount journeys and/or the transformation of mythical persons into animals or landmarks. Many stories are part of traditional song cycles, and the landmarks identified in the stories include those within traditional Mojave territory as well as places in the surrounding region (Kroeber 1925:756). Additionally, Mojave tradition involves the naming of clans. Clan names were given by *Mutavilya*, The Creator, based on aspects of the natural world, including (but not limited to) the sun, rain, small birds, the coyote, prickly pear cactus, and the frog. According to oral tradition, each clan went in different directions from *Avi kwami* (Spirit Mountain) after receiving their name. Each clan has a song commemorating the journey and various encounters experienced during that journey. Modern Mojave consultants indicate that three somewhat distinct geographic groupings of clans were recognized: a northern group in the Davis Dam vicinity, a middle group in the Mojave Valley, and a southern group south of Needles.

The Mojave successfully resisted Spanish attempts at colonization and maintained traditional lifeways and political systems until the U.S. military gained control of the area in the 1850s. Consequently, many tribal members relocated to an area south of Parker in 1859. Additional Mojave settled there when the Colorado River Indian Tribes Reservation was founded in 1865. Many Mojave, however, remained in Mojave Valley. The Fort Mojave Reservation was founded there in 1870.

Chemehuevi

In addition to Yuman-speaking groups such as the Mojave, the lower Colorado River was also traditionally inhabited by the Numic-speaking Chemehuevi, also known as Nuwu (The People). The Chemehuevi are considered to be the most southern sociopolitical division of the Southern Paiute, although a substantial amount of intercultural interaction occurred between the Chemehuevi and Mojave. Individual bands of Chemehuevi people traditionally inhabited a large range, containing areas in Nevada, California, and Arizona. Halmo (2001:45) described the range of the Chemehuevi as:

> …territory that extended in the north from roughly (east to west) Indian Springs through Ash Meadows in Nevada to the Funeral and Black Mountains immediately east of Death Valley; the western boundary encompassed the San Bernardino Mountains and Barstow, and extended from (north to south) Death Valley and the Panamint Range to the western flanks of the Avawatz Mountains, just east of Soda Lake south to the western flank of the Old Dad Mountains, near to or encompassing Cadiz Dry Lake, to the Big Maria and Little Maria Mountains, and to the area around Blythe, California. In the east, Chemehuevi territory included alluvial floodplain lands east of the Colorado River and up along the Bill Williams River and northward….

Through much of prehistory, the Chemehuevi were largely hunter-gatherers who traveled cyclically through a traditional range over the course of a year; however, at the time of contact with European explorers, many Chemehuevi practiced floodplain agriculture. Habitation styles varied depending on the band, with some bands inhabiting caves or protected canyons, while others lived in conical brush structures and wickiups, which are dome-shaped structures covered with grass or bark. In contrast with the rest of the Southern Paiute bands, the Chemehuevi would also sometimes build a modified version of the mud-covered house described above; however, this structure was usually built without a front wall (Kelly and Fowler 1986:371). Settlements were typically close to horticultural fields and riverine areas, or near oases (Halmo 2001:47).

The earliest European explorers to come in contact with the Chemehuevi documented an irrigated horticultural system along the river. In areas where population densities were higher and villages were present, agriculture was employed as a subsistence technique. Plants typically raised in this manner included gourds, winter wheat, yellow maize, and grasses (Kelly and Fowler 1986:371). The collection of wild plants supplemented the Chemehuevi diet, including the collection of seeds, pine nuts, and acorns. Communal hunting parties generally hunted rabbits, antelope, and mountain sheep, with deer, bear, mountain lion, water fowl, small rodents, fish, lizards, and some insects rounding out the menu of Chemehuevi protein sources (Kelly and Fowler 1986:370).

Historical accounts suggest that the Chemehuevi belief systems include a form of shamanism where power was bestowed upon a person through dreams. A prospective shaman would be visited in his dream by one or more guardians—usually in animal form—who would teach them instructions, songs, and bestow upon them shamanistic power (Kelly and Fowler 1986:383). The songs passed on through dreams were of great importance and include the Funeral, Deer and Mountain Sheep, Bird, Salt, Quail, and Coyote songs. These songs are generally descriptions of travels, complete with place names, important landmarks, natural phenomena, and environmental conditions (including the animals present). The recitation of important songs is common at Chemehuevi cultural events even today.

The oral traditions of the Chemehuevi are similar to those of the other Southern Paiute bands, with the origin of the people located near Mount Charleston (near present-day Las Vegas). Coyote is a principal personality in the Chemehuevi oral tradition and is responsible for naming the animals, stealing fire for mankind, inventing agriculture, establishing customs, teaching mankind about archery, and passing down pottery making (Kelly and Fowler 1986:385). Chemehuevi stories reinforce the belief that all things are alive and possess a certain amount of power. Thus, interactions with the natural environment are typically accompanied by an explanation and thanks to the resource for benefiting mankind (Halmo 2001:49).

In 1853 the Chemehuevi lost their traditional lands to the U.S. Government. The Chemehuevi Valley Reservation was established in 1907 and the tribe was reinstated and recognized as the Chemehuevi Tribe in 1970. Today, the reservation comprises approximately 32,000 acres of trust land, including thirty miles of Colorado River frontage, downstream of the project area (Chemehuevi Indian Tribe 2010). Chemehuevi descendents reside on the Colorado River Indian Tribes reservation and several other reservations as well, including the Twentynine Palms reservation.

Hualapai

Like the Mojave, the Hualapai, or “Hwal’bay,” speak a Yuman language. The Hualapai once inhabited a large area of northwestern Arizona. According to McGuire (1983:25), the canyons of the Colorado River formed the northern border of their traditional area, while the Black Mountains formed its western boundary. The southern boundary of their traditional area is near the Bill Williams and Santa Maria Rivers, with the eastern border generally running across the Coconino Plateau to Cataract Creek Canyon.

Throughout much of prehistory, the Hualapai were hunter-gatherers, organized socially by families and camps into larger “subtribes” and tribes (McGuire 1983:30). For much of the year, families would live together in small camps that numbered approximately 25 persons. Wickiups and caves or other rock shelters were common habitation sites in early prehistory, although ramadalike structures became more common for summer use. Semi-permanent winter homes made of arrowwood and covered with juniper bark were common in the early 20th century; however, little evidence suggests that this building style has much antiquity.

While the area of northwestern Arizona is arid, it is relatively diverse biologically. This variation provided the Hualapai an adequate foundation for a hunter-gatherer lifestyle that was fairly consistent in its seasonal pattern. The spring would start with the gathering and processing of mescal and agave in the canyons and foothills, with summer bringing a move to the valley floor in search of stick-leaf, which was an important carbohydrate source. Cactus, prickly pear, saguaro, barrel cactus, and yucca were collected during the summer as well, with plant collecting shifting toward nuts, juniper berries, piñon cones, and sumac berries in the autumn. Hualapai men would typically hunt rabbits, rodents, mule deer, bighorn sheep, and pronghorn antelope over the year. Oral histories suggest that the Hualapai created irrigation networks and diversion dams to seasonally flood nearby fields. The Hualapai grew squash, maize, beans, watermelons, and wheat.

McGuire (1983:35) reports that details of distinctive Hualapai religious beliefs are not provided in early ethnographic works, likely because the Hualapai were regularly subjected to religious conversion during the historic period. It is clear that shamanism, however, was common among the Hualapai, with shamans gaining their power through dreams. The Hualapai also have a complex mourning ritual that involves ceremonial crying (Kroeber 1935:148).

Like the Chemehuevi, Coyote plays a primary role in the traditions of the Hualapai, which also includes Coyote's older brother (*Matvila*) and younger brother (*Turcupa*). A fourth entity, *Kathat Kanave*, "Told the Coyote" is also present in the mythology, but is not necessarily considered a character, but a designation of the type of story being told and its place in time (McGuire 1983:26).

According to an origin story recorded by Ewing (1961:8-23), *Kathat Kanave* and Coyote were instructed by the Great Spirit to cut large bundles of canes from the western bank of the Colorado River. At night, the Great Spirit created people from the canes but, being interrupted by an excited Coyote, only a few people were created. *Kathat Kanave* then took the people to Meriwhitica Canyon and instructed them in irrigation techniques, hunting, and food gathering. Eventually, the Yavapai were forced by *Kathat Kanave* to move to the southeast, Mojaves to the west, Southern Paiute to the north, and the Navajos, Hopis, and Havasupais to the south, with the Hualapai remaining at the canyon.

The Hualapai Tribal Reservation was created in 1883 and occupies part of three northern Arizona Counties. Peach Springs, the tribal capital, is 50 miles east of Kingman on Historic Route 66.

Quechan

The Quechan occupied the lower Colorado River corridor up and downstream of the Gila River confluence near Yuma. Their settlements ranged from just south of the international border to as far north as Palo Verde Valley; beyond this core territory, they travelled widely both up and down the river corridor from the delta to southern Nevada and east and west from the Phoenix basin to the Pacific Coast. This long-distance travel was facilitated by a regional trail system, portions of which have may have passed near the Topock area (Johnson 2001:36). The Quechan language is a member of the Yuman linguistic family, closely related to Mojave and Cocopah.

Like other lower Colorado River groups, the Quechan practiced flood-based agriculture. Maize, tepary beans, squash, pumpkins, and melons were staple crops**.** This farming system depended upon the annual flooding of the Colorado River to provide new soil nutrients and particularly moisture to make river bottom planting possible. Anthropologists generally conclude that agricultural production provided less than 50 percent of the diet (Bee 1983:86). Thus, fishing and the gathering of wild plant foods, especially mesquite and screwbean, were also very important in the subsistence economy.

For the Quechan, like other lower Colorado River groups, individual dreaming to seek guidance in life and spiritually based power was a principal aspect of religious belief and practice (Forde 1931:201; Kroeber 1925:783). This included the learning of sacred songs, through dreaming, about the events that occurred at the time of the creation of the world. The singing of these songs by individuals was a principal avenue of religious expression. The dreaming experience meant that sacred places could be visited, and the sacred landscape traversed, through dreaming rather than through conventional travel, although physical travel along trails to sacred places was also an important aspect of the religious experience. The geography of sacred places related to the sacred song cycles of Yuman groups is a major cultural feature of the lower Colorado River region. Kroeber (1925:786) collected large quantities of information on places mentioned in Mojave song cycles, from as far afield as the Pacific Ocean and the Tehachapi Mountains, the Gulf of California, Tucson, and southern Nevada. Modern Quechan have stated that a similar geography of scared places is important in their culture, but place names have not been compiled to the same extent.

The Fort Yuma Indian Reservation was established in 1884 for the Quechan. The reservation is located near Yuma, Arizona, and includes land in Yuma County, Arizona, as well as land in Imperial County, California.

Cocopah

During the historic period, the Cocopah occupied the banks of the Hardy River in northern Baja California and the Colorado River south of the Quechan and other portions of the Colorado River delta (Alvares de Williams 1983:99). They shared the linguistic and cultural traditions with the other lower Colorado River groups. This included flood horticulture generally similar to that practiced by their Quechan neighbors to the north. Like other Lower Colorado River groups, the Cocopah travelled widely across the desert and up-and-down the river corridor. During the late 18th and early 19th centuries, the Cocopah were traditional allies of the Maricopa of the middle Gila River and the Halchidhoma, who then occupied the river corridor in the vicinity of Blythe. This alliance and religious travel to Yuman sacred sites may have brought the Cocopah to the Topock vicinity on occasion.

The Cocopah Reservation was established in 1917 and is currently divided into three parcels: East, West, and North. The reservation is located approximately 13 miles south of Yuma, Arizona near the community of Somerton, Arizona in Yuma County.

Halchidhoma/Maricopa

During the early historic period, the Yuman-speaking Halchidhoma occupied the banks of the Colorado River north of the Quechan (Kroeber 1925:799). They were closely linked culturally and politically with the Maricopa of the middle Gila River (Harwell and Kelly 1983:71–75). Spanish- and Mexican-era accounts, including statements by Halchidhoma and Maricopa themselves, tend to use the designations somewhat interchangeably. The Halchidhoma were thought of by other native groups as simply a division of the Maricopa located on the Colorado River. The subsistence and settlement practices, social organization, and general cultural characteristics of the Halchidhoma appear to have been very similar to those of other lower Colorado River groups of Yuman speech.

The Halchidhoma were allies of the Maricopa to the east and of the Cahuilla to the west. During the late 18th and early 19th century, there was severe conflict between the Halchidhoma and Mojave to the north of them and of the Quechan downriver. Around 1828, the Halchidhoma were defeated and survivors took refuge with their Maricopa allies and relatives primarily in central Arizona. As a result, very little ethnographic or ethnohistoric information is available on Halchidhoma utilization of southern California. However, it is likely that they periodically visited the Topock area during the times that they maintained villages along the river to the south.

Current reservations with Maricopa membership are located east of the Colorado River in central Arizona, near Phoenix, Arizona.

Serrano

The Serrano are a group whose language belongs to the Takic branch of the Uto-Aztecan stock, like the Cahuilla, and they shared many cultural traits with the Cahuilla. A mountain division of the Serrano occupied the slopes and upland areas of the San Bernardino mountain range (Bean and Smith 1978:570). The Serrano also originally occupied parts of the San Bernardino Valley. Serrano territory also included the desert region to the east of the San Bernardino Mountains out to Twentynine Palms. From there, the Serrano carried on exchange relations with the Halchidhoma by way of Pinto Basin and Rice Valley. A number of Serrano clan communities were located along the Mojave River from its headwaters to the sinks of the Mojave near Baker. These formed a desert division of the Serrano, intermarried with clans on the northern edge of the mountain division. Unlike the Mountain Serrano, the Serrano groups of the Mojave River were friends and allies of the Mojave of the Colorado River.

While the desert division of the Serrano exploited mesquite, like the Desert Cahuilla, the desert agave was absent from the desert territories of the Serrano. Various species of yucca were exploited in a manner similar to agave. Desert Serrano villages on the Mojave River did not have direct local access to pinyon and acorns but were able to procure them either through exchange or through visits to mountain area clans that had direct access to these resources. The Mojave River Serrano clan communities formed part of a long-distance exchange route that moved Olivella shell and other beads to the east, and textiles and other goods to the west, between Oraibi in northeastern Arizona and the Santa Barbara Channel. The Mojave played a key role in this long-distance trade to the Pacific.

Current reservations for Serrano members are located in western Riverside and San Bernardino counties, near the towns of Banning and Highland, California.

Cahuilla

Groups speaking the Cahuilla language occupied much of central-southern California from the inland valleys of western Riverside County, across the San Jacinto and Santa Rosa Mountains, throughout the Coachella Valley, and into the northern Colorado Desert (Bean 1978:575). The Cahuilla language is classified within the Takic family of the Uto-Aztecan stock, closely related to several other southern California languages such as Luiseno, Serrano, and Gabrielino. Ethnographers have divided the Cahuilla into three geographic units—the Mountain, Pass, and Desert Cahuilla. The Desert Cahuilla resided closest to Topock; their territory extended from the Coachella Valley into the Chuckwalla Valley west of the Colorado River. Earle (2009:66) documents historic-era Desert Cahuilla use and knowledge of sites on or adjacent sites on and near the Indian trail that later became the route of the Bradshaw Trail leading to the Colorado River corridor. The Cahuilla participated in alliance and exchange relationships with the Halchidhoma during the early historic period, activities that may have brought them periodically to the Topock vicinity.

The Desert Cahuilla subsistence economy focused on the gathering of wild plant foods from lowland environments, including mesquite, screwbean, cactus, and hard seeds (Bean 1978:578). But, the groups inhabiting settlements in the Coachella Valley in the 19th century often retained gathering areas in the Santa Rosa Mountains or in other upland environments, such as the northern Chocolate Mountains. At least by 1824, the Desert Cahuilla were practicing irrigation agriculture (Bean 1978:578), producing foods similar to those grown by Yuman-speaking groups on the Colorado River, including maize, beans, squashes, pumpkins, melons, and wheat.

Cahuilla religious beliefs and practices include sacred songs and oral texts that tell of the creation of the world and place of the Cahuilla within that creation. These traditional sources also provide moral and ethical guidance. The Cahuilla creation narrative includes several key elements that are common amongst the Takic and Yuman-speaking groups of southern California and eastern Arizona (Kroeber 1925:708). Public ceremonies were important components of Cahuilla culture and were held for a variety of occasions, including the marriage, naming of children, male and female initiation, cremation of the dead, and the annual mourning ceremony.

There are various reservations throughout southern California with Cahuilla membership, located primarily in central and western Riverside County near the Salton Sea and the San Jacinto Mountains.

Yavapai

The Yavapai are a group whose language is classified as Upland Yuman, which is related closely with the languages of the Hualapai and the Havasupai. The Yavapai are typically arranged into four general subtribe groups: Tolkapaya, Yavepe, Wipukpaya, and Kewevkapaya. The Yavapai occupied much of what is now central and west-central Arizona. The Tolkapaya subtribe occupied an area in the mid 19th century that ranged approximately 30 miles north of the Bill Williams River, near the Colorado River, to present-day Yuma. As such, parts of the Yavapai traditional territory include portions of the Havasu National Wildlife Refuge and areas immediately to the west and southwest of Topock (Khera and Mariella 1983:38). Yavapai historically had a number of hostile encounters with their neighbors to the north and south, including the Hualapai, Havasupai, Papago, Pima, and Maricopa. However, relations were generally peaceful with neighboring Navajo and Hopi tribes, with whom they exchanged mescal and buckskin for blankets and jewelry. Relations with neighboring Quechan, Mojave, and Cocopah were reportedly peaceful, as well, with some evidence that members of the Tolkapaya subtribe joined the Cocopah tribe in the mid-1800s and that agreements were made with the Quechan to share land and resources along the Colorado River (Khera and Mariella 1983:40).

Subsistence practices of the Yavapai generally followed the seasonal ripening of different plant foods, with bands migrating throughout their local territory as food became available throughout the year. Important plant materials collected for subsistence included nuts, seeds, and berries, as well as the fruit of the banana yucca. These crops were typically more plentiful in higher elevations and during the autumn months, with leafy greens collected in the spring and desert fruits collected in the summer. Agave was collected throughout the year and provided a dietary staple. Small-scale agriculture also supplemented the Yavapai diet, primarily including corn, beans, squash, and tobacco, although historical evidence suggests that intertribal warfare made sedentary agricultural activities difficult for some bands (Khera and Mariella 1983:45–47).

The homeland of the Yavapai is centered on the Sedona Red Rock and Verde Valley area in Arizona. The Yavapai believe that all human beings were sent forth from the Red Rock Mountains to the rest of the world, with the Yavapai remaining in the immediate region. Like other Yuman-speaking groups, spiritual leaders can gain knowledge, power, and songs through sleeping in sacred places (such as caves). Prayer is a central concept for the Yavapai religion, with those offering a prayer regularly drawing a cross, square, or diamond on the ground to indicate the four cardinal directions while the person positions themselves in the middle of the figure. The use of certain pollens, musical instruments, eagle features, and colored beads may also occur during rituals and prayers. Sweat lodge ceremonies are commonly held to provide opportunities for purification (Khera and Mariella 1983:51–53).

Current reservations with Yavapai membership are located in central and northern Arizona, near the cities of Prescott, Camp Verde, and Scottsdale, Arizona.

Havasupai

The Havasupai are another Upland Yuman-speaking group, closely related to the Hualapai and Yavapai. The traditional territory of the Havasupai includes an area south of the Colorado River in the Grand Canyon area, extending to Bill Williams Mountain and the San Francisco Peaks. The territory extends laterally from the Aubrey Cliffs in the west to the Little Colorado River in the east (Schwartz 1983:13-14). The Havasupai are closely tied linguistically and culturally with the nearby Hualapai, and relations with the Hualapai have been generally friendly. There is some evidence to suggest that relations between the Havasupai and Hopi were also friendly, although relations with Yavapai and Navajo were reportedly antagonistic up until the mid-19th century. Havasupai trade networks extended to the Hopi, Hualapai, Navajo, and Mojave areas surrounding the Havasupai traditional range, with buckskins, basketry, and foodstuffs traded to these tribes in return for cotton goods, horses, jewelry, and hides (Schwartz 1983:14).

The Havasupai had a relatively set annual subsistence cycle, with agriculture in the low-lying Cataract Canyon area occupying most of the warmer months, and hunting on the surrounding plateau occurring in the cooler months of autumn and winter. Corn, beans, and squash were raised in the irrigated agricultural fields of the low-lying canyons, with other crops, including peaches, figs, and apricots becoming more common in historic times. Subsistence during the winter months on the surrounding plateau included deer, antelope, and rabbits, as well as the collection of plant materials, including pinon nuts and mescal (Schwartz 1983:15).

In a manner similar to other Yuman-speaking tribes in the region, the Havasupai place great importance on dreams and dreaming. It is through dreams that important songs and power were transmitted to shamans. Dreams can have malevolent or healing qualities, depending on their nature. Upon death, it is believed that the spirit will travel to a land of the dead in the sky but can reappear as ghosts and cause illness or death. The primary ceremony held every year, the round dance, was in conjunction with harvest time and was meant to secure prosperity and rain. Neighboring Hualapai, Hopi, and Navajo were typically invited to this ceremony (Schwartz 1983:19).

The Havasupai reservation is located east of the Hualapai Reservation, in northern Arizona, directly south of the Grand Canyon and west of the Kaibab National Forest.

Historical Setting

The most significant trends and events of the historic era (starting around 1800 A.D.) in the project area had mainly to do with the development of the Topock crossing area of the Colorado River as a major transportation corridor. Today, the project area funnels railroad traffic across the Burlington Northern Santa Fe (BNSF) Railway bridge, truck and automobile traffic across the Interstate 40 (I-40) bridge, and natural gas through large interstate pipelines, including the pipeline that crosses the river on the Old Trails Arch Bridge. The latter was, originally, the first automobile bridge across the Colorado River in this region.

Surveys conducted in the project area for the first railroad crossing over the Colorado River resulted in the selection of an area near present-day Needles, which was initially established to serve as a primary depot for the Atlantic and Pacific railroads as trains moved across the desert. The initial bridge was destroyed in 1890 and the crossing was moved to the Red Rock Bridge, at present-day Topock, which was one of the first steel bridges and the longest cantilever bridge in the Americas. Early automobile traffic typically ferried across the Colorado River in the Topock area, but ferrying proved unreliable, depending on river flows, and a new bridge—Old Trails Arch Bridge—was constructed in 1916 to create a more reliable crossing. This bridge later served as the primary crossing for the National Old Trails Road, and later Route 66. Railroad realignments in the area resulted in the creation of a new bridge. Route 66 was routed across the Red Rock Bridge, while Old Trails Arch Bridge was adopted for use as a natural gas pipeline bridge, which it remains today. By the 1970s, the Red Rock Bridge was dismantled and Route 66 in the project area was relinquished by the California Department of Transportation.

During the operation of Historic Route 66, the town of Needles remained an important stopping place for westbound travelers as they moved across the Mojave Desert, serving as one of the closest places to purchase fuel, water, and food before journeying across California. As described by CH2M Hill (2004a:3-10 to 3-16), Route 66 itself began as the favored route of an influential citizen of Tulsa, Oklahoma named Cyrus Avery. He promoted a route between Chicago and Los Angeles that passed through St. Louis, Tulsa, Oklahoma City, Amarillo, Santa Fe, Albuquerque, Flagstaff, Barstow, and San Bernardino. The route was eventually approved by a committee of state and federal transportation officials in 1926, and U.S. Route 66 was born. While the roadway was barely more than a collection of local, county, and state routes (most of them in poor condition), marketing efforts by Avery promoted the route as “The Main Street of America” and the route received increasing utilization and fame. Through the 1920s and 1930s, passenger automobile and trucking traffic started to grow, as the average family could afford an automobile and expanded distribution networks became cheaper for farmers to support.

Despite being neither one of the earliest nor one of the longest American highways, Historic Route 66 is arguably the most famous highway route in the United States, inspiring songs and television shows and featured prominently in John Steinbeck’s novel *The Grapes of Wrath*. Historic Route 66 exemplifies a number of highly significant historical themes having to do with the development of the United States during the first three-quarters of the 20th Century. These include the expanding role of the federal government in transportation and other realms; the rise of the trucking industry; the penetration of the mass market by automotive technology and the massive changes in the American culture and lifestyle that the automobile brought; public works labor during the Depression; the migration of poor southern farmers to California during the Dust Bowl years and their return home; and prewar, wartime, and postwar mass migration to the Sun Belt, to name just a few. The Route 66 Study Act of 1990 (PL 101-400, 101st Congress) states, "Route 66 has become a symbol of the American people's heritage of travel and their legacy of seeking a better life…." By the 1960s, Route 66 began to show signs of age and was eventually decommissioned in 1986 (CH2M Hill 2004a:3-13).

4.4.1.2 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

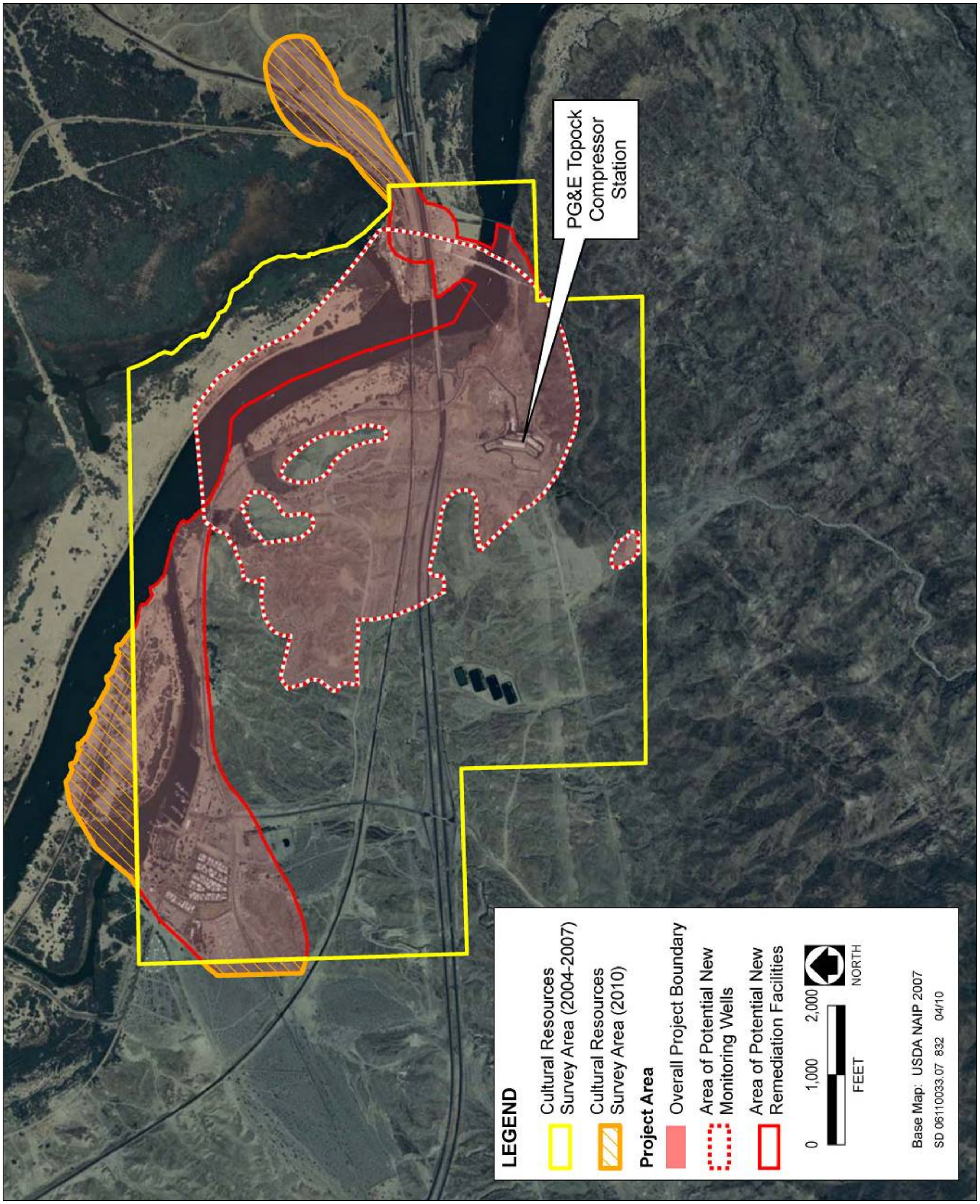
Methods and Sources of Information

Inventories for cultural resources have been conducted for the majority of the project area. This section summarizes these studies and identifies portions of the proposed project footprint where additional inventory is required.

From May to August 2004, CH2MHill conducted a cultural resource investigation related to the IM-3 project area, which encompassed a 155-acre "Area of Potential Effects" (CH2MHill 2004:3-30). From September to December 2004, a complete and intensive archaeological survey of an "expanded Area of Potential Effects" was conducted by Applied Earthworks (2007:4). This investigation involved a 1,660-acre survey area that encompassed both the original IM-3 survey area and the majority of the current project area. This area was defined in 2004 as the maximum area where remediation activities were expected to take place (see the area bounded in yellow on Exhibit 4.4-1). All landforms in this area likely to contain or exhibit prehistoric or historical archaeological resources were inspected carefully to ensure that visible, potentially significant cultural resources were discovered and documented. Additionally, surveyors investigated unusual landforms, contours, soil changes, features (e.g., road cuts, drainages), and other potential site markers. Areas of exceedingly dense vegetation along the Colorado River, private property not owned by PG&E, and parcels that had been developed with standing structures were not surveyed. Applied Earthworks prepared two addenda to its original 2004 survey (Applied Earthworks 2004a and 2004b) to reflect potential revisions to transportation plans for the IM-3 Facility.

In 2007, Applied Earthworks prepared a third addendum (Applied Earthworks 2007), a comprehensive report that described all of the archeological and historical resources identified within an enlarged "expanded Area of Potential Effects," a 1,815-acre project study area. PG&E has recorded six additional sites since 2007, all of which are located within the 1,815-acre project study area.

Finally, as further information about the remediation issues were developed and the Final CMS/FS was prepared, the project area boundaries were revised to address updated information regarding the actual extent of the area needed for remediation activity. While the overall area needed for remediation activity has been reduced, the project area has been expanded at one location along the northern boundary, at a second location along the eastern boundary, and at a third location along the western boundary in order to account for the option to locate wells needed for the freshwater flushing portion of the proposed project, as shown in Exhibit 4.4-2. It is anticipated that facilities that could be located in these areas would be limited to freshwater well(s) and a pipeline delivering the water to the project site. These areas have not been surveyed intensively, but preliminary field reconnaissance and record searches of the extended project area shown as hatched in Exhibit 4.4-2 suggest that prehistoric sites may exist on the western end due to some areas of undisturbed desert pavement and the close proximity of other previously recorded prehistoric sites. Prehistoric lithic scatters, railroad-related materials, and some historic structural remains were observed in the area along the eastern boundary in Arizona where potential new freshwater supply wells could be constructed (Applied Earthworks 2010:16).



Source: Adapted by AECOM in 2010

Cultural Resources Survey Area **Exhibit 4.4-1**

While there are minor differences in the current project area boundaries and the survey areas previously investigated by Applied Earthworks and CH2M Hill, the available data from these archaeological inventories provides substantial information that is used to discuss cultural resources and potentially significant impacts to these resources at a programmatic level within this EIR.[1]

Inventory of Resources

As documented in the Applied Earthworks (2007:7-31) study, and supplemented by additional work in the cultural resource study area, 193 known prehistoric and historic resources are within the previously investigated 1,815 acre project study area, consisting of 138 prehistoric sites, 22 historic-era resources, and 33 isolates that generally include historical refuse scatters and lithics. Of the 138 prehistoric archaeological sites, a great proportion of them are lithic scatters, with other sites including geoglyph/intaglios, possible temporary camps, trail alignments, rock alignments, ceramic scatters, cairns, and rock rings. Historic-era resources documented within the previously surveyed area include various segments of the Historic Route 66, segments of the National Old Trails Road, remains of the El Rancho Colorado Roadhouse and Gas Stop, remains of a tourist rest stop, historic railroad segments, Red Rock Bridge, Old Trails Arch Bridge, and the remnants of two bridges near Bat Cave Wash. Historical refuse scatters and archaeological isolates are common throughout the 1,815 acre project study area and the current project area.

As documented in the previous studies, one site (Locus A of the Topock Maze) is listed on the National Register of Historic Places (NRHP). Parts of the Route 66 and the Atlantic and Pacific Railroad right of way have previously been found to meet the criteria for listing on the NRHP. Two prehistoric sites and one historic site were found to meet the criteria for listing on the NRHP (CH2MHill 2004:7-3 and 7-4).

Table 4.4-1 lists all of the archaeological and historical resources recorded within the previously surveyed areas as described by Applied Earthworks (2007:7-31), with additions by PG&E.

4.4.1.3 NATIVE AMERICAN HERITAGE RESOURCES

Methods and Sources of Information

In addition to the numerous recorded archaeological and historical sites located throughout the 2004 survey area, Native American representatives of several tribes have stated strong cultural and/or religious concerns for the Topock area. As a state agency, the California Department of Toxic Substances Control (DTSC) respects the sovereignty of tribal governments and has solicited comments from tribal members throughout the CEQA review and administrative decision-making process. In addition to working directly with tribal governments, it is the policy of Cal/EPA and its departments to, “include federally-recognized and nonfederally recognized California Indian Tribes in decision-making processes that affect cultural resources” (Cal/EPA CIT-09-01). To this end, DTSC and its consultants conducted an extensive communication program with involved tribes that included formal meetings with tribal councils, informal meetings and field visits with cultural resource personnel and other tribal members, solicitation of written comments, and the incorporation of information related to heritage resources gathered internally by involved tribes.

The communication program conducted for this EIR by DTSC began on October 1, 2007, with a letter to the Native American Heritage Commission (NAHC) describing the project and requesting a Sacred Lands Search

[1] Despite the fact that the Applied Earthworks and CH2M Hill archaeological studies do not specifically address CEQA or the California Register of Historical Resources, but rather appear to focus on federal requirements, the methods utilized in these reports are consistent with the requirements of CEQA to identify historical resources and unique archaeological sites that may be affected by the project. The methodologies employed by Applied Earthworks and CH2M Hill during archaeological fieldwork have produced a body of baseline cultural resources information with adequate historical background, contextual detail, locational information, and resource detail for the purposes of CEQA, supplemented by DTSC’s Native American Communication Program (see below).

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11861H	Trash Scatter	Two turn-of-the-century historic refuse deposits associated with National Old Trails Road segment (i.e., CA-SBR-2910H; pre-1926 alignment).	No
CA-SBR-11862H	Foundations; Trash Scatter; Ditch	Razed remains of the historic Route 66 (1947–1966 alignment) El Rancho Colorado Road House and Gas Station.	Yes
CA-SBR-11863H	Foundations; Trash Scatter; Road	Tourist rest stop located adjacent to the Topock Maze (CA-SBR-219, Locus C) and along newly recorded extension of the National Old Trails Road (CA-SBR-2910H; pre-1926 alignment).	Yes
CA-SBR-11864	Lithic Scatter	Four tested quartzite cobbles, one broken and one complete quartzite hammerstone, one tested chert cobble, and three quartzite primary flakes.	Yes
CA-SBR-11865H	Railroad Grade or Siding	Railroad grade; segment or siding of the 1890–1947 Atlantic & Pacific/Atchison, Topeka and Santa Fe Railway (CASBR-6693H).	Yes
CA-SBR-11866H	Sedimentation Ponds; Ditch	Two sedimentation ponds with earthen berms.	Yes
CA-SBR-11867	Lithic Scatter	Two quartzite cores, three pieces of quartzite debitage, two chert flakes, and a water-rounded quartzite cobble hammerstone.	Yes
CA-SBR-11868	Lithic Scatter	Approximately 20 pieces of chert debitage.	No
CA-SBR-11869	Lithic Scatter	Approximately 28+ quartzite and chert debitage items, and one feature consisting of a pile of schist rocks.	No
CA-SBR-11870	Lithic Scatter	Approximately 100+ pieces pf quartzite, chert, rhyolite, and agate debitage.	No
CA-SBR-11871	Lithic Scatter	A water-rounded, brown quartzite hammerstone, an assayed quartzite cobble, and eight pieces of rhyolite debitage.	Yes
CA-SBR-11872	Lithic Scatter	Quartzite cores, assayed cobbles, and approximately 30 pieces of quartzite debitage (primary flakes and shatter).	Yes
CA-SBR-11873	Lithic Scatter; Ceramic Scatter	Features 1 and 2 have more than 40 pieces of debitage of various materials. Feature 3 is a tested cobble and hammerstone. Feature 4 is a scatter of seven prehistoric, ceramic pot sherds.	No
CA-SBR-11874	Lithic Scatter	Eight pieces of quartzite debitage derived from a single water-rounded quartzite cobble.	No
CA-SBR-11875	Lithic Scatter	Two quartzite hammerstones, three tested quartzite cobbles, and 12 pieces of associated debitage. Material is primarily quartzite, but two flakes are a fine-grained rhyolite.	No
CA-SBR-11876	Lithic Scatter	Feature 1 contains approximately 25 items, including 20 pieces of quartzite and rhyolite debitage, one rhyolite core, one assayed quartzite cobble, and one water-rounded quartzite hammerstone. Six other pieces of quartzite debitage and one quartz hammerstone are also present.	No

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11877	Lithic Scatter	One large water-rounded quartzite core and four quartzite flakes.	No
CA-SBR-11878	Lithic Scatter	One water-rounded rhyolite hammer/core and three quartzite flakes.	No
CA-SBR-11879	Lithic Scatter	A lithic scatter and quarry location containing more than 250 items, including hammerstones, cores, assayed cobbles, primary decortification flakes, secondary flakes, and interior flakes. Most of the material is quartzite; however, debitage, cores, and assayed cobbles of chert, rhyolite, and chalcedony are also present.	No
CA-SBR-11880	Lithic Scatter	Approximately 25 artifacts, including decortification flakes, primary flakes, split and tested cobbles, and two hammerstones.	No
CA-SBR-11881	Intaglio	Desert intaglio, round in shape.	No
CA-SBR-11882	Lithic Scatter	One tested quartzite cobble and one tested chert cobble, and five pieces of resultant debitage.	No
CA-SBR-11883	Ceramic Scatter	An apparent “pot drop” consisting of 17 pieces of buff brown pottery with red ochre paint.	No
CA-SBR-11884	Lithic Scatter	Six tested water-rounded cobbles of quartzite and chert and three chert decortification flakes.	No
CA-SBR-11885	Lithic Scatter	Approximately 35 cultural items, include four or five rhyolite and chert cobble cores and assayed cobbles, along with more than 30 flakes.	No
CA-SBR-11886	Lithic Scatter	Eight pieces of quartzite debitage.	No
CA-SBR-11887	Lithic Scatter	Twenty-nine pieces of quartzite debitage and one quartzite hammerstone.	No
CA-SBR-11888	Lithic Scatter	Approximately 100 cultural items including five quartzite hammerstones, tested cobbles, cores, and the resultant debitage.	No
CA-SBR-11889	Lithic Scatter	Approximately 40 cultural items including two quartzite hammerstones and resultant debitage.	No
CA-SBR-11890	Lithic Scatter	Over 80 debitage items, most of which are quartzite.	No
CA-SBR-11891	Lithic Scatter	Over 200 pieces of debitage consisting of quartzite, chert, agate, andesite, chalcedony, and one piece of cryptocrystalline silicate.	No
CA-SBR-11892	Lithic Scatter	Twelve pieces of chert debitage.	No
CA-SBR-11893	Lithic Scatter	More than 30 cultural items including one hammerstone, one anvil stone, and quartzite, chert, and andesite debitage.	No
CA-SBR-11894	Lithic Scatter	Approximately 25 cultural items including two quartzite, one chert cobble, and resultant debitage.	No
CA-SBR-11895	Lithic Scatter	Seventeen pieces of quartzite and chert debitage, two quartzite cobble hammerstones, and one quartzite cobble.	No

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11896	Lithic Scatter	Locus 1 contains 15 quartzite debitage items. Locus 2 contains 12 quartzite debitage items and three hammerstones. The remaining 21 pieces of debitage observed on the site includes one quartzite core, one quartzite tested cobble, one tested andesite cobble, and quartzite primary lithic debitage.	No
CA-SBR-11897	Lithic Scatter	Fourteen quartzite and eight agate debitage items.	No
CA-SBR-11898	Lithic Scatter	One discrete chipping station containing one chert core, 12 pieces of chert debitage, one tested quartzite cobble, and one piece of quartzite debitage. In addition, quartzite and chert debitage amounting to eight flakes, one quartzite core tool, two quartzite hammerstones, and one quartzite tested cobble were also noted.	Yes
CA-SBR-11899	Lithic Scatter	The site consists of about 350 quartzite and chert artifacts. Also included are seven hammerstones, one anvil stone, and two cores, all of quartzite. One large crude quartzite chopper of poor material and two chert cores were also found.	Yes
CA-SBR-11900	Lithic Scatter	One tested quartzite cobble, four quartzite flakes, one quartzite hammerstone, and one quartzite core.	No
CA-SBR-11901	Lithic Scatter	Two tested quartzite cobblers, one flake, and one quartzite core/tool.	No
CA-SBR-11902	Lithic Scatter	One tested water-rounded cobble of poor quality chert, one tested water-rounded quartzite cobble, and two quartzite decortification flakes.	No
CA-SBR-11903	Lithic Scatter	Over 60 pieces of quartzite debitage and two hammerstones.	No
CA-SBR-11904	Lithic Scatter	Approximately 15 pieces of quartzite debitage, one chert flake, one quartzite hammerstone, one quartzite core, and one chert cobble.	No
CA-SBR-11905	Lithic Scatter	Two tested chert cobbles, five flakes, and one quartzite hammerstone.	Yes
CA-SBR-11906	Lithic Scatter	One tested quartzite cobble, six flakes, and one quartzite hammerstone.	No
CA-SBR-11907	Lithic Scatter; Ceramic Scatter	Four tested water-rounded quartzite cobbles, 24 flakes, one quartzite cobble hammerstone, and one ceramic pot sherd.	No
CA-SBR-11908	Lithic Scatter	Three quartzite cobbles, two chert cobbles, and two quartzite flakes.	No
CA-SBR-11909H	Trash dump	Approximately 1,800 cans of various types and small quantities of broken whiteware. Cow bones are also present, as is a very small quantity of amethyst, brown, and clear glass.	No
CA-SBR-11910	Lithic Scatter	One quartzite cobble, five primary flakes derived from the same cobble, and two water-rounded quartzite cobble hammerstones.	Yes
CA-SBR-11911	Trail	A segment of a prehistoric trail running generally 350° to 170° across a well-developed desert pavement covered with patinated rocks and boulders.	No

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11912	Lithic Scatter	Five tested, water-rounded, quartzite cobbles; one tested, water-rounded, chert cobble; and three resultant quartzite primary flakes.	Yes
CA-SBR-11913	Lithic Scatter	Two tabular porphyritic basalt cores and 10 associated cortical flakes.	No
CA-SBR-11914	Rock Alignment Feature	Rock alignment consisting of 24 schist cobbles and boulders.	No
CA-SBR-11915	Lithic Scatter	One tested water-rounded quartzite cobble and nine resultant flakes.	No
CA-SBR-11916	Rock Ring Feature	Circular rock alignment or rock ring consisting of a loosely constructed, single course of 16 rocks.	No
CA-SBR-11917	Intaglios	Four small, circular, prehistoric desert intaglios located on a desert pavement surface.	Yes
CA-SBR-11918	Rock Ring Feature	Prehistoric rock ring feature consisting of a single-coursed, circular alignment of over 30 schist/rocks 2.3 meters (m) in diameter on a desert pavement surface.	Yes
CA-SBR-11919	Lithic Scatter	Four very patinated chert primary flakes, two patinated chert cores, and two tested quartzite pebbles.	No
CA-SBR-11920	Lithic Scatter	Ten quartzite flakes, two tested quartzite cobbles, one chert core, and one chert flake.	No
CA-SBR-11921	Lithic Scatter	One tested quartzite cobble, over 20 quartzite pieces of debitage, and one quartzite cobble hammerstone.	No
CA-SBR-11922	Rectangular Rock Alignment	A rectangular configuration of 35+ mostly tabular schist rocks.	No
CA-SBR-11923	Lithic Scatter	Two quartzite cobbles cores, nine quartzite tested cobbles, approximately 15 quartzite flakes, and approximately 30 chert flakes.	No
CA-SBR-11924	Lithic Scatter	One tested quartzite cobble and seven quartzite flakes.	No
CA-SBR-11925	Lithic Scatter	One tested quartzite cobble, one quartzite flake, and two quartz flakes.	No
CA-SBR-11926	Lithic Scatter	One tested quartzite cobble and 12 quartzite flakes.	No
CA-SBR-11927	Lithic Scatter (Redeposited)	Over 60 pieces of quartzite and chert debitage.	No
CA-SBR-11928	Lithic Scatter	Over 1,000 artifacts (cores, tested cobbles, hammerstones, and debitage), about 90% of which are quartzite, 5% chert, 3% basalt, and 2% agate.	Yes
CA-SBR-11929	Lithic Scatter	Approximately 120 artifacts, primarily tested cobbles and cortical flakes of quartzite (few pieces of chert debitage were also observed). Other cultural materials include two quartzite hammerstones, two chert cores, one quartzite core, one unifacially worked quartzite cobble tool with a denticulate edge, and one basalt ground stone fragment.	Yes
CA-SBR-11930	Lithic Scatter	Three tested quartzite cobbles, one quartzite hammerstone, one quartzite anvilstone, and approximately 40 pieces of quartzite debitage.	No

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11931	Lithic Scatter	One broken quartzite hammerstone, four quartzite cobbles, one split quartzite pebble, and eight quartzite flakes.	Yes
CA-SBR-11932	Lithic Scatter	Over 400 artifacts of quartzite, rhyolite, basalt, chert, and mudstone, most of which is represented by tested cobbles and debitage.	Yes
CA-SBR-11933	Lithic Scatter; Rock Ring Feature	Over 150 pieces of debitage of quartzite, chert, basalt, and quartz, including over 16 tested cobbles, three quartzite cobble hammerstones, one basalt core, and one quartzite cobble anvil stone. A single-coursed rock ring feature is also present.	Yes
CA-SBR-11934	Lithic Scatter	Two quartzite cobble hammerstones, 45 pieces of quartzite debitage, and two pieces of chert debitage.	No
CA-SBR-11935H	Retaining Wall	Historic retaining wall of old railroad ties, cut telephone poles, and large wooden planks.	No
CA-SBR-11936	Lithic Scatter	Over 150 pieces of quartzite, chert, and rhyolite debitage, most of which are flakes. In addition, tested cobbles, cores, and several well-battered hammerstones are present.	Yes
CA-SBR-11937	Lithic Scatter	Seven discrete chipping stations and one discrete concentration of cultural materials, including quartzite and cherf flakes, cobbles, and hammerstones.	Yes
CA-SBR-11938	Lithic Scatter	Fifteen quartzite flakes, one quartzite cobble, one chert core, and one rhyolite flake.	Yes
CA-SBR-11939	Lithic Scatter	Approximately 33 quartzite flakes, two basalt cobbles, 12 quartzite cobbles, and four rhyolite flakes.	Yes
CA-SBR-11940	Lithic Scatter	One quartzite cobble and two quartzite flakes.	Yes
CA-SBR-11941	Lithic Scatter	One quartzite hammerstone, two quartzite cobbles, four quartzite flakes, two rhyolite cobbles, 16 rhyolite primary flakes, six tested chert cobbles, and 21 chert flakes.	No
CA-SBR-11942	Lithic Scatter	Approximately 19 tested quartzite cobbles and/or quartzite primary flakes, one quartzite hammerstone, one rhyolite cobble, one rhyolite primary flake, and one tested chert cobble.	Yes
CA-SBR-11943	Lithic Scatter; Hearth	One rock concentration, five prehistoric pot sherds, one tested chert cobble, two tabular rocks, and over 40 quartzite artifacts including hammerstones, tested cobbles, and debitage.	No
CA-SBR-11944	Lithic Scatter	One tested chert cobble, one quartzite cobble core, a hammerstone, and three primary flakes.	No
CA-SBR-11945	Lithic Scatter; Rock Cairn	One eroded rock cairn and over 120 lithic artifacts, including quartzite and chert cobbles and resultant debitage.	Yes
CA-SBR-11946	Lithic Scatter	Two quartzite cobbles, two quartzite flakes, one rhyolite cobble, and one flake of rhyolite.	Yes

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11947	Lithic Scatter	One quartzite core, one quartzite cobble, two rhyolite cobbles, and one chert cobble split in two.	Yes
CA-SBR-11948	Lithic Scatter	Approximately 67 pieces of debitage, seven tested cobbles, four cores, and two hammerstones. Majority of material is quartzite.	Yes
CA-SBR-11949	Lithic Scatter	One quartzite cobble hammerstone, one quartzite cobble associated with eight pieces of quartzite debitage, and one chert cobble associated with four chert flakes.	Yes
CA-SBR-11950	Lithic Scatter	Three quartzite cobbles and 13 quartzite flakes.	Yes
CA-SBR-11951	Lithic Scatter	One quartzite core/hammerstone, two quartzite cobbles, one chert cobble, and two pieces of quartzite debitage.	Yes
CA-SBR-11952	Lithic Scatter	One tested quartzite cobble and six quartzite flakes.	Yes
CA-SBR-11953	Lithic Scatter	Approximately two quartzite cobbles, 12 quartzite flakes, and two quartzite hammerstone/cores.	Yes
CA-SBR-11954	Lithic Scatter	Two partially buried quartzite cobbles, one quartzite cobble hammerstone, and 10 quartzite flakes.	Yes
CA-SBR-11955	Lithic Scatter	One quartzite multidirectional core, one quartzite cobble, and 18 pieces of quartzite debitage.	Yes
CA-SBR-11956	Lithic Scatter	Approximately 70 cultural items including cobbles and debitage of chert and quartzite.	Yes
CA-SBR-11957	Lithic Scatter	Over 40 cultural items including cobbles and debitage of quartzite and chert.	Yes
CA-SBR-11958	Lithic Scatter	One chert cobble, one chert cobble broken into three pieces, one quartzite cobble core, and five quartzite flakes.	Yes
CA-SBR-11959	Lithic Scatter	Approximately 46 cultural items, including numerous quartzite cobbles and hammerstones, one chert core, one rhyolite core, and debitage of quartzite, chert, and rhyolite.	Yes
CA-SBR-11960	Lithic Scatter	Two lithic assay stations, including 2 quartzite cobbles, and 6 quartzite flakes.	Yes
CA-SBR-11961	Lithic Scatter	Approximately one chert cobble, seven flakes, one quartzite cobble, and seven quartzite flakes.	Yes
CA-SBR-11962	Lithic Scatter	Approximately 10 quartzite flakes.	Yes
CA-SBR-11963	Lithic Scatter	One quartzite hammerstone and eight quartzite flakes.	Yes
CA-SBR-11964	Lithic Scatter	One chert pebble, five chert flakes, and 12 flakes of quartzite.	Yes
CA-SBR-11965	Lithic Assay Station	One quartzite cobble, one chert cobble, and five quartzite flakes.	Yes

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11966	Lithic Scatter	Approximately 37 cultural items include quartzite and chert flakes and cobble hammerstones.	Yes
CA-SBR-11967	Lithic Scatter	Three discrete lithic assay stations containing approximately 35 cultural items, including chert and quartzite cobbles and flakes.	Yes
CA-SBR-11968	Lithic Scatter	Over 50 cultural items from five discrete assay stations, including cobbles of quartzite, chert, and rhyolite, quartzite cobble hammerstones, and debitage of quartzite and chert.	Yes
CA-SBR-11969	Lithic Scatter; Desert Intaglio; Aboriginal Trail	Cultural materials include over 300 lithic artifacts, the vast majority of which (over 95%) occur within the boundaries of 15 discrete lithic assay stations. Cultural materials primarily include hammerstones, cobbles, cores, and debitage of quartzite and chert. Cultural materials of rhyolite and chalcedony are also minimally represented.	Yes
CA-SBR-11970	Aboriginal Trail	An aboriginal trail segment measuring approximately 250 m in length.	Yes
CA-SBR-11971	Lithic Scatter	Two quartzite cobbles, seven quartzite flakes, and one quartzite cobble core.	No
CA-SBR-11972	Lithic Scatter	Approximately 39 quartzite and chert artifacts in two discrete assay stations and one quartzite cobble.	No
CA-SBR-11973	Aboriginal Trail	An aboriginal trail segment measuring 300 m long.	No
CA-SBR-11974	Lithic Scatter	One quartzite cobble, one quartzite cobble hammerstone, one cobble hammerstone core, and one ceramic pot sherd.	No
CA-SBR-11975	Lithic Scatter	One quartzite cobble and 14 quartzite flakes.	No
CA-SBR-11976	Lithic Scatter; Ceramic Scatter	Three quartzite cobbles, three quartzite flakes, six ceramic sherds.	No
CA-SBR-11977	Lithic Scatter	Over 30 cultural items include two cobble hammerstones, four cobbles, and 25 pieces of debitage.	No
CA-SBR-11978	Lithic Scatter	Three quartzite flakes.	Yes
CA-SBR-11979	Lithic Scatter	Approximately 52 cultural items, including cobbles and flakes of quartzite and chert.	Yes
CA-SBR-11980	Lithic Scatter	Seven quartzite flakes.	No
CA-SBR-11981	Lithic Scatter	Three quartzite flakes and one quartzite cobble core tool.	No
CA-SBR-11982	Lithic Scatter	Thirteen pieces of quartzite debitage, one chert cobble, and one chert flake.	No
CA-SBR-11983	Lithic Scatter	Cultural materials observed throughout the project area include 20 cobbles, six cores, two core-tools, and 50 pieces of lithic debitage. Most of the artifacts are various types of chert. Artifacts of quartzite, rhyolite, and quartz are minimally represented.	No
CA-SBR-11984	Lithic Scatter	One chert cobble, one chert flake, and three pieces of a broken chert cobble.	No

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-11985	Lithic Scatter	One quartzite cobble hammerstone, one quartzite cobble, one quartzite flake, and seven pieces of chert debitage.	No
CA-SBR-11986	Lithic Scatter; Ceramic Scatter	Nine quartz flakes and three gray ceramic sherds.	No
CA-SBR-11987	Lithic Scatter	One quartzite cobble hammerstone, one quartzite cobble core, and 12 quartzite flakes.	Yes
CA-SBR-11988	Lithic Scatter; Ceramic Scatter; Semi-circular Coursed Rock Alignment	Seventeen quartzite flakes, one chert cortical flake, two prehistoric pot sherds, and a coursed, semicircular rock alignment feature.	No
CA-SBR-11989	Semi-circular Coursed Rock Alignment	A semicircular rock alignment of 15 rocks located on top of the schist bedrock outcrop overlooking a very steep narrow drainage.	No
CA-SBR-11990H	Other	A coursed, semicircular rock alignment constructed against a rock outcrop, one matchstick filler condensed milk can dating from 1935 to 1945, two keywind strip openers from cans, one clear glass bottle base with the embossed mark “Duraglas,” and three pieces of brown bottle glass.	Yes
CA-SBR-11991	Lithic Scatter	Four chert flakes.	Yes
CA-SBR-11992	Ceramic Scatter; Semi-Circular Rock Alignment; Other	One unmodified rock shelter, one semicircular rock alignment, four cleared circular depressions, and over 100 ceramic pot sherds.	Yes
CA-SBR-11993	Rock Shelter; Collapsed Rock Wall	One collapsed rock wall, one quartzite cobble, one quartzite flake, and one ceramic sherd.	No
CA-SBR-11994	Lithic Scatter	Seven quartzite cobbles, 28 quartzite flakes, one rhyolite core, 10 rhyolite flakes, one flaked piece of quartz, one quartzite cobble core tool, one quartzite cobble hammerstone core, and one quartzite cobble hammerstone.	Yes
CA-SBR-11997H	Bridge	A flagstone and mortar masonry bridge and culvert.	Yes
CA-SBR-12506	Cairns/Rock Features	One small, somewhat circular, intaglio constructed by the removal and relocation of desert pavement gravels.	No
CA-SBR-219; Loci A–C	Intaglios; Lithic Scatter	Topock Maze (Loci A–C), including all associated lithics. Locus A currently on the National Register of Historic Places; Loci B and C determined eligible.	No
CA-SBR-12641H	Lithic Scatter; Refuse Scatter; Bladed/Graded Dirt Road; Other	Prehistoric cultural items include one multidirectional chert core, one quartz cobble, eight quartzite cobbles, eight chert cobbles, four quartzite cobble hammerstones, 14 pieces of chert debitage, six quartzite flakes, and two chalcedony flakes. Historic cultural items include materials/refuse associated with Cold War–era military maneuvers associated with “Desert Strike” operations in 1964.	Yes
CA-SBR-12642H	Foundation	A formed-and-poured concrete (cement and gravel aggregate) footing that appears to be the last surviving component of the Red Rock Bridge.	Yes

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
CA-SBR-2910H / AZ I:15:156 U.S. Route 66	Highway/Trail	Various sections of historic Route 66 constructed of an oil-soil batch mix roadbed. Eligible for the National Register of Historic Places.	Yes
CA-SBR-2910H National Old Trails Road	Historic Road	A short section of National Old Trails Road constructed before 1926.	Yes
CA-SBR-5237	Lithic Scatter; Desert Intaglios	Six intaglio features, two rock ring features, and over 150 cultural items including hammerstones, choppers, cobbles, one piece of ground stone, and one chert biface fragment.	No
CA-SBR-5523	Lithic Scatter	Approximately 45 quartzite cobbles, or chalcedony core, and numerous flakes of quartzite and chalcedony.	No
CA-SBR-6693H	Railroad Line	Atlantic and Pacific Railroad Company railroad line. Eligible for the National Register of Historic Places.	No
CA-SBR-11697H	Trash Scatter/Dump; Road/Trail; Rock Piles/Cairns	Ten small rock and dirt piles and widely scattered historic refuse, including one plate, bottle glass, wire, metal struts, tin cans, and a small fireplace feature. Eligible for the National Register of Historic Places.	No
CA-SBR-11698	Lithic Scatter; Small Rectangular Rock Alignment	Approximately 45 lithic artifacts including quartzite, chert, and rhyolite cobbles and associated debitage. Also contains a roughly rectangular rock alignment. Not eligible for the National Register of Historic Places.	No
CA-SBR-11699	Lithic Scatter	Over 900 lithic artifacts among 21 discrete assay stations, including cobble hammerstones, cobbles, cores, and debitage. Quartzite comprises 95% of the assemblage. Not eligible for the National Register of Historic.	No
CA-SBR-11700	Lithic Scatter; Rock Ring Feature; Aboriginal Trail	Over 1,000 lithic artifacts, including cobbles, cobble cores, flakes, and hammerstones. The preponderance of artifacts are quartzite. Eligible for the National Register of Historic Places.	No
CA-SBR-11701	Hearth; Qurry; Stone Bead	Hundreds of flaked cobbles and debitage, several hammerstones, one stone bead, and one stone hearth. Eligible for the National Register of Historic Places.	Yes
CA-SBR-11702	Lithic Scatter; Quarry	Approximately 35 cultural items, including quartzite flakes and cobbles. Not eligible for the National Register of Historic Places.	Yes
CA-SBR-11703	Lithic Scatter	A number of discrete lithic reduction areas and one rock cairn. Not eligible for the National Register of Historic Places.	Yes
CA-SBR-11704H	Landscaping; Trash Dump; Gravel Processing Quarry	Historic gravel quarry and trash dump. Not eligible for the National Register of Historic Places.	Yes
CA-SBR-11705	Lithic Scatter; Quarry	Approximately 28 cultural items, including quartzite cores, cobbles, flakes, and chert cores and flakes. Not eligible for the National Register of Historic Places.	Yes

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
None	Old Trails Arch Bridge	Old Trails Arch Bridge.	Yes
P-36-020378	Other	One quartzite hammerstone.	Yes
P-36-020379	Other	One truck body or hopper.	Yes
P-36-020380	Other	One ceramic sherd.	Yes
P-36-020381	Other	One metate/milling slab.	No
P-36-020382	Other	One quartzite hammerstone.	No
P-36-020383	Other	One rhyolite core.	No
P-36-020384	Other	One rock cairn.	No
P-36-020385	Other	A group of 20 fire-altered schist and granitic rocks.	No
P-36-020386	Other	One collapsed rock campfire ring.	No
P-36-020387	Ceramic Scatter	Five ceramic sherds.	No
P-36-020388	Other	One quartzite cobble and one quartzite flake.	No
P-36-020389	Other	One partially collapsed rock campfire ring.	No
P-36-020390	Other	One quartzite cobble.	No
P-36-020391	Other	Two ceramic sherds.	No
P-36-020392	Other	One quartzite flake.	Yes
P-36-020393	Other	One quartzite chopper.	Yes
P-36-020394	Other	One quartzite cobble.	Yes
P-36-020395	Bedrock Milling Feature	One basalt boulder containing one mortar cup and one milling slick surface.	Yes
P-36-020396	Other	One quartzite cobble.	No
P-36-020397	Other	One rhyolite core.	No
P-36-020398	Other	One quartzite flake.	Yes
P-36-020399	Other	One quartzite cobble split into two pieces.	No
P-36-020400	Other	One quartzite cobble.	No
P-36-020401	Other	One quartzite hammerstone.	No
P-36-020402	Other	Two ceramic sherds.	No
P-36-020403	Other	Two ceramic sherds.	No
P-36-020404	Other	One quartzite cobble and one quartzite flake.	No
P-36-020405	Other	One quartzite cobble and one quartzite flake.	No
P-36-020406	Other	One quartzite cobble hammerstone and one quartzite flake.	No

Table 4.4-1
Archaeological and Historical Resources within Previous Survey Areas

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]	Within Project Area
P-36-020407	Other	One rock cairn.	No
P-36-020408	Ceramic Scatter	Over 35 ceramic sherds.	No
P-36-020409	Ceramic Scatter	Twelve ceramic sherds.	No
P-36-020410	Ceramic Scatter	Six ceramic sherds.	Yes
Not yet assigned. Temporary Site No. AE-Topock-139	Intalgio	Small, circular intaglio with inner radii pointing to the four cardinal directions.	Yes
Not yet assigned. Temporary Site No. AE-Topock-140H	Railroad debris scatter.	Scatter associated with CA-SBR-6693H (A&P/AT&SF Railroad) consisting primarily of locomotive firebox bricks labeled with "American Arch Security Co." (1918-1946) intermixed with other railroad-related and historical debris (timbers, spikes, tie-plates, bolts, cans, bottle glass, ceramics).	Yes
Not yet assigned. Temporary Site No. AE-Topock-141H	Concentration of historical features of unknown age at the southern end of the Old Arch Trails Bridge	Features include one rock wall, three rock retaining walls, three footpaths leading to/from the features, one cement footing, and five shallow pits excavated into bedrock (possibly the former locations of power poles).	Yes
Not yet assigned. Temporary Site No. AE-Topock-142H	Explosives storage feature	Rectangular hole cut into the cutbank of an arroyo that may have been used to store explosives. Possibly associated with construction of the National Old Trails Highway/Historic Route 66.	Yes
Not yet assigned. Temporary Site No. AE-Topock-143/H	Multi-component site encompassing one prehistoric lithic reduction locus (formerly recorded as CA-SBR-11705), and historical loci and features associated with sediment/gravel borrow, stockpile, and processing.	The prehistoric locus includes three discrete lithic concentrations containing a total of three quartzite cobble tools, one quartzite cobble hammerstone, and 52 debitage items (over 95% quartzite; 3 chert flakes also present). The historical component includes three loci and 10 features (borrow pits, sediment/gravel processing and stockpile areas, bladed road paths) associated with use of the site as a sediment/gravel borrow, stockpile, and processing area. Ca. 1940s-50s refuse (e.g., cans, bottle glass, various types of hardware) also scattered throughout site area.	Yes
Not yet assigned. Temporary Site No. AE-Topock-144H	"Welcome to Historic Route 66" sign.	Large cement, rock, and tile "Welcome to Historic Route 66" sign located on bluff above the west bank of the Colorado River 200 ft north of Section 1 (1914-1947 alignment) of Historic Route 66, and 100 ft east of the 1947-1966 alignment of Historic Route 66. Sign is shown on aerial photo dating to 1936.	Yes

Notes:
[1] National Register of Historic Places (NRHP) eligibility, when present, is based on information and evaluations in CH2MHill 2004.

along with a list of Native American tribes, communities, groups, organizations, and individuals with historical ties to the area that should be involved in the process. The NAHC replied on October 18, 2007 that a search of the Sacred Lands File failed to indicate the presence of Native American cultural resources in the area. The NAHC also provided a list of 10 tribal contacts that may have knowledge of cultural resources in the project area. This NAHC tribal contact list was expanded to 13 based on prior experience in the region and ongoing existing tribal interest in other compressor station projects.

On February 15, 2008, a letter was mailed to each of the Native American tribal contacts informing them of the proposed project. The letter included a brief project description, project location and vicinity maps, a copy of the NAHC tribal contacts who received the letter, and a response form soliciting feedback. Follow-up calls to each tribal representative were completed by DTSC staff to ensure receipt of the contact letter and to solicit comments directly. In the instances that phone calls were unsuccessful, a follow-up e-mail was sent to the tribal representative.

At the beginning of the Notice of Preparation (NOP) process for this EIR, members of the Native American community were invited to scoping meetings held for purposes of assisting DTSC in determining the scope and content of the environmental document. A series of five scoping meetings were held during which oral and/or written comments were submitted. Written comments to DTSC were also collected throughout the NOP commenting period, including written comments from Native Americans. Table 4.4-2 outlines the tribal concerns, both oral and written, expressed regarding cultural resources that emerged during the NOP process.

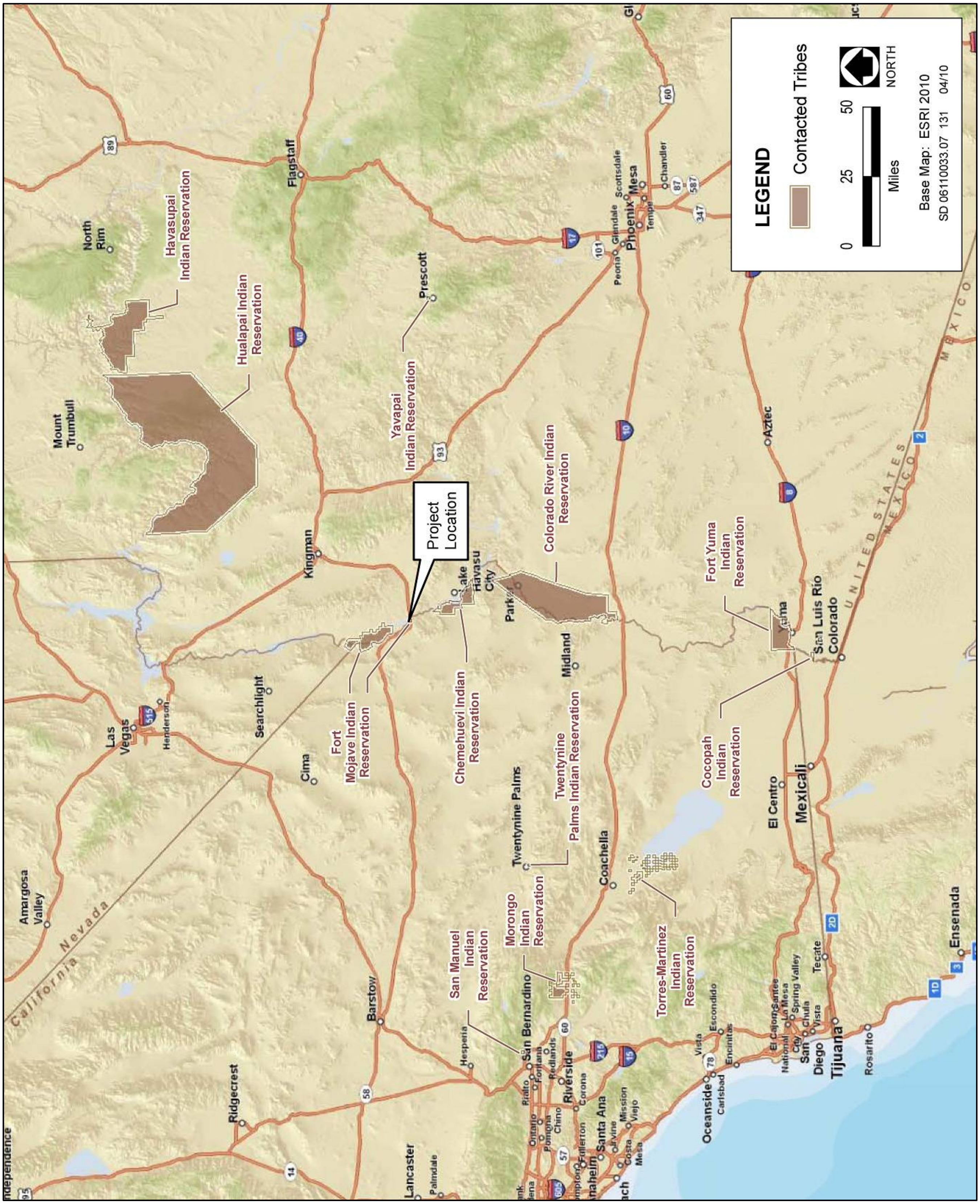
Following the NOP process, DTSC and its consultants prepared and implemented a separate Native American Communication Plan (NACP), due in large part to traditional cultural concerns about potential impacts on the Topock Maze (a large geoglyph in the area with substantial cultural significance to some tribal members; see below for full description of this feature), the Colorado River, and the surrounding landscape. The NACP was intended to inform Native American tribal representatives about the EIR process and provide them with adequate opportunity beyond the NOP process to comment. The NACP was also meant to provide a forum to elicit sensitive and confidential information as part of the identification and evaluation of cultural resources for the EIR. Finally, the NACP provided the opportunity for tribal representatives to offer input into the evaluation of potential project impacts, cumulative impacts, and possible mitigation measures. Tribes included in the NACP were those identified early in the EIR process by the NAHC and other nearby tribes that were known historically to have concerns about the Topock region and the Colorado River. Exhibit 4.4-2 shows the various Native American tribes contacted through the NACP in relation to the proposed project area. The following sections briefly describe the communications among DTSC, its subconsultants, and the tribes as part of the NACP process, including a summary of project concerns.

Chemehuevi Indian Tribe

The chairman of the Chemehuevi Indian Tribe expressed that the tribe does not have any cultural resource concerns in the project area. However, the tribe does have pronounced water-quality concerns in regard to the Colorado River and possible contamination from the groundwater plume. As the Chemehuevi reservation and riverside resort casino are downriver of the project area and contaminated groundwater plume, the tribe believes that an unsuccessful remediation of the groundwater plume may result in socioeconomic and environmental impacts on the tribe.

Cocopah Indian Tribe

The vice chairman of the Cocopah Indian Tribe expressed that the Colorado River is an important cultural element to all tribes along the river, and the region has been occupied and utilized by Yuman-speaking tribes throughout history. Equal in importance to the river, however, are the cultural resources in the surrounding landscape, which the tribes consider irreplaceable and unique to the region. The tribe has great concern over the destruction of cultural resources in the area and believes that the preservation of a feature known as the Topock



Source: Adapted by AECOM in 2010

Contacted Tribes **Exhibit 4.4-2**

Table 4.4-2
Summary of Cultural Resources Concerns Communicated During the NOP Process

Tribal Entity	Comment
Colorado River Indian Tribes	The tribe is in the process of preparing an ethnographic study and requests updates as to the EIR schedule so that information from the ethnographic study can be incorporated. Additional questions were posed by the tribe through its attorney. (See Letter to Aaron Yue, DTSC, from Greg deBie, Deputy Attorney General, CRIT [June 13, 2008]).
Fort Mojave Indian Tribe	The Mojave people are affiliated deeply with the land, air, water and all living things within the region. The protection of the Colorado River and sacred land areas are the primary concerns to the tribe. The EIR should recognize the tribe's strong and continuing cultural affiliation to the area. The EIR should include a thorough cultural resources technical report and ethnographic study.[2] The area of the proposed project is critical to the beliefs, especially those beliefs related to the afterlife, and the area should be treated with respect and acknowledged as sacred despite evident ground disturbance in the area. The EIR should contain an honest assessment of the cumulative past, current, and planned impacts on the sacred area, which is considered to be a cultural and ethnographic landscape by the Tribe. Regulatory agencies are required under federal law and the recent settlement agreement to consult with the tribe. The tribe will be hosting a forum for tribal members to discuss the project. The tribe would like the comments to be incorporated into the NOP process and to inform the EIR. All efforts must be made to avoid and minimize impacts on the cultural and spiritual values the tribe ascribes to the landscape, air, and water subject to effect. Cultural resource management must fully consider the cultural value attributed by the tribe to the entire landscape and its constituent parts, and not focus on the research value of specific sites. Residual data gaps may be acceptable and decisions regarding the need for additional data acquisition should be balanced against further impacts on the sacred area and legal obligations to prevent or minimize such impacts. All efforts must be made to correct the damage that has already been sustained and the tribe must be consulted on such matters. The EIR should be consistent with the settlement agreement in *Fort Mojave Indian Tribe v. Department of Toxic Substances Control, et al*., Sacramento Superior Court Case No. 05CS00437. The EIR must include a consideration of the entire Topock area as a traditional cultural property and determine its eligibility for the California Register of Historical Places and the National Register of Historic Places. The project must be consistent with, and the EIR must fully evaluate, Public Resources Code Section 5097.97 on project design and impacts on both state and federal lands. Consultation between DTSC, its consultants, and the tribe should occur regarding each and every alternative prior to the finalization of the EIR, as different alternatives may affect cultural resources differently.
Morongo Band of Mission Indians	If human remains are encountered during grading and other construction excavation, work in the immediate vicinity shall cease and the county coroner shall be contacted pursuant to State Health and Safety Code Section 7050.5. In the event that Native American cultural resources are discovered during the project development/construction, all work in the immediate vicinity of the find shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. If significant Native American cultural resources are discovered, for which a treatment plan must be prepared, the developer shall contact the Morongo Band of Mission Indians. If requested by the tribe, the developer shall, in good faith, consult on the discovery and its disposition.

Notes: DTSC = California Department of Toxic Substances Control, NOP = notice of preparation.
Source: Data compiled by AECOM in 2009.

[2] The Fort Mojave Indian Tribe later recommended that an ethnographic study not be conducted (FMIT letter to Arizona SHPO, August 17, 2009).

Maze (as well as the surrounding landscape) should be "foremost in all future remediation plans for the area." The Cocopah Indian Tribe supports the concerns of the Fort Mojave Indian Tribe, which are identified below.

Colorado River Indian Tribes

The Colorado River Indian Tribes (CRIT) has numerous enrolled members who are identified as being of Mojave and Chemehuevi cultural descent, as well as Navajo, Hopi, and other cultural groups. The director of the Colorado River Indian Tribes Museum and Library, as well as tribal counsel, have expressed desire that the prevention of the contaminated groundwater plume from reaching the Colorado River be the primary motivation in the selection of remediation strategies. Like the Chemehuevi, the Colorado River Indian Tribes Reservation and riverside resort casino are located downriver from the proposed project and the unsuccessful remediation of the groundwater plume may result in socioeconomic and environmental impacts on the tribe.

Initial comments expressed by a tribal representative suggested that the tribe was supporting research to develop an ethnographic study of the project area and that the ethnographic study would reveal that there are diverse opinions about the importance of the Topock area among its tribal members. It was suggested that some tribal members believe that the Topock Maze is of relatively recent origin and do not believe that it is highly significant culturally. It was also noted by this representative that the Topock Maze area has been repeatedly disturbed over the past 100 years by transportation corridors, hydrographic changes, and other linear infrastructure. Subsequently, statements from the CRIT tribal council during meetings with DTSC suggested that the Topock Maze area continues to be of cultural concern for some members of CRIT.

CRIT concerns regarding the proposed project and its effect on cultural resources were generally focused on the cultural importance of the Colorado River, including the transformation of Cr(VI) to Cr(III), which, in the tribe's opinion, would not, "begin the process to heal the land and water," and the concern that freshwater flushing would push contaminated groundwater closer to the river. A letter sent to DTSC by Envirometrix, a consultant hired on behalf of CRIT, on June 12, 2009 stated a number of specific concerns regarding cultural resources, including:

- Based on the constitution of the CRIT, the tribal government has the expressed power to preserve and protect, as well as encourage the culture and traditions of the tribes.
- The large population of Mojave members enrolled at CRIT. "CRIT has both Mohave and Chemehuevi members, and encompasses politically the largest membership for both tribes." It is noted that some Mojave people are not enrolled in either tribe, and that Chemehuevi and Mojave people can be found on reservations throughout the region.
- The project area, including portions of the Topock Maze, "does not appear to be an untouched or pristine cultural or historical site that is not impacted by human activities." The area may have cultural significance for some tribal members, but more information needs to be gathered systematically to determine what degree cultural resources may be affected by the proposed project.
- CRIT strongly desired that DTSC conduct an ethnographic study that would produce, "factual verifiable information, clarity and definition on cultural resource and religious sacred concerns that could be used to help understand, evaluate and consider remedial alternatives in a manner that is respectful of, and causes minimal disturbance to, cultural resources including, in particular, resources that are of special interest to Mohave and Chemehuevi Tribes in the area."
- CRIT urges that only verifiable information be used when selecting a final remedy.

Fort Mojave Indian Tribe

The director of the AhaMaKav Cultural Society, along with other members of the Fort Mojave Indian Tribe, conducted a field trip with representatives from DTSC and its subconsultant during which cultural sites were visited and described for purposes of the EIR. The field trip began with a visit to Spirit Mountain and ended with a visit to Locus A of the Topock Maze.

According to Fort Mojave Indian Tribe representatives, the Topock Maze is the area where deceased spirits go to pass on to the next world. The Maze, which is an array of windrows, is not considered to be a true Maze with an entrance and exit, but is represented as a place where a final test of character for a deceased spirit occurs. There is a belief that the remaining parts of the Topock Maze are part of a larger system of cultural sites that once existed that were important areas for rituals and celebrations. For tribal members, the Topock Maze is more than an archaeological site, as it is representative of larger, intangible cultural beliefs. An example given by one tribal member likened the Topock Maze to Arlington National Cemetery, with both areas serving not only as the final resting place of those who have passed on, but also a symbolic image of honor, sacrifice, and shared history.

The Fort Mojave Indian Tribe also expressed a deep cultural connection to the Colorado River and the water in the area. It is widely noted that the Mojave term for themselves, the AhaMaKav, means “People of the Water,” which suggests a strong connection by itself. Tribal representatives also noted that the linguistic part “MaKav” is also used in the term for “diaper” and has a connotation similar to “swaddle,” suggesting that “People Swaddled by Water” could be a more literal translation of AhaMaKav. This is an important distinction because it suggests a more nuanced connection between the Mojave people and the Colorado River. Aside from being a people in close proximity to the river, the Mojave believe that they are protected and secured by the river, as it provides everything for them and is a constant, reliable force in the Mojave culture as a source of water and nourishment.

In addition to the field trip described above, the Fort Mojave Indian Tribe has met and spoken with members of the NACP team on a number of occasions over the course of the CEQA process. During these confidential conversations, as well through comments submitted to DTSC on the CMS/FS, representatives of the Fort Mojave Indian Tribe expressed concerns about cultural resources. Generally, the Fort Mojave Indian Tribe believes that the area surrounding the compressor station, the Topock Maze, and the entire surrounding landscape are of paramount importance to the tribe. The Fort Mojave Indian Tribe notes that the cultural resources of importance to the tribe not only include the artifacts found within the project area and that, “the cultural landscape within which the artifacts are located…has the deepest importance to the tribe, and the desecration of this landscape, not simply the disturbance or destruction of artifacts that needs to be, and must be, acknowledged.” (FMIT 2009a). Due to the strong cultural ties to the area, the Fort Mojave Indian Tribe believes that any remediation activity that requires the construction of additional facilities would be detrimental and continue the historic and contemporary desecration of the area. The tribe believes that the naturally occurring reactive zone in the fluvial sediments of the Colorado River is, “owed to the wisdom of Providence,” and believes that, “this is earth’s natural process of self-healing after an unnatural intrusion.” (FMIT 2009a).

Specific concerns regarding cultural resources identified over the course of the NACP outreach include:

- The Fort Mojave Indian Tribe has a cultural affiliation with an expansive traditional territory extending from north of Las Vegas, south/southeast to the Phoenix area, east into Kingman, and as far west as Santa Barbara. Representatives state that Mojave have lived within this area since time immemorial and, although tribal lands are now confined to reservations, the Mojave people still have very strong cultural affiliation with the entire traditional territory.

- The Tribe has concerns about the many areas of cultural and spiritual connection throughout the Colorado River valley. The traditional beliefs about these areas are very important in defining tribal identity and are critical to how the Mojave people continue to exist as a people.

- The Tribe is affiliated deeply with the land, plants and animals, air, and water of the region. The Tribe feels a responsibility to be stewards of its historical land and the environment. The tribe respects the land and the spirit of the place, and believes they were put there by the Creator for a purpose. They’ve never severed their relationship with the land and the entire environment.

- The Tribe did not create and had no power to stop the contamination of the Topock area, but now it has to live with the consequences of that, including impacts to its culture, religion, and people.

- The Tribe's traditional songs are evidence of strong cultural ties to the Topock area and are tied to the land on and surrounding the project site. The songs describe the Tribe's creation, history, and provide guidance about the Creator's commandments about how to live life.

- Members of the Tribe want to be able to continue to conduct traditional religious activities in the area.

- The area of the proposed project is critical to tribal cultural beliefs, especially those beliefs related to the afterlife, and the area should be treated with respect and acknowledged as sacred despite previous impacts and desecrations to the area. According to the Fort Mojave Indian Tribe, the Topock area is place where deceased spirits go to pass on to the next world. It is very important to living tribal members that the spirits of the departed can pass properly from this world.

- The Topock area is also a place for purification after engaging in warfare or other actions.

- Any approach to cultural resource management must fully consider the cultural value attributed by the Tribe to the entire landscape and its constituent parts (e.g., landforms, water, plants, animals, spiritual relevance), and not focus only on the research value of specific sites that are of interest to archaeologists.

- The Fort Mojave Indian Tribe asserts that the entire Topock area is a traditional cultural property and deserves protection. The Tribe believes that an area larger than what has already been listed on the NRHP since 1978 is eligible for listing on the NRHP and the California Register of Historical Resources (CRHR). According to the Tribe, the TCP includes essentially the entire area potentially affected by the proposed project. If desecration occurs to the area, the damage cannot be repaired. The BLM has recognized the cultural importance of the Topock area in designating the Beale Slough ACEC and the Topock-Needles Special Cultural Resource Management Area.

- The protection of the Colorado River is the primary concern to the Tribe, as well as other tribes along the Colorado River, but the remediation process should minimize impacts to religious and cultural resources. In the studies necessary for remediation, residual data gaps may be acceptable to the Tribe, and decisions regarding the need for additional data acquisition (which may involve the construction of test wells or other ground disturbance activities) should be balanced against further impacts to cultural resources and tribal members.

- The Tribe is concerned about potential visual impacts from viewpoints the general public may have in the area, as well as those viewsheds enjoyed by Tribal members as they look out and toward the Topock Maze area while carrying out spiritual activities. Sensitive viewsheds may also include those that include the river, the mountains, and other features of the landscape.

- The Tribe is concerned about potential noise impacts to the Topock area and surrounding landscape. The EIR should include an assessment of impacts on existing sensitive receptors, as well as impacts to tribal members who may be in the area engaging in cultural or spiritual activities.

- Lithic scatters at Topock are important to the Tribe. There is an overwhelming sense of connection there. These sites are markers of what is still there, and what remains of their ancestors. These sites deserve to be protected.

- The Tribe expects that impacts in the Topock area be as limited as possible. The Tribe believes that some groundwater and soil remediation technologies are more damaging than others and will comment on the alternatives. They have stated that a complete analysis of alternatives must include Tribal views on the relative impacts. Consultation between DTSC, its consultants, and the tribe should occur regarding each and every alternative prior to the finalization of the EIR, as different alternatives may affect cultural resources differently.

- The Tribe expects all impacts, direct, indirect, and cumulative, will be analyzed in the EIR.

Fort Yuma-Quechan Indian Tribe

The Fort Yuma-Quechan Tribal Historic Preservation Officer, with members of the Cultural Committee, expressed concerns that government entities have not taken tribal concerns into consideration, citing as an example the installation of wells in Arizona despite Native American opposition. Another concern of the tribe is the lack of staff continuity within the government agencies, which results in the tribe having to repeat the same concerns with each new agency person who becomes involved in the project.

Specific cultural resources concerns cited during the meeting included the preservation of the water in the river and the aquifer, both of which are important parts of the Quechan culture. The river and aquifer also nourish the plants and animals in the area, which were cited as also being important. For the Quechan, the river, plants, animals, land, and air are all interconnected, with damage to one resulting in damage to the entire whole.

The Colorado River is the link for all the people living along it, and a number of songs and stories tell of the history and travels that once occurred along the river. Trails in the region mark where ancestors travelled, with travelling occurring both in the physical realm and also in the dream realm. Geoglyphs/intaglios and cleared areas may indicate ceremonial areas, as well as lithic scatters, pottery scatters, and rock rings, which are not always associated with subsistence activities. Finally, clay deposits were identified as important cultural sites, as high-quality clay was important for pottery-making, face-painting, and as a form of sunscreen.

Havasupai Indian Tribe

The Environmental Programs Manager expressed that the Havasupai Indian Tribe was aware of the project but did not have any specific comments. He also suggested that the tribe was more involved with other development projects in the immediate area of their reservation in Arizona, including recovering from a recent flood in the community. No formal input on the proposed project was provided.

Hualapai Indian Tribe

The tribal chairman and council expressed that the land, water, plants, and animals are all important to the tribe, with any disturbance to the land once used by ancestors considered damaging. To the tribe, the best practice related to places of spiritual or cultural importance is to respect it and not to disturb it. Other concerns identified by the council included possible impacts on Spirit Mountain and Boundary Cone, both of which are north of the project area, and possible disturbances to grave sites. Specific concerns included trails near the Topock area, areas of pinyon, the aquifer as a whole, and suggested changes to the Topock Maze National Register of Historic Places nomination to include a stronger statement of significance for traditional culture.

Morongo Band of Mission Indians

The Cultural Heritage Program coordinator expressed confidence that salient cultural resources concerns were being addressed by representatives from the Colorado River Indian Tribes and the Fort Mojave Indian Tribe, both of which are actively involved.

San Manuel Band of Mission Indians

A representative from the Environmental Department at the San Manuel Band of Mission Indians expressed that the project area is outside the traditional area for the tribe. However, there is a concern that ground disturbing activities may affect graves in the area.

Serrano Nation of Indians

The chairwoman of the Serrano Nation of Indians expressed that the project area is outside the tribe's traditional area. No formal input on the proposed project was provided.

Torres-Martinez Desert Cahuilla Indian Tribe

A representative from the Torres-Martinez Desert Cahuilla Indian Tribe expressed that the project area is outside the tribe's traditional area. No formal input on the proposed project was provided.

Twenty-Nine Palms Indian Tribe

At the time of writing, the Twenty-Nine Palms Indian Tribe has not provided any formal input on the project. A representative of the Tribal Environmental Protection Department was to provide a summary to the tribal council and forward feedback to the EIR team. This feedback has not been provided to date.

Yavapai-Prescott Tribe

The compliance officer for the Yavapai-Prescott Tribe expressed that the tribe has concerns about cleanup activities creating areas of ground disturbance. As an example, there are concerns that additional wells are being drilled in the project area for personal and/or monetary gain on the part of the consultants hired to formulate the final remedy. There is a concern that these additional wells are adding very little to the scientific foundation of the project, but are irrevocably damaging cultural resources.

Inventory of Resources

A very significant place within the project area identified during the NACP is considered by certain Tribes to be the Topock Maze and the surrounding landscape. According to Earle's draft report (2005:8), the Topock Maze—also referred to historically by non-Indians as "Mystic Maze"—is a large geoglyph of piled gravel windrows of dark desert-pavement terraces, to the west and northwest of the compressor station. The windrows are made of large pieces of gravel that are typically darkly stained by "desert-varnish," which is a naturally occurring chemical transformation of exposed rock surfaces that largely depends on geological and atmospheric factors. Each windrow is comprised of piled gravel, most of which is darkened with desert varnish, with the spaces in between the windrows appearing lighter in color without a covering of darkened rock. The Maze is comprised of a series of parallel rows, some of which may intersect and curve slightly across the landscape, spanning minor drainages. As stated above, the Topock Maze is not considered a Maze at all, as it does not have a beginning, end, or "solution" per se (Exhibit 4.4-3).

The Topock Maze, as currently described archaeologically, comprises three separate locations, typically referred to by archaeologists as Loci A, B, and C. Locus A is the largest of the loci (17.7 acres) and is located west of the compressor station, south of I-40. Loci B (9 acres) and C (6 acres) are located north of the compressor station near the IM-3 Facility, on the east and west sides of Bat Cave Wash, respectively. Locus A is thought by archaeologists to contain the best-preserved rows. Historical testimony suggests that a large, anthropomorphic geoglyph, as well as a cairn shrine, were part of a complex of cultural features in the vicinity of Locus A at Topock. Loci B and C are smaller and have experienced a higher level of disturbance than Locus A, but windrows are still visible in these areas. According to the draft report by Earle (2005:9–15), the rows at Locus B show more variation in their alignments than at Locus A, while some rows at Locus C are almost completely gone, leaving

Source: Photograph taken by AECOM in 2009

Aerial Photo of the Topock Maze Locus A with Compressor Station in the Distance **Exhibit 4.4-3**

only the faintest hint that rows once existed. The evidence suggests, and interviews with the Mojave confirm, that all Topock Maze loci and nearby geoglyphs form a complex suite of an associated cultural complex that has been partially destroyed by the construction of the railroad, interstate, and various other linear features in the area and by off-road vehicle activity. As discussed above, members of the Fort Mojave Indian Tribe assert that the Maze as understood by archaeologists is only part of the Maze as they understand and value it; the tribally valued property includes the disturbed inter-locus areas as well as surrounding lands and is linked conceptually and spiritually to other landforms in the area.

The origin of the Topock Maze has been disputed. Some arguments support a Native American origin, while others have suggested that the Maze is a byproduct of railroad construction, which occurred between 1888 and 1893. On the assumption that the Maze is of Native American origin, there is also little agreement as to its age or how it was created. Those who consider its origin related to the construction of the railroad typically cite a memo from a railroad engineer in 1891 that describes the collection of gravel into windrows by Mojave workers, prior to the gravel being hauled and used to support a bridge caisson. Photographic evidence of the bridge construction, interviews with railroad workers from that time, and statements from Needles residents present at the time of the bridge construction all suggest, however, that the Maze was present prior to bridge construction, even if portions of it were later collected for ballast or support.

Earle’s draft report (2005:42–44) notes that some interviews conducted with Mojave tribal members in the early 20th century have been cited to suggest that the Topock Maze did not have a strong cultural affiliation with the Mojave people, and that its origin can be attributed to a tribe that had lived in the area prior to the Mojave, perhaps the Maricopa. Interviews conducted with Fort Mojave Indian Tribe representatives for this EIR as part of the NACP indicate that the Tribe considers it inappropriate for them to discuss who made the Maze; however, interviewees believed that the Maze is of ancient origin and of deep cultural importance to the Mojave people.

Other interviewees suggested that stories or songs telling of its construction were present in the Mojave culture, but these stories are only told in some family lines and are not known by everyone (FMIT, pers. comm., 2008). Other interviews in the 20th Century suggested that the Mojave would use the Maze to purify themselves by running through the Maze or by navigating through the Maze without walking over a windrow, leaving evil spirits or ghosts in the Maze, or that the purpose of the Maze is to help the deceased atone for their life before fully passing to the afterlife.

Taking into account the numerous comments of Native American representatives throughout the EIR process, the Topock Maze and the surrounding area—including many of the other cultural sites and geoglyphs in the vicinity—are an integral part of the worldview of the Fort Mojave and other Yuman tribes. Earle’s draft report (2005:50–52) outlines the many other cultural sites in the region, as well as many Mojave song cycles that speak of the Topock area, and concludes that the Topock area is a key location for supernatural events and mythical feats for the Mojave. The Topock Maze is believed by some Tribes to form part of a geoglyph tradition for the lower Colorado River valley that has “its origin in the sacred song and story traditions of the prehistoric and historic Yuman-speaking cultures of the region” (Earle 2005:51). For example, official statements from the Fort Mojave Indian Tribe state the cultural significance of the Topock area: “Archaeologists may view [the Topock Maze] as three archaeologically distinct areas, but as the Tribe has commented many times, the Tribe sees the Maze as a spiritual whole and within the context of the surrounding landscape” (FMIT 2009b). As stated above, the Hualapai, Quechan, and Cocopah tribes have also expressed cultural concerns for the Topock area during the EIR process, and the CRIT has stated that some of its members also view the area as culturally significant.

4.4.1.4 PALEONTOLOGICAL RESOURCES

A paleontological records check was conducted by Dr. Samuel McLeod, Vertebrate Paleontology Division of the Natural History Museum of Los Angeles County (LACM) on March 2, 2010 and by Eric Scott, Curator of Paleontology Division of Geological Sciences Museum of San Bernardino County (SBCM) on March 8, 2010. The records check from the SBCM indicated that three fossil localities (SBCM 1.39.1, SBCM 1.39.2 and SBCM 1.39.3), lie within the proposed project area. The fossil localities SBCM 1.39.1, SBCM 1.39.2 and SBCM 1.39.3 are located just west and south of the existing PG&E Topock Compressor Station and are associated with the presumed Pleistocene age from the sediments of the Chemehuevi Formation. In addition, the LACM records check indicated that one locality (LACM 4090), has been documented in the general vicinity but is not within the project area itself.

Quaternary Alluvium

The project site contains within its boundaries, a layer of Quaternary Alluvium of the late Pleistocene and/or Holocene age that is deposited at the surface level in the western and southwestern areas of the proposed project. Quaternary lake sediments in this region have undetermined paleontologic sensitivity; if confirmed to be of Pleistocene age, they likely have high paleontologic sensitivity.

Bouse Formation

Marine late Miocene Bouse Formation has also been documented in the western and southwestern portions of the proposed project area in slightly elevated terrain. One locality (LACM 4090) is not located within the proposed project boundaries but, shares the same sedimentary deposits of the Bouse Formation and is situated south of the project area, on the eastern side of the Colorado River and south of Cibola, Arizona. This locality produced fossil specimens of false grunion, *Colpichthys regis*.

Chemehuevi Formation

According to the results from the SBCM, the Chemehuevi Formation has "high potential to contain significant nonrenewable paleontologic resources subject to adverse impact by development-related excavation." Two localities (SBCM 1.39.1 and SBCM 1.39.3) consist of root casts, animal burrows and mollusk shells of the presumed Pleistocene age Chemehuevi Formation. Moreover, locality SBCM 1.39.2, located within one-half mile of the southern portion of the study area, yielded fossil root casts and microvertebrate bones. It is not known if sediments of the Chemehuevi Formation are present at depth within the boundaries of the proposed project area, underlying Holocene alluvial sediments; if so, these subsurface sediments would have high paleontologic sensitivity.

The locations of all of these geologic formations and compositions are shown on Exhibit 4.5-2.

4.4.2 REGULATORY SETTING

Cultural and paleontological resources are considered under a variety of federal and state laws, regulations, guidelines, and policies. These are presented below as they are relevant to the analysis required by CEQA or potential future actions and approvals that may be associated with the proposed project.

4.4.2.1 FEDERAL LAWS AND REGULATIONS

This section describes the federal laws and regulations that are relevant to the analysis of impacts to historic, cultural, and paleontological resources. In addition, DTSC has coordinated with a number of federal agencies, including the Bureau of Land Management (BLM), as part of this project in relation to the remediation process and issues such as those associated with the Native American community.

Section 106 of the National Historic Preservation Act

As noted below under Section 4.4.2.2, resources that qualify as historic properties under the National Historic Preservation Act (NHPA) are historical resources under CEQA. Therefore, the NHPA is relevant to the identification and management of cultural resources under CEQA. Section 106 of the NHPA requires federal agencies to consider the effect of their undertakings on historic properties, to provide the Advisory Council on Historic Preservation an opportunity to comment, and to resolve any adverse effects on historic properties through the process provided in the Section 106 regulations (36 CFR Part 800 et seq.). Historic properties consist of resources listed on or eligible for listing on the NRHP. Because DTSC is not a federal agency and is not responsible for compliance with the NHPA, DTSC cannot make a determination of what resources in the project area constitute historic properties or the effect that federal undertakings necessary to implement the remediation would have on these resources. This section however, reviews the process for determining if cultural resources qualify as historic properties under the Section 106 implementing regulations because it is relevant to the identification of historical resources under CEQA. This is because Public Resources Code Section 5024.1(d), provides that the California Register includes California properties determined eligible for the NRHP. Similarly, Public Resources Code Section 21084.1 provides that a historical resource includes California Register-eligible properties based on the NRHP. Given this, properties potentially eligible for the NRHP are also potentially historical resources under CEQA.

To be eligible for listing on the NRHP, a property must possess both significance and integrity, as defined at 36 CFR Section 60.4:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and,

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that have yielded, or may be likely to yield, information important in prehistory or history.

Ordinarily, cemeteries, birthplaces, or graves of historical figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; properties primarily commemorative in nature; and properties that have achieved significance within the past 50 years shall not be considered eligible for the NRHP, unless certain limited exceptions apply (none of which are relevant here).

National Register Bulletin 38

The NHPA provides that historic properties may include traditional cultural properties (TCP) of religious and cultural significance to American Indian tribes. National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (NPS 1998), outlines in more detail how to evaluate and document these types of historic properties. TCPs are resources eligible for the NRHP based on traditional cultural significance derived from the “role the property plays in a community's historically rooted beliefs, customs, and practices.” (NPS 1998:1). National Register Bulletin 38 defines a TCP as “one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community” (NPS 1998:1). TCPs can embrace a wide range of historic properties, such as the location associated with a Native American group’s origin or the origin of the world (cosmogony), or an urban neighborhood that is the traditional home of a particular cultural group and that still reflects and is associated with their beliefs and practices. Other examples of TCPs include places where traditional people historically have gone and continue to visit for ceremonial practices. These examples are not intended to be exhaustive, but instead to illustrate the range of possible TCPs. The identification and evaluation of TCPs can be conducted only by consultation with members of the relevant group of people that ascribe value to the resource, or through other forms of ethnographic research.

Evaluation of Traditional Cultural Properties for NRHP Eligibility

Evaluation of TCPs requires two major steps: first the federal agency evaluates the integrity of the resource as a TCP; then the resource is evaluated for eligibility for listing on the NRHP against the four basic criteria set forth in 36 CFR Section 60.4 (criteria [a]–[d]).

As with any resource that is evaluated for listing on the NRHP, the TCP must be a tangible district, site, building, structure, or object (NPS 1998:11). These terms are not meant to limit or exclude places from evaluation as a TCP; for instance, a bare grassy expanse at Mt. Tonaachaw on Truk, an island that is part of the Federated States of Micronesia, has been evaluated as a component of a TCP (NPS 1998:20) because it is associated with at least two different spirits who reside on or are represented by the mountain. This consideration requires merely that the TCP be a tangible property, rather than the intangible beliefs or values alone.

Integrity

The TCP must have integrity, like any property eligible for listing on the NRHP. For traditional cultural resources this means that they must have “integrity of relationship” and “integrity of condition” (NPS 1998:11–12). Integrity of relationship means simply that the specific place is integral and necessary to a traditional cultural group’s beliefs or specific practices (NPS 1998:11). National Register Bulletin 38 gives the example of two different cultures, one that believes that baptism at a specific river is necessary to accept individuals as members, and another that simply requires baptism in any body of water. For the first example, the river is integrated into beliefs and practices of a traditional culture and thus has integrity of relationship.

Integrity of condition requires simply that the TCP has not been altered in such a way that it no longer can serve its function for the traditional cultural group. For example, a pilgrimage route to a sacred site would no longer have integrity of condition if modern construction had physically interrupted the route and thus made it unusable. This requirement does not mean that the TCP must be completely intact without any changes to the setting or features of the resource; rather the test is whether or not the resource can still function for traditional cultural purposes or whether the presence of new elements disrupts the function. National Register Bulletin 38 offers an example of a resource that has integrity despite changes to the setting. One reach of the Klamath River in Northern California is within the ancestral and present territory of the Karuk people, and is the place where they carry out world renewal ceremonies and other rituals despite the presence of a modern highway, a U.S. Forest Service ranger station, and modern residences (NPS 1998:12).

If the TCP has integrity of relationship and integrity of condition, evaluation progresses to the second step of evaluating the resource for eligibility for listing on the NRHP applying the criteria set forth in 36 CFR Section 60.4, as described above.

National Park Service Preservation Brief 36: Protecting Cultural Landscapes

The National Park Service (NPS) defines cultural landscapes as an additional category of resources that can qualify as historic properties. Cultural landscapes consist of (NPS 1994):

> a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.

The NPS defines four general types of cultural landscapes which are not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes (NPS 1994):

1. A historic site is a landscape significant for its association with a historic event, activity, or person. Examples include battlefields and president’s house properties.

2. A historic designed landscape is significant as a design or work of art; was consciously designed and laid out either by a master gardener, landscape architect, architect, or horticulturist to a design principle, or by an owner or other amateur according to a recognized style or tradition; has a historical association with a significant person, trend, or movement in landscape gardening or architecture, or a significant relationship to the theory or practice of landscape architecture. Examples include parks, campuses, and estates.

3. A historic vernacular landscape is one whose use, construction, or physical layout reflects endemic traditions, customs, beliefs, or values; expresses cultural values, social behavior, and individual actions over time; is manifested in physical features and materials and their interrelationships, including patterns of spatial organization, land use, circulation, vegetation, structures, and objects. Examples include rural villages, industrial complexes, and agricultural landscapes.

4. An ethnographic landscape contains a variety of natural and cultural resources that associated people define as heritage resources, including plant and animal communities, geographic features, and structures, each with their own special local names. Examples include contemporary settlements, religious sacred sites, and massive geological structures. Small plant communities, animals, and subsistence and ceremonial grounds are often components.

Because the Topock area, inclusive of the Maze and its environs, is strongly associated with traditional Native American culture and beliefs it is discussed below in the context of a TCP, although TCPs and cultural landscapes are not mutually exclusive categories. As noted above, TCPs often include elements of the natural landscape.

Antiquities Act of 1906

The Antiquities Act of 1906 (U.S. Code, Title 16, Sections 431–433) is meant to protect cultural resources by requiring a fine and/or imprisonment be leveled upon any person "who shall appropriate, excavate, injure, or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States."

Historic Sites Act of 1935

The Historic Sites Act of 1935 sets forth as a national policy that the United States should, "preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States." The act also sets forth duties by the National Park Service related to the preservation and interpretation of historic sites.

American Indian Religious Freedom Act of 1978

The American Indian Religious Freedom Act of 1978 makes it the policy of the United States to "protect and preserve for the American Indians their inherent right to freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites."

Archaeological Resources Protection Act of 1979

The Archaeological Resources Protection Act is meant to secure the protection of archaeological resources on public and tribal land for the present and future benefit of the American people. It is designed to prevent looting and the destruction of archeological resources and provides for civil and criminal penalties. It is also meant to increase information exchange between professional archaeologists, governmental officials, and private individuals concerning collections and archaeological resources. Under the Act, "archaeological resources" are defined as items: (1) of archaeological interest over 100 years old; and (2) found in an archaeological context on federal or Indian lands. The Act requires finders of such resources to obtain a federal permit before excavating, and potentially recovering these objects, consistent with the standards and requirements of the Federal Archaeology Program.

Native American Graves Protection and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act (NAGPRA) provides for the protection of Native American graves including human remains, funerary objects, and "objects of cultural patrimony" throughout the United States and its territories. It outlines the procedures for determining ownership for Native American human remains, funerary objects, and other sacred objects that may be discovered intentionally or unintentionally on federal land.

Religious Freedom Restoration Act of 1993

The Religious Freedom Restoration Act prohibits the government from substantially burdening religious exercise without demonstrating a compelling governmental interest as a justification for the burden. The government must also demonstrate that the action contemplated is the least restrictive means of furthering the demonstrated compelling governmental interest.

Paleontological Resources Preservation Act

The Paleontological Resources Preservation Act (PRPA) requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise (BLM 2010). The PRPA provides authority for the protection of paleontological resources including criminal and civil penalties for fossil theft and vandalism. The PRPA affirms the authority for many of the policies the federal land managing agencies, including the BLM, already have in place for the management of paleontological resources, such as issuing permits for collecting paleontological resources, curation of paleontological resources, and confidentiality of locational data (BLM 2010).

Executive Order 11593

Executive Order 11593, entitled Protection and Enhancement of the Cultural Environment, mandates that the federal government preserve, restore, and maintain the "historic and cultural environment" of the United States for future generations. It requires the federal government to initiate measures that protect federally owned, and nonfederally owned, "sites, structures, and objects of historical, architectural or archaeological significance."

Executive Order 12875

Executive Order 12875, entitled Enhancing the Intergovernmental Partnership, establishes regular and meaningful consultation and collaboration with State, local, and tribal governments on Federal matters that significantly or uniquely affect their communities.

Executive Order 13007

Executive Order 13007, entitled Indian Sacred Sites, mandates that agencies managing federal lands shall, to the extent feasible, permitted by law, and not clearly inconsistent with essential agency functions "(1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites." For the purposes of this executive order, sacred sites are considered to be any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe or associated Native American individual to be representative of the Native American religion in discussion.

Executive Order 13175

Executive Order 13175, entitled Consultation and Coordination with Indian Tribal Governments, mandates that federal agencies conduct "regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications…." It also requires agencies to participate in these consultation processes to strengthen government-to-government relations with Native American tribal entities. Consultation guidance from the BLM is also discussed specifically in Manual Section 8120 and BLM Handbook 8120-1. Further, on November 5, 2009 President Obama issued a Presidential Memorandum For the Heads of Executive Departments and Agencies Re: Tribal Consultation. This memorandum reaffirms the federal government's commitment to regular and meaningful consultation and collaboration with tribal officials in policy decisions that have tribal implications. All federal agencies are required to complete a detailed plan of actions the agency will take to implement the policies and directives of Executive Order 13175, after consultation by the agency with Indian tribes and tribal officials.

Executive Order 13287

Executive Order 13287, entitled Preserve America, is meant to outline the role of the federal government in creating partnerships between governmental entities in the preservation and reuse of historic properties. It actively advances the protection, enhancement, and contemporary use of the historic properties owned by the federal government and promotes intergovernmental cooperation and partnerships for the preservation and use of historic properties. It advocates that each federal agency seek partnerships with state and local governments, Indian tribes, and the private sector to promote local economic development. Specifically, by pursing these partnerships, the federal government can "promote the preservation of the unique cultural heritage of communities and of the Nation and to realize the economic benefit that these properties can provide."

Executive Order 13352

Executive Order 13352, entitled Facilitation of Cooperative Conservation, is meant to ensure that the Department of Interior (as well as other federal departments) implements laws relating to the environment and natural resources in a manner that promotes cooperative conservation. According to the executive order, the term cooperative conservation means, "actions that relate to use, enhancement, and enjoyment of natural resources, protection of the environment, or both, and that involve collaborative activity among Federal, State, local, and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities and individuals."

Presidential Memorandum on Government-to-Government Relationship with Tribal Governments (September 23, 2004)

This presidential memorandum reaffirms the existence and durability of the unique government-to-government relationship and commitment to working with federally recognized tribal governments on a government-t-government basis. It advocates that all departments and agencies adhere to these principles and work with tribal governments in a manner that cultivates mutual respect and fosters greater understanding to reinforce these principles.

Bureau of Land Management Manual 8100, Handbook 8120-1

Sections 8110 through 8140 of this BLM Manual provide specific guidance for the BLM concerning cultural resources, which may include TCPs. Section 8100 provides a general summary of the framework for managing cultural resources. Specific objectives include, among others, the recognition of the public uses and values attributed to cultural resources on public lands, the preservation of cultural resources on public lands for current and future generations, and the assurance that proposed land uses would avoid inadvertent damage to cultural resources. Section 8110 outlines the procedures recommended for the identification and description of cultural resources. Specific objectives of Section 8120 include the assurance that tribal issues and concerns are given consideration during the planning and decision-making process. Objectives of consultation should also include input from tribes as to proper collection, evaluation, and protection methodologies employed during the consultation process. Guidelines for this process are specifically outlined in BLM Handbook 8120-1. BLM Handbook 8120-1 also outlines the process for determining NRHP eligibility for a traditional cultural property and states that eligibility must be based on application of the NRHP criteria, that only places fulfilling one or more of the criteria may be found eligible, and that no type of property is automatically eligible for the NRHP, including TCPs. Section 8130 provides planning guidance for the BLM that considers the current and future use of cultural resources with the aim to resolve use allocation conflicts that have the potential to affect cultural properties. Finally, Section 8140 outlines objectives for the preservation of cultural resources, including the safeguarding of cultural resources from improper use and responsibly maintained in the public interest. Section 8140 also outlines the BLM's responsibility to adequately consider the effects on cultural properties from land use decisions.

Bureau of Land Management Manual 8270 and Handbook H-8270-1

BLM Manual 8270 and BLM Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) contain the agency's guidance for the management of paleontological resources on public land. The Manual has information on the federal authorities and regulations related to these resources. The handbook gives procedures for permit issuance, requirements for qualified applicants, information on paleontology and planning, and a classification system for potential fossil-bearing geologic formations on public lands (BLM 2010).

In October 2007, BLM formalized the use of the new classification system for identifying fossil potential on public lands with the release of instruction memorandum 2008-009. The classification system is based on the potential for the occurrence of significant paleontological resources in a geologic unit, and the associated risk for impacts to the resource based on federal management actions. It is intended to be applied in a broad approach for planning efforts, and as an intermediate step in evaluating specific projects. This IM is part of a larger effort to update the Handbook H-8270-1.

In October 2008, the BLM introduced guidelines for assessing potential impacts on paleontological resources in order to determine mitigation steps for federal actions on public lands under the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA) in IM 2009-011. In addition, this IM provides field survey and monitoring procedures to help minimize impacts to paleontological resources from federal actions cases where it is determined that significant paleontological resources would be adversely affected by a federal action.

Bureau of Land Management Lake Havasu Field Office Resource Management Plan

Desired future conditions for the Beale Slough Areas of Critical Environmental Concern (ACEC) outlined in the Lake Havasu Field Office Resource Management Plan (RMP) require that, "Beale Slough Riparian and Cultural ACEC will be managed to protect and prevent irreparable damage to the relevant characteristics and important values," acknowledging that the ACEC contains "significant cultural resources [and] cultural sites within part of a regional cultural complex." The RMP also notes that, "the area's fragile and irreplaceable prehistoric sites are eligible for inclusion on the NRHP." The RMP designates an area near Topock as part of the Topock-Needles Special Cultural Resource Management Area (SCRMA), which is categorized as an area for "Conservation for Future Use" and as an area for "Traditional Use" (BLM 2007: 28). As an area categorized as allocated for Traditional Use, the Topock-Needles SCRMA is considered a site that is "important for maintaining [Native American] cultural identity, heritage, or wellbeing." The final environmental impact statement for the RMP addresses these designations in the context of the project, stating, "ACEC designation or SCRMA allocation is meant to protect significant cultural resources. Management decisions relating to Chromium VI remediation will take into account the special status of these lands but will not preclude necessary actions to protect the Colorado River from contamination" (BLM 2006:5-117).

4.4.2.2 State Plans, Policies, Regulations, and Laws

California Environmental Quality Act

The CEQA Statute and Guidelines include procedures for identifying, analyzing, and disclosing potentially significant adverse impacts of a project to historical and unique archaeological resources, including resources listed in or formally determined eligible for the NRHP, the CRHR, or local registers.

CEQA requires the lead agency to consider the effects of a project on archaeological resources and to determine whether any identified archaeological resource is a historical resource (i.e., if the archaeological resource meets the criteria for listing in the CRHR) (CEQA Guidelines Sections 15064.5[a][1] and [3] and [c][1] and [2]). An archaeological resource that qualifies as a historical resource under CEQA generally qualifies for listing under Criterion 4 of the CRHR (CEQA Guidelines Section 15064.5[a][3][D]) (NRHP Criterion D). An archaeological resource may qualify for listing under Criterion 4 when it can be demonstrated that the resource has the potential to significantly contribute to questions of scientific or historical importance. Archaeological resources that are not historical resources according to the above definitions may be “unique archaeological resources,” as defined in PRC Section 21083.2, which generally provides that “non-unique archaeological resources” do not receive any protection under CEQA. If an archaeological resource is neither a unique archaeological resource nor a historical resource, the effects of a project on those resources are not considered significant under CEQA.

PRC Section 21084.1 and CEQA Guidelines Section 15064.5 define historical resources as including:

- A resource listed in, or determined to be eligible for listing in, the National Register or California Register;
- A resource included in a local register of historical resources, as defined in PRC Section 5020.1(k), unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
- A resource identified as significant (e.g., rated 1 through 5) in a historical resource survey meeting the requirements of PRC Section 5024.1(g), unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
- Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the determination is supported by substantial evidence in light of the whole record. Generally, a resource is considered “historically significant” if it meets the criteria for listing in the California Register (CEQA Guidelines Section 15064.5); or
- A resource that is determined by a local agency to be historically or culturally significant even though it does not meet the other four criteria listed here.

According to the CEQA Guidelines (Section 15064.5[a][3]), a resource is generally considered historically significant if the resource meets the criteria for listing in the California Register (PRC Section 5024.1, California Code of Regulations, Title 14, Section 4852). A historical resource may be eligible for inclusion on the CRHR, as determined by the State Historical Resources Commission or the lead agency, if the resource:

- is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage;
- is associated with the lives of persons important in our past;
- embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- has yielded, or may be likely to yield, information important in prehistory or history.

A historical resource, which can include archaeological resources, is defined as any site that:

1. Is listed in or determined to be eligible by the State Historical Resources Commission for listing in the California Register, or is determined to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California; and
2. Is eligible for listing in the California Register (criteria noted above); or

3. Is included in a local register of historical resources, as defined by PRC Section 5020.1(k), or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.l(g), is presumed to be historically or culturally significant.

TCPs may also be eligible for the CRHR under Section 15064.5[a][3]. CEQA Guidelines Section 15064.5 provides that, in general, a resource not listed in state or local registers of historical resources shall be considered by the lead agency to be historically significant if the resource meets the criteria for listing in the CRHR.

Section 15064.5(b) of the CEQA Guidelines states that "a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment." This section also provides standards for determining what constitutes a "substantial adverse change" on archaeological or historical resources, including physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired (CEQA Guidelines Section 15064.5[b][1]). The significance of a historical resource is considered to be materially impaired when a project demolishes or materially alters in an adverse manner those characteristics that convey its historical significance and that justify its inclusion on a historical resource list (CEQA Guidelines 15064.5[b][2]).

Another category of "historical resources" are those "deemed significant pursuant to criteria set forth in subdivision (g) of Section 5024.1. Subdivision (g) of that statue provides that "[a] resource identified as significant in an historical survey may be listed in the CRHR if the survey meets all of the following criteria:

(1) The survey has been or will be included in the State Historic Resources Inventory.

(2) The survey and the survey documentation were prepared in accordance with…procedures and requirements [of the (California) Office of Historic Preservation].

(3) The resource is evaluated and determined [by the Office of Historic Preservation] to have a significance rating of Category 1 to 5 on [the Department of Parks and Recreation Historic Resources Inventory Form].

(4) If the survey is five years or more old at the time of its nomination for inclusion in the California Register, the survey is updated to identify historic resources which have become eligible or ineligible due to changed circumstances or further documentation and those which have been demolished or altered in a manner that substantially diminished the significance of the resource.

Resources identified by such surveys are presumed to be historically or culturally significant unless the preponderance of evidence demonstrates otherwise.

The final category of "historical resources" is a discretionary one, which a lead agency may or may not opt to consider. According to State CEQA Guidelines Section 15064.5(a)(3):

> Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, education, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

In addition to the obligation to consider impacts on "historical resources," CEQA and the CEQA Guidelines require consideration of unique archaeological resources (14 CCR Section 15064.5; see also PRC Section 21083.2). A "unique archaeological resource" is defined as "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

If data recovery through excavation is the only feasible mitigation, a data recovery plan, which makes provisions for adequately recovering the scientifically consequential information from and about the historical resource, shall be prepared and adopted prior to any excavation being undertaken (CCR Section 15126.4[b][3][C]). Other acceptable methods of mitigation under CCR Section 15126.4 include excavation and curation or study in place without excavation and curation (if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource)."

CCR Section 15064.5(e) of the CEQA Guidelines requires that excavation activities be stopped whenever human remains are uncovered and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the NAHC must be contacted within 24 hours. At that time, CCR Section 15064.5(d) of the CEQA Guidelines directs the lead agency to consult with an appropriate Native American as identified by the NAHC and directs the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

Public Resources Code 5020.7

PRC 5020.7 directs public agencies to carry out their responsibilities in a manner that encourages owners of identified (and unidentified) historical resources to preserve and enhance these historical resources for the general public.

Public Resources Code 5097.9

PRC 5097.9 requires that no public agency (or private party using or occupying public property) interfere with "the free expression or exercise of Native American religion as provided in the United States Constitution and the California Constitution." Specifically, no part shall cause, "severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, except on a clear and convincing showing that the public interest and necessity so require."

Public Resources Code 5097.99

PRC 5097.99 prohibits acquisition or possession of Native American artifacts or human remains taken from a Native American grave or cairn after January 1, 1984, except in accordance with an agreement with the NAHC.

Public Resources Code 5097.991

PRC 5097.991 states that it is the policy of California that Native American remains (and associated grave artifacts) shall be repatriated.

Public Resources Code 5097.993 and 5097.994

This section establishes as a misdemeanor the unlawful and malicious excavation, injury, destruction, or defacement of any property eligible for listing in the CRHP, including, "any historic or prehistoric ruins, any burial ground, any archaeological or historic site, any inscriptions made by Native Americans at such site, any archaeological or historic feature of a Native American historic, cultural, or sacred site" located on public land or on private land, by a person, other than the landowner.

Health and Safety Code 7050.5-7055

Health and Safety Code 7050.5-7055 establishes the intentional disturbance, mutilation, or removal of interred human remains as a misdemeanor. In some cases, this intention disturbance, mutilation, or removal can be considered a felony. The Health and Safety Code sections also outline the process through which excavation must take place in the event human remains are discovered, including the involvement of the NAHC.

California Executive Order W-26-92

California Executive Order W-26-92 affirms that all state agencies shall recognize, preserve, and maintain the significant heritage resources of the state.

Cal/EPA Policy Memorandum CIT-09-01: Cal/EPA Policy for Working with California Indian Tribes

Cal/EPA Policy Memorandum CIT-09-01 is meant to provide, "a framework for Cal/EPA and its Boards, Departments and Offices (BDOs) to improve and maintain communication and collaboration between Cal/EPA, its BDOs, and California Indian Tribes to further the mission of Cal/EPA." The memorandum puts forth a number of guidance principles for Cal/EPA and its BDOs, including, but not limited to; the acknowledgement of tribal sovereignty; to identify, include, and communicate with California Native American tribes in decision-making processes that may affect tribal lands and/or cultural resources; and consider the potential impact of activities on tribal lands and cultural resources. The memorandum includes 10 actions that are identified to help Cal/EPA achieve its guiding principles, with many focusing on increasing and/or improving communication between Cal/EPA and tribes.

4.4.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

County of San Bernardino 2007 General Plan

According to the *County of San Bernardino 2007 General Plan*, nearly 12,000 cultural resources have been recorded in the San Bernardino County. This includes 122 properties within the county on the California Point of Historic Interest list, 39 on the California Historical Landmarks list, 413 properties eligible for the NRHP, and 49 properties that are listed on the NRHP. A goal of the County General Plan is the preservation and promotion of San Bernardino County's historic and prehistoric cultural heritage. Policies related to cultural resources include:

- **Policy CO 3.1:** Identify and protect important archaeological and historic cultural resources in areas of the County that have been determined to have known cultural resource sensitivity.
- **Policy CO 3.2:** Identify and protect important archaeological and historic cultural resources in all lands that involve disturbance of previously undisturbed ground.
- **Policy CO 3.3:** Establish programs to preserve the information and heritage value of cultural and historical resources.
- **Policy CO 3.4:** The County will comply with Government Code Section 65352.2 (SB 18) by consulting with tribes as identified by the California Native American Heritage Commission on all General Plan and specific plan actions.

- **Policy CO 3.5:** Ensure that important cultural resources are avoided or minimized to protect Native American beliefs and traditions.

Programs identified in the County General Plan with specific application to this project include two programs related to Policy CO 3.5:

- **Program 1:** Consistent with SB 18, as well as possible mitigation measures identified through the CEQA process, the County will work and consult with local tribes to identify, protect and preserve TCPs. TCPs include both manmade sites and resources as well as natural landscapes that contribute to the cultural significance of areas.

- **Program 3:** The County will work in good faith with the local tribes, developers/applicants and other parties of the local affected tribes request the return of certain Native American artifacts from private development projects. The developer is expected to act in good faith when considering the local tribe's request for artifacts. Artifacts not desired by the local tribe will be placed in a qualified repository as established by the California State Historical Resources Commission. If no facility is available, then all artifacts will be donated to the local tribe.

In the event that archaeological sites are affected by a project, the following actions related to Policy CO 3.5 are required by the County regarding the disposition of archaeological sites and cultural remains (including human remains):

(a) The NAHC and local reservation, museum, and other concerned Native American leaders will be notified in writing of any proposed evaluation or mitigation activities that involve excavation of Native American archaeological sites, and their comments and concerns solicited.

(b) The concerns of the Native American community will be fully considered in the planning process.

(c) If human remains are encountered during grading and other construction excavation, work in the immediate vicinity will cease and the County Coroner will be contracted pursuant to the state Health and Safety Code.

(d) In the event that Native American cultural resources are discovered during project development and/or construction, all work in the immediate vicinity of the find will cease and a qualified archaeologist meeting U.S. Secretary of the Interior standards will be hired to assess the find. Work on the overall project may continue during this assessment period.

(e) If Native American cultural resources are discovered, the County will contact the local tribe. If requested by the tribe, the County will, in good faith, consult on the discovery and its disposition with the tribe.

4.4.3 Environmental Impacts and Mitigation Measures

4.4.3.1 Analysis Methodology

This section analyzes the potential for the suite of activities included in the proposed project to result in significant impacts on cultural resources at a program level based on available information and the project description provided in Chapter 3 of this EIR. Specifically, the analysis takes the conservative approach of assuming that all unevaluated cultural resources in the project area could qualify as historical resources under CEQA.

Prehistoric and Historic-Era Resources

As described in Section 4.4.1, "Existing Setting," above, 193 prehistoric and historic resources were documented within the 1,815-acre survey area and by subsequent surveys conducted by PG&E, with approximately 80 of these resources located within the proposed project area (see Table 4.4-3). A formal determination of eligibility for inclusion in the CRHR has not been performed for most of the individual prehistoric and historic-era sites within the project area. However, several resources have been evaluated and recommended or determined eligible for listing on the NRHP, and thus are historical resources for the purposes of CEQA. Thus, documented sites analyzed for this project fall into two main categories: those sites that have been determined eligible for inclusion in the NRHP (which makes them historical resources subject to CEQA) and those sites for which a determination of eligibility has not yet been made.

NRHP-eligible and listed sites within or immediately adjacent to the project area include CA-SBR-219 (Topock Maze Loci A–C, which is adjacent to the project footprint), historic-era resources such as CA-SBR-2910H (Historic Route 66 and portions of the National Old Trails Road), CA-SBR-6693H (Atlantic and Pacific Railroad Company rail line, which is adjacent to the planned project activities), and CA-SBR-11701, which consists of numerous lithic artifacts, stone tools, and features such as an aboriginal trail.

The remaining resources documented within the project area have not been formally evaluated for eligibility for listing on the NRHP or CRHR as formal eligibility evaluations are not required by CEQA. Historic-era resources that have not been evaluated may be significant for a number of reasons, for example, for their association with important historical themes such as transportation and westward migration along historic highways such as Route 66. Such resources may also be significant because they contain information about these historic themes that would be of importance in historic research. If such resources are significant for these reasons, or meet other criteria for listing on the NRHP or CRHR and have sufficient integrity to convey this significance, they would qualify as historical resources under CEQA.

Also, many of the archaeological resources in the group of unevaluated resources may be significant under CEQA because of their association with the Topock Maze. A high probability also exists that some of these resources are significant because they contain information that is important in prehistoric research.

Topock Cultural Area

In addition to the cultural resources recorded by these previous surveys, DTSC has determined, based on the weight of the evidence, that the Topock Maze and the surrounding area appear to qualify as a historical resource under CEQA as an area that is significant in the social and cultural annals of California. This section explains DTSC's determination that the Topock Cultural Area is a historical resource for purposes of impact evaluation under CEQA.

As noted above, PRC Section 21084.1 and CEQA Guidelines Section 15064.5(a) establish three analytical categories for use in determining whether a historical resource exists for purposes of CEQA. These are (1) mandatory historical resources; (2) presumptive historical resources; and (3) discretionary historical resources. A mandatory historical resource is one that has been listed on or determined eligible for listing on the CRHR. Only an official determination by the State Historical Resources Commission triggers this mandatory determination. A presumptive historical resource is one that has been listed on a local register or included in a local survey that meets specified criteria, unless the preponderance of evidence demonstrates otherwise.

A discretionary historical resource is a resource that does not fit within the mandatory or presumptive categories, but that is determined to be a historical resource in the exercise of the lead agency's discretion. Under CEQA case law, a lead agency evaluating potential project impacts under CEQA has broad discretion to determine whether a particular resource that may be affected by a proposed project is a historical resource for purposes of CEQA, provided the lead agency determination is supported by substantial evidence. When such a determination is made, the criteria to be applied include the criteria for listing on the CRHR.

Table 4.4-3
Archaeological and Historical Resources within the Project Area

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]
CA-SBR-11862H	Foundations; Trash Scatter; Ditch	Razed remains of the historic Route 66 (1947–1966 alignment) El Rancho Colorado Road House and Gas Station.
CA-SBR-11863H	Foundations; Trash Scatter; Road	Tourist rest stop located adjacent to the Topock Maze (CA-SBR-219, Locus C) and along newly recorded extension of the National Old Trails Road (CA-SBR-2910H; pre-1926 alignment).
CA-SBR-11864	Lithic Scatter	Four tested quartzite cobbles, one broken and one complete quartzite hammerstone, one tested chert cobble, and three quartzite primary flakes.
CA-SBR-11865H	Railroad Grade or Siding	Railroad grade; segment or siding of the 1890–1947 Atlantic & Pacific/Atchison, Topeka and Santa Fe Railway (CASBR-6693H).
CA-SBR-11866H	Sedimentation Ponds; Ditch	Two sedimentation ponds with earthen berms.
CA-SBR-11867	Lithic Scatter	Two quartzite cores, three pieces of quartzite debitage, two chert flakes, and a water-rounded quartzite cobble hammerstone.
CA-SBR-11871	Lithic Scatter	A water-rounded, brown quartzite hammerstone, an assayed quartzite cobble, and eight pieces of rhyolite debitage.
CA-SBR-11872	Lithic Scatter	Quartzite cores, assayed cobbles, and approximately 30 pieces of quartzite debitage (primary flakes and shatter).
CA-SBR-11898	Lithic Scatter	One discrete chipping station containing one chert core, 12 pieces of chert debitage, one tested quartzite cobble, and one piece of quartzite debitage. In addition, quartzite and chert debitage amounting to eight flakes, one quartzite core tool, two quartzite hammerstones, and one quartzite tested cobble were also noted.
CA-SBR-11899	Lithic Scatter	The site consists of about 350 quartzite and chert artifacts. Also included are seven hammerstones, one anvil stone, and two cores, all of quartzite. One large crude quartzite chopper of poor material and two chert cores were also found.
CA-SBR-11905	Lithic Scatter	Two tested chert cobbles, five flakes, and one quartzite hammerstone.
CA-SBR-11910	Lithic Scatter	One quartzite cobble, five primary flakes derived from the same cobble, and two water-rounded quartzite cobble hammerstones.
CA-SBR-11912	Lithic Scatter	Five tested, water-rounded, quartzite cobbles; one tested, water-rounded, chert cobble; and three resultant quartzite primary flakes.
CA-SBR-11917	Intaglios	Four small, circular, prehistoric desert intaglios located on a desert pavement surface.
CA-SBR-11918	Rock Ring Feature	Prehistoric rock ring feature consisting of a single-coursed, circular alignment of over 30 schist/rocks 2.3 meters (m) in diameter on a desert pavement surface.
CA-SBR-11928	Lithic Scatter	Over 1,000 artifacts (cores, tested cobbles, hammerstones, and debitage), about 90% of which are quartzite, 5% chert, 3% basalt, and 2% agate.

Table 4.4-3
Archaeological and Historical Resources within the Project Area

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]
CA-SBR-11929	Lithic Scatter	Approximately 120 artifacts, primarily tested cobbles and cortical flakes of quartzite (few pieces of chert debitage were also observed). Other cultural materials include two quartzite hammerstones, two chert cores, one quartzite core, one unifacially worked quartzite cobble tool with a denticulate edge, and one basalt ground stone fragment.
CA-SBR-11931	Lithic Scatter	One broken quartzite hammerstone, four quartzite cobbles, one split quartzite pebble, and eight quartzite flakes.
CA-SBR-11932	Lithic Scatter	Over 400 artifacts of quartzite, rhyolite, basalt, chert, and mudstone, most of which is represented by tested cobbles and debitage.
CA-SBR-11933	Lithic Scatter; Rock Ring Feature	Over 150 pieces of debitage of quartzite, chert, basalt, and quartz, including over 16 tested cobbles, three quartzite cobble hammerstones, one basalt core, and one quartzite cobble anvil stone. A single-coursed rock ring feature is also present.
CA-SBR-11936	Lithic Scatter	Over 150 pieces of quartzite, chert, and rhyolite debitage, most of which are flakes. In addition, tested cobbles, cores, and several well-battered hammerstones are present.
CA-SBR-11937	Lithic Scatter	Seven discrete chipping stations and one discrete concentration of cultural materials, including quartzite and cherf flakes, cobbles, and hammerstones.
CA-SBR-11938	Lithic Scatter	Fifteen quartzite flakes, one quartzite cobble, one chert core, and one rhyolite flake.
CA-SBR-11939	Lithic Scatter	Approximately 33 quartzite flakes, two basalt cobbles, 12 quartzite cobbles, and four rhyolite flakes.
CA-SBR-11940	Lithic Scatter	One quartzite cobble and two quartzite flakes.
CA-SBR-11942	Lithic Scatter	Approximately 19 tested quartzite cobbles and/or quartzite primary flakes, one quartzite hammerstone, one rhyolite cobble, one rhyolite primary flake, and one tested chert cobble.
CA-SBR-11945	Lithic Scatter; Rock Cairn	One eroded rock cairn and over 120 lithic artifacts, including quartzite and chert cobbles and resultant debitage.
CA-SBR-11946	Lithic Scatter	Two quartzite cobbles, two quartzite flakes, one rhyolite cobble, and one flake of rhyolite.
CA-SBR-11947	Lithic Scatter	One quartzite core, one quartzite cobble, two rhyolite cobbles, and one chert cobble split in two.
CA-SBR-11948	Lithic Scatter	Approximately 67 pieces of debitage, seven tested cobbles, four cores, and two hammerstones. Majority of material is quartzite.
CA-SBR-11949	Lithic Scatter	One quartzite cobble hammerstone, one quartzite cobble associated with eight pieces of quartzite debitage, and one chert cobble associated with four chert flakes.
CA-SBR-11950	Lithic Scatter	Three quartzite cobbles and 13 quartzite flakes.
CA-SBR-11951	Lithic Scatter	One quartzite core/hammerstone, two quartzite cobbles, one chert cobble, and two pieces of quartzite debitage.
CA-SBR-11952	Lithic Scatter	One tested quartzite cobble and six quartzite flakes.

Table 4.4-3
Archaeological and Historical Resources within the Project Area

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]
CA-SBR-11953	Lithic Scatter	Approximately two quartzite cobbles, 12 quartzite flakes, and two quartzite hammerstone/cores.
CA-SBR-11954	Lithic Scatter	Two partially buried quartzite cobbles, one quartzite cobble hammerstone, and 10 quartzite flakes.
CA-SBR-11955	Lithic Scatter	One quartzite multidirectional core, one quartzite cobble, and 18 pieces of quartzite debitage.
CA-SBR-11956	Lithic Scatter	Approximately 70 cultural items including cobbles and debitage of chert and quartzite.
CA-SBR-11957	Lithic Scatter	Over 40 cultural items including cobbles and debitage of quartzite and chert.
CA-SBR-11958	Lithic Scatter	One chert cobble, one chert cobble broken into three pieces, one quartzite cobble core, and five quartzite flakes.
CA-SBR-11959	Lithic Scatter	Approximately 46 cultural items, including numerous quartzite cobbles and hammerstones, one chert core, one rhyolite core, and debitage of quartzite, chert, and rhyolite.
CA-SBR-11960	Lithic Scatter	Two lithic assay stations, including 2 quartzite cobbles, and 6 quartzite flakes.
CA-SBR-11961	Lithic Scatter	Approximately one chert cobble, seven flakes, one quartzite cobble, and seven quartzite flakes.
CA-SBR-11962	Lithic Scatter	Approximately 10 quartzite flakes.
CA-SBR-11963	Lithic Scatter	One quartzite hammerstone and eight quartzite flakes.
CA-SBR-11964	Lithic Scatter	One chert pebble, five chert flakes, and 12 flakes of quartzite.
CA-SBR-11965	Lithic Assay Station	One quartzite cobble, one chert cobble, and five quartzite flakes.
CA-SBR-11966	Lithic Scatter	Approximately 37 cultural items include quartzite and chert flakes and cobble hammerstones.
CA-SBR-11967	Lithic Scatter	Three discrete lithic assay stations containing approximately 35 cultural items, including chert and quartzite cobbles and flakes.
CA-SBR-11968	Lithic Scatter	Over 50 cultural items from five discrete assay stations, including cobbles of quartzite, chert, and rhyolite, quartzite cobble hammerstones, and debitage of quartzite and chert.
CA-SBR-11969	Lithic Scatter; Desert Intaglio; Aboriginal Trail	Cultural materials include over 300 lithic artifacts, the vast majority of which (over 95%) occur within the boundaries of 15 discrete lithic assay stations. Cultural materials primarily include hammerstones, cobbles, cores, and debitage of quartzite and chert. Cultural materials of rhyolite and chalcedony are also minimally represented.
CA-SBR-11970	Aboriginal Trail	An aboriginal trail segment measuring approximately 250 m in length.
CA-SBR-11978	Lithic Scatter	Three quartzite flakes.
CA-SBR-11979	Lithic Scatter	Approximately 52 cultural items, including cobbles and flakes of quartzite and chert.
CA-SBR-11987	Lithic Scatter	One quartzite cobble hammerstone, one quartzite cobble core, and 12 quartzite flakes.
CA-SBR-11990H	Other	A coursed, semicircular rock alignment constructed against a rock outcrop, one matchstick filler condensed milk can dating from 1935 to 1945, two keywind strip openers from cans, one clear glass bottle base with the embossed mark “Duraglas,” and three pieces of brown bottle glass.

Table 4.4-3
Archaeological and Historical Resources within the Project Area

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]
CA-SBR-11991	Lithic Scatter	Four chert flakes.
CA-SBR-11992	Ceramic Scatter; Semi-Circular Rock Alignment; Other	One unmodified rock shelter, one semicircular rock alignment, four cleared circular depressions, and over 100 ceramic pot sherds.
CA-SBR-11994	Lithic Scatter	Seven quartzite cobbles, 28 quartzite flakes, one rhyolite core, 10 rhyolite flakes, one flaked piece of quartz, one quartzite cobble core tool, one quartzite cobble hammerstone core, and one quartzite cobble hammerstone.
CA-SBR-11997H	Bridge	A flagstone and mortar masonry bridge and culvert.
CA-SBR-12641H	Lithic Scatter; Refuse Scatter; Bladed/Graded Dirt Road; Other	Prehistoric cultural items include one multidirectional chert core, one quartz cobble, eight quartzite cobbles, eight chert cobbles, four quartzite cobble hammerstones, 14 pieces of chert debitage, six quartzite flakes, and two chalcedony flakes. Historic cultural items include materials/refuse associated with Cold War–era military maneuvers associated with "Desert Strike" operations in 1964.
CA-SBR-12642H	Foundation	A formed-and-poured concrete (cement and gravel aggregate) footing that appears to be the last surviving component of the Red Rock Bridge.
CA-SBR-2910H / AZ I:15:156 U.S. Route 66	Highway/Trail	Various sections of historic Route 66 constructed of an oil-soil batch mix roadbed. Eligible for the National Register of Historic Places.
CA-SBR-2910H National Old Trails Road	Historic Road	A short section of National Old Trails Road constructed before 1926.
CA-SBR-11701	Hearth; Qurry; Stone Bead	Hundreds of flaked cobbles and debitage, several hammerstones, one stone bead, and one stone hearth. Eligible for the National Register of Historic Places.
CA-SBR-11702	Lithic Scatter; Quarry	Approximately 35 cultural items, including quartzite flakes and cobbles. Not eligible for the National Register of Historic Places.
CA-SBR-11703	Lithic Scatter	A number of discrete lithic reduction areas and one rock cairn. Not eligible for the National Register of Historic Places.
CA-SBR-11704H	Landscaping; Trash Dump; Gravel Processing Quarry	Historic gravel quarry and trash dump. Not eligible for the National Register of Historic Places.
CA-SBR-11705	Lithic Scatter; Quarry	Approximately 28 cultural items, including quartzite cores, cobbles, flakes, and chert cores and flakes. Not eligible for the National Register of Historic Places.
None	Old Trails Arch Bridge	Old Trails Arch Bridge.
P-36-020378	Other	One quartzite hammerstone.
P-36-020379	Other	One truck body or hopper.
P-36-020380	Other	One ceramic sherd.

Table 4.4-3
Archaeological and Historical Resources within the Project Area

Permanent Trinomial or Primary No.	Site Type	Materials Present[1]
P-36-020392	Other	One quartzite flake.
P-36-020393	Other	One quartzite chopper.
P-36-020394	Other	One quartzite cobble.
P-36-020395	Bedrock Milling Feature	One basalt boulder containing one mortar cup and one milling slick surface.
P-36-020398	Other	One quartzite flake.
P-36-020410	Ceramic Scatter	Six ceramic sherds.
Not yet assigned. Temporary Site No. AE-Topock-139	Intalgio	Small, circular intaglio with inner radii pointing to the four cardinal directions.
Not yet assigned. Temporary Site No. AE-Topock-140H	Railroad debris scatter.	Scatter associated with CA-SBR-6693H (A&P/AT&SF Railroad) consisting primarily of locomotive firebox bricks labeled with "American Arch Security Co." (1918-1946) intermixed with other railroad-related and historical debris (timbers, spikes, tie-plates, bolts, cans, bottle glass, ceramics).
Not yet assigned. Temporary Site No. AE-Topock-141H	Concentration of historical features of unknown age at the southern end of the Old Arch Trails Bridge	Features include one rock wall, three rock retaining walls, three footpaths leading to/from the features, one cement footing, and five shallow pits excavated into bedrock (possibly the former locations of power poles).
Not yet assigned. Temporary Site No. AE-Topock-142H	Explosives storage feature	Rectangular hole cut into the cutbank of an arroyo that may have been used to store explosives. Possibly associated with construction of the National Old Trails Highway/Historic Route 66.
Not yet assigned. Temporary Site No. AE-Topock-143/H	Multi-component site encompassing one prehistoric lithic reduction locus (formerly recorded as CA-SBR-11705), and historical loci and features associated with sediment/gravel borrow, stockpile, and processing.	The prehistoric locus includes three discrete lithic concentrations containing a total of three quartzite cobble tools, one quartzite cobble hammerstone, and 52 debitage items (over 95% quartzite; 3 chert flakes also present). The historical component includes three loci and 10 features (borrow pits, sediment/gravel processing and stockpile areas, bladed road paths) associated with use of the site as a sediment/gravel borrow, stockpile, and processing area. Ca. 1940s-50s refuse (e.g., cans, bottle glass, various types of hardware) also scattered throughout site area.
Not yet assigned. Temporary Site No. AE-Topock-144H	"Welcome to Historic Route 66" sign.	Large cement, rock, and tile "Welcome to Historic Route 66" sign located on bluff above the west bank of the Colorado River 200 ft north of Section 1 (1914-1947 alignment) of Historic Route 66, and 100 ft east of the 1947-1966 alignment of Historic Route 66. Sign is shown on aerial photo dating to 1936.

Therefore, DTSC has looked beyond the specific cultural resources recorded by previous archaeological surveys, and has determined, based on the weight of the evidence, that the Topock Maze and the surrounding area within the project area appears to qualify as a historical resource under CEQA as an area that is significant in the social and cultural annals of California. The historical resource consisting of the project area depicted in Exhibit 3-2 and the Topock Maze is referred to in this EIR as the "Topock Cultural Area."

In making its discretionary determination under CEQA, DTSC has carefully weighed the evidence, including (1) the testimony of Native American tribal representatives received during the confidential NACP tribal consultation process, (2) the ethnographic and historical literature and the archaeological record, and (3) California and federal regulations and guidelines. DTSC has also consulted the federal government's guidance regarding TCPs provided in National Register Bulletin 38 (NPS 1998). The Topock Cultural Area is of cultural significance to several different Native American tribes as described above. In accordance with federal guidelines, the significance of a TCP is derived from the "role the property plays in a community's historically rooted beliefs, customs, and practices" (NPS 1998:1). The consultations during the NACP process identified various aspects of the significance of the Topock Cultural Area. For example, the Fort Mojave Indian Tribe indicated that the Topock area has symbolic value akin to the Arlington National Cemetery. Acknowledged representatives of this tribe stated during the EIR process that the Topock area is critical to tribal cultural beliefs, especially those beliefs related to the afterlife. They also stated that conducting cultural practices, including religious practices, within the Topock area is very important to the continuation of tribal traditions.

The Fort Mojave Indian Tribe attributes high cultural value to the entire area in which the project is located including the constituent parts of that area (landforms, water, plants, and animals), although for purposes of this analysis, it is not necessary to make any findings with respect to historical resources under CEQA beyond the area that may be affected by the proposed project (that area being the Topock Cultural Area as defined in this EIR). Any ground-disturbing activity or impact to the plants, wildlife, visual characteristics, or setting of the Topock Cultural Area is considered by the Fort Mojave Indian Tribe to be a desecration of their religious and cultural beliefs. These kinds of impacts are experienced as a loss and sorrow akin to the passing of a loved one or family member. As noted above in Section 4.4.1.3, other Colorado River tribes, including the Hualapai, Cocopah, and Fort Yuma-Quechan, also expressed strong cultural concerns for Topock, and the Colorado River Indian Tribes indicated that some tribal members have cultural concerns for the Topock area.

Although the Topock Cultural Area has sustained some damage, the cultural significance ascribed to the resource by these Native American tribes appears to demonstrate that the Topock Cultural Area generally has sufficient integrity of relationship and condition to these communities. Tribal representatives have repeatedly stated that, despite existing impacts from highway, railroad, pipeline, and recreational developments, the resource continues to be important in their culture. Based upon the Native American testimony it appears that the Topock Cultural Area can still function for traditional cultural purposes despite the modern intrusions.

Certain tribes have repeatedly stated that the cultural significance of the Topock Cultural Area goes beyond the bounds of the Maze itself. For example, the Fort Mojave Indian Tribe stated, "the cultural landscape within which the artifacts are located…has the deepest importance to the tribe," (FMIT 2009a). This tribe also stated that the Topock Cultural Area includes the entire project area. Native American representatives have stated that the Topock Cultural Area is tied in with the larger regional landscape that includes the Colorado River corridor and that within that larger landscape, the Topock Cultural Area has distinctive importance because of the traditional cultural values at Topock itself. However, it is beyond the scope of this EIR to define whether there may be an additional historical resource area for purposes of the CRHR or the NRHP beyond the project boundaries, or to address areas that are not affected by the proposed project. As discussed above, a lead agency's evaluation under CEQA as to whether there is a discretionary historical resource on a project site is not a formal eligibility determination for the CRHR or NRHP, and CEQA does not require a formal eligibility determination. As such, in compliance with CEQA, DTSC has only referenced the federal TCP guidelines in weighing the balance of the evidence in order to determine if the proposed project would adversely impact the physical characteristics of the Topock Cultural Area that convey its historical significance as a historical resource under CEQA. DTSC has not attempted to evaluate whether the Topock Cultural Area would be determined to be a TCP by the federal government.

4.4.3.2 THRESHOLDS OF SIGNIFICANCE

Based on the CEQA Guidelines, the proposed project would have a significant impact on cultural resources if it would:

- cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5;
- cause a substantial adverse change in the significance of a unique archaeological resource pursuant to Section 15064.5;
- directly or indirectly destroy a unique paleontological resource or site or unique geological feature; or
- disturb any human remains, including those interred outside of formal cemeteries.

Section 15064.5(b) of the CEQA Guidelines clarifies the meaning of "substantial adverse change" by defining this phrase as the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings. Additionally, the significance of a historical resource or a unique archaeological resource would be "materially impaired" by the proposed project if it:

- demolishes or materially alters in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR, including those resources for which eligibility has been determined by the lead agency for the purposes of CEQA.

4.4.3.3 IMPACT ANALYSIS

The area analyzed in this section includes those locations where planned construction, operations, and decommissioning activities could occur. This includes the land surrounding the compressor station and portions west of the Colorado River, which, in addition to archival research and searches of standard repositories containing existing information, has been intensively surveyed for archaeological and historical resources, as well as preliminarily surveyed lands near Moabi Regional Park and floodplain areas directly north, where facilities related to freshwater flushing may be located. The third area includes another portion of lands near the community of Topock on the Arizona side of the Colorado River along the BNSF Railway that have been subject to recent reconnaissance-level surveys (see Exhibit 4.4-1).

The anticipated physical extent of remediation components, including all in situ reactive zone (IRZ) wells, injection wells, extraction wells, and pipeline/utility corridors, will be partially sited within previously disturbed areas. These areas include existing roads in the project area, existing monitoring well pads, or floodplain areas. However, the exact placement of the needed remediation and monitoring elements is not defined pending completion of final project design. The ultimate placement of monitoring wells and freshwater extraction wells near Moabi Regional Park or in Arizona is also not yet fully defined. The ultimate placement of the freshwater extraction wells and other project features depends on a range of issues, including rights-of-way, engineering feasibility, environmental sensitivity, and water use agreements. Finally, the ultimate placement of monitoring wells is dependent on the efficiency of the remediation system and the needs of PG&E to document and understand the movement of the groundwater plume over the decades during the remediation and long-term monitoring that would take place under the proposed project; thus, a possibility exists that monitoring wells may be placed anywhere in the project area. Thus, impact analyses for cultural and paleontological resources presented below are based on a worst-case scenario regarding the ultimate placement of wells, conveyance pipelines, access roads, and other proposed project facilities, which provides for a conservative analysis of the potential impacts on significant resources.

Substantial adverse changes to archaeological, historical, and paleontological resources could result from ground disturbing activities necessary to construct, operate, or decommission the proposed project. Such activities may include but are not limited to:

- the installation and maintenance of wells (injection, extraction, and construction of the IRZ),
- construction and maintenance of water conveyance pipelines, placement and maintenance of reductant storage facilities,
- construction and maintenance of roadways connecting well locations and conveyance pipelines with access roads and paths. Ground disturbance activities could also occur during operation and maintenance during which time wells that are no longer operable may be replaced.
- Maintenance activities such as intermittent construction and repairs, and use of roads in the project area, and;
- demolition and removal of project features during decommissioning.

In addition, the mere presence of the constructed features of the proposed project such as wells and water pipelines may create ongoing impacts, such as visual or auditory intrusions, to the Topock Cultural Area because such features are inconsistent with the sacred and traditional cultural functions of the resource. As discussed in more detail in the "Aesthetics" and "Noise" sections of the DEIR (Sections 4.1 and 4.9, respectively), construction and operation of all types of remediation facilities within the project area has the potential to create a significant impact to the Topock Cultural Area in light of Native American statements that these activities are inconsistent with cultural significance of that historical resource.

IMPACT CUL-1	Cause Substantial Adverse Change in the Significance of a Historical Resource as Defined in CEQA Guidelines Section 15064.5. *Construction, operation and maintenance, and decommissioning activities of the proposed project could result in substantial adverse changes to historical resources in the project area, including the (1) Topock Cultural Area, (2) other historical resources listed in Table 4.4-3, (3) historical resources that have yet to be identified in unsurveyed areas, and (4) historical resources that could be identified during construction. Impacts could occur through ground disturbance and other project-related activities or through the introduction of out-of character visual or auditory intrusions to historical resources that gain their significance in part because historical associations or aesthetic values. This impact would be potentially significant.*

Substantial Adverse Changes to the Topock Cultural Area

The proposed project would have a substantial adverse impact on the Topock Cultural Area, which is considered a historical resource because of its historic (and continuing) importance to representatives of the Fort Mojave Indian Tribe and certain other Yuman-speaking tribes in the lower Colorado River region. The area in which ground-disturbing activities and facilities would be located has been designed to avoid the NRHP- listed and NRHP- and CRHR-eligible site CA-SBR-219 (Loci A, B, and C, of the Topock Maze), which is an integral part of the Topock Cultural Area. However, because of the introduction of additional infrastructure, ground-disturbing activity, and overall nature of modern intrusions associated with the proposed project, the changes to the character, nature, and use of the historical resource the proposed project would indirectly affect the Topock Maze and adversely affect the Topock Cultural Area. As discussed further in Section 4.1, "Aesthetics," and Section 4.9, "Noise," of this EIR, the construction of new modern features such as wells and water pipelines would be inconsistent with the setting and visual and auditory characteristics of the Topock Cultural Area that contribute to its historical significance to certain Native American tribes and could be deemed a material alteration of the physical characteristics of the historical area. As expressed by tribal stakeholders during the NACP, even the transformation of Cr(VI) to Cr(III) would create an impact to the cultural and historical values associated with the Topock Cultural Area through the deposition of an unnatural amount of Cr(III) into the environment. The only mitigation that would reduce this impact to a less-than-significant level would be avoidance of any type of project-related activity. It should be noted, however, the proposed remedy would affect a relatively small percentage of the ground surface within the Topock Cultural Area and that the evidence suggests that the Topock Cultural Area will retain its historical and cultural significance even after the proposed remedy is in operation and completed. Thus, there are mitigation measures that will reduce the level of impact, although not below the level of significance.

Complete avoidance of the Topock Cultural Area and the physical characteristics that convey its historical significance is not feasible given the need to have an active remediation system to clean up the contaminated groundwater plume. As such, impacts on this historical resource would be **significant and unavoidable. (IMPACT CUL-1a)**

Substantial Adverse Changes to the Other Identified Historical Resources (see Table 4.4-3)

Two resources that have been previously determined eligible for listing on the NRHP are located within the proposed project area. These resources consist of CA-SBR-2910H (remnant segments of Route 66) and CA-SBR-11701 (a prehistoric quarry site with associated hearth and artifacts). In addition CA-SBR-219 (Loci A, B, and C of the Topock Maze) is adjacent to the project area. In addition to being a contributing component of the Topock Cultural Area, this site qualifies as a historical resource under CEQA and could be subject to visual and auditory intrusions that affect its character as a historical resource (see Sections 4.1 and 4.9 of this EIR for further information on visual and noise-related impacts). These NRHP-eligible and listed resources are automatically considered eligible for inclusion in the CRHR and are treated as historical resources under CEQA as described above.

CA-SBR-2910H (Route 66) has significance as an important historical highway associated with westward migration during the Great Depression and postwar years. It could be subject to ground disturbance and out-of-character visual intrusions. Historic and prehistoric archaeological deposits that are spatially and functionally associated with the Maze or Route 66 are likely to contain information that would be important to the understanding of prehistoric lifeways or the use of Route 66.

Additionally, other unevaluated cultural resources identified in Table 4.4-3 may qualify as historical resources under CEQA. While most of the cultural resources listed in Table 4.4-3 have not been formally evaluated for listing on the CRHR, sufficient information exists to conservatively consider that many of them are likely to qualify as historical resources. The variety and density of recorded resources within the project area suggests that they may have the potential to qualify for the CRHR for their associations with significant historical events or because of the information that they can provide in the study of prehistory and history. Thus it is reasonable to conservatively consider that some of the documented but currently unevaluated resources identified within the project area would qualify as historical resources, and they are all treated as such for purposes of the analysis in this EIR.

Project construction, operations, and decommissioning could disturb or alter these historical resources. Disturbance could occur through ground-disturbing work that may be required within the boundaries of these resources and the introduction of intrusive new features to the landscape. Excavation within the boundaries of the archaeological sites would materially alter these historical resources by (1) disrupting the spatial associations that contain information about the prehistoric or historic lifeways represented by those sites or (2) by materially altering in an adverse manner the physical characteristics that convey the resource’s historical significance. These impacts would be **potentially significant. (IMPACT CUL-1b)**

Substantial Adverse Changes to As Yet Undiscovered Historical Resources

In addition to the currently identified cultural resources listed in Table 4.4-3, it is reasonable to conclude that undocumented archaeological sites may be encountered during ground-disturbing construction activities within the project area. Such resources may be inadvertently disturbed or damaged by construction before such impacts can be avoided.

Ground disturbing activities associated with the proposed project during construction, operation and maintenance, and decommission would have the potential to cause substantial adverse changes to undocumented and/or buried archaeological resources. This impact could result in **potentially significant** impacts on currently undocumented historical resources. **(IMPACT CUL-1c)**

Mitigation Measure CUL-1a: Consider the Location of Historical Resources During Project Design, Avoid Resources to the Extent Feasible, Communicate with Native American Tribes, Ensure Continued Tribal Access to the Topock Cultural Area

- During selection of the final design and location for physical improvements, PG&E shall utilize previously disturbed areas for the placement of new physical improvements to the extent feasible, and shall use previously existing physical improvements, such as wells and other facilities, where appropriate.
- PG&E shall also consider the location of Loci A, B and C of the Topock Maze during the design of the physical improvements necessary for the proposed project and avoid direct impacts to the Topock Maze to the fullest extent feasible.
- Upon selection of the final design and location for physical improvements, PG&E shall consult with Native American Tribes that attach cultural significance to the Topock Maze and the Topock Cultural Area and develop a plan to ensure tribal access to and use of the project area for religious, spiritual or cultural purposes, to the extent PG&E has the authority to grant such access, consistent with existing laws, regulations and agreements governing property within the project area. The plan may specify that such access may not interfere with the project or create health and safety concerns. Due to health and safety concerns, PG&E may exclude the Topock Compressor Station and related facilities from the area for which tribal access and use may be provided.
- This mitigation measure shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.
- Mitigation measures AES-1, AES-2 and NOISE-3 are also applicable to the Topock Cultural Area. Mitigation measures AES-1 and AES-2 would reduce impacts related to aesthetic qualities of the project area, including those views from the Topock Maze Locus B. Mitigation measure NOISE-3 would serve to reduce noise impacts that could be experienced within the Topock Cultural Area and notify tribal members of project activity that would generate new noise.

Timing:	DTSC shall review PG&E's proposed plans and their use of previously disturbed areas, previously existing physical improvements, and their avoidance of direct impacts on the Topock Maze. DTSC shall review the plan to allow cultural access.
Responsibility:	PG&E shall draft its final design plans to utilize previously disturbed areas for the placement of new physical improvements and previously existing physical improvements, such as wells and other facilities, where appropriate, and shall consider the location of the Topock Maze and avoid impacts to it to the extent feasible. DTSC shall confirm that use of previously disturbed areas and previously existing physical improvements, and avoidance of direct impacts to

the Topock Maze is adequate. PG&E shall conduct the required consultation with Native American Tribes regarding development of a plan to ensure tribal access to and use of the project area for religious, spiritual or cultural purposes to the extent feasible. DTSC shall review this plan to ensure that it is adequate. PG&E and DTSC shall coordinate their cultural management activities with the Bureau of Land Management to minimize the duplication of efforts or implementation of conflicting management goals.

Significance after Mitigation: Complete avoidance of the Topock Cultural Area is not feasible given the need to have an active remediation system to clean up the contaminated groundwater plume. Accordingly, even with the implementation of mitigation via use of previously disturbed areas and previously existing physical improvements, avoidance of direct impacts to the Topock Maze, and a plan to ensure reasonable continued tribal access to and use of the project area for religious, spiritual or cultural purposes, the proposed project retains the potential to result in significant impacts on the Topock Cultural Area. Thus this impact is **significant and unavoidable**.

Mitigation Measure CUL-1b and CUL-1c: Consider the Location of Historical Resources During Project Design, Avoid Resources to the Extent Feasible, Communicate with Native American Tribes, and Prepare and Implement Treatment for Impacted Historical Resources

The following actions will reduce the potential for impacts to identified historical resources (other than the Topock Cultural Area, which is separately addressed in CUL-1a) within the project area. To the extent feasible, these actions shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.

- PG&E shall consider the locations of the identified historic resources described above during the design of the physical improvements necessary for the proposed project and avoid impacts to historical and archaeological resources to the extent feasible. DTSC shall review the plans for the final design of the project and compare such plans to the location of identified resources to assist in and enforce the avoidance of identified resources to the extent feasible.

- Upon selection of the final design and location for physical improvements, PG&E shall retain a qualified cultural resources consultant to prepare a cultural resources study that assesses the potential for the construction, operations, or decommissioning of proposed improvements to result in significant impacts on identified historical resources described in Impact CUL-1b and CUL-1c. This will include cultural resources survey and evaluation of unsurveyed areas that could be affected by construction as determined by DTSC in consultation with PG&E and BLM. "Significant impacts" as used here means the potential for construction to demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR. DTSC shall review this study.

- If the study determines that the construction of physical improvements would result in significant impacts on identified historical resources described in Impact CUL-1b and CUL-1c, and avoidance of the resource is not feasible, PG&E shall prepare and DTSC shall review a treatment plan that identifies measures to reduce these impacts. The treatment plan shall identify which criteria for listing on the CRHR contribute to the affected resource's significance and which aspects of significance would be materially altered by construction, operations, or decommissioning. However, if avoidance is not feasible, the Plan shall provide for reasonable efforts to be made to permit the resource to be preserved in place or left in an undisturbed state. Methods of accomplishing this may include capping or covering the resource with a layer of soil. To the extent that resource cannot feasibly be preserved in place or not left in an undisturbed state, excavation as mitigation shall be restricted to those parts of resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a unique archaeological resource if the treatment plan determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource. The plan shall require communication and consultation with Native American tribes that attach cultural significance to the Topock Maze and the Topock Cultural Area with regard to their perspectives and wishes for the treatment of the resources.

- PG&E shall retain a qualified cultural resources consultant to observe ground-disturbing activities and shall invite the participation of Native American tribal monitors during those activities, including repairs necessary during operations and decommissioning activities, to ensure that identified historical resources are avoided, to the extent feasible, during actual construction. The cultural resources consultant shall provide training to construction personnel on the locations of identified resources, values associated with the identified resources, responsibility for reporting suspected historic resources, and procedures for suspension of work in the immediate vicinity of the discovery, and shall use exclusionary fencing, flagging, or other appropriate physical barriers to mark the boundaries of identified resources. The cultural resources consultant shall invite Native American tribes to participate in this training.

- PG&E shall retain a qualified cultural resources consultant and shall invite Native American tribal monitors to conduct yearly inspections (or less frequently if agreed upon) identified historical resources and unique archaeological resources to determine if they have been impacted by ongoing operations activity relative to their condition prior to the project. If deterioration caused by ongoing operations is detected, PG&E shall develop and implement a treatment plan to reduce or avoid further degradation.

Timing:	PG&E shall consider the locations of identified resources during the final design of the proposed project and shall avoid impacts to archeological resources to the extent feasible. DTSC shall review the proposed plans relative to the mapped location of identified historic properties during the design sufficiently prior to finalization of the designs to enforce the avoidance of identified resources to the extent feasible. PG&E shall conduct a study to determine the full number of historical resources that would be subject to significant impacts prior to construction. PG&E retain a qualified cultural resources consultant to conduct the study to identify appropriate treatment and implement treatment prior to relevant project activities that would result in significant impacts on historical resources. PG&E shall monitor ground-disturbing activity during construction, relevant operations and maintenance, and decommissioning, and shall invite the participation of Native American tribal monitors during those activities. PG&E shall also retain a consultant to conduct the yearly inspection of identified resources and shall invite Native American monitors to participate at least 30 days in advance of the inspection.
Responsibility:	PG&E shall retain the cultural resources consultants and invite appropriate Native American tribal monitors necessary to perform the studies and monitoring identified above. DTSC shall review these studies to ensure that they are adequate and shall approve these studies or suggest edits and revisions. PG&E and DTSC shall coordinate their cultural management activities with the Bureau of Land Management to minimize the duplication of efforts or implementation of conflicting management goals.
Significance after Mitigation:	These measures would reduce but may not completely avoid the potential for significant impacts on identified historical resources listed in Table 4.4-3. While excavations or documentation performed to capture and retrieve the qualities of significance associated with identified other historical resources would diminish

these impacts this mitigation may not completely avoid such impacts. For example because archaeological deposits often contain information relevant to archaeological research in the spatial associations of artifacts contained in the deposit, studies and excavations may not completely capture all of this information and thus may not completely avoid the impact. While documentation of these resources in their current state would capture some of the significance and feeling associated with these resources it would not preserve the status quo but instead would simply record it for posterity. Thus this impact is **potentially significant and unavoidable.**

IMPACT CUL-2 Cause a Substantial Adverse Change in the Significance of a Unique Archaeological Resource. *Many of the cultural resources listed in Table 4.4-3 may meet the CEQA criteria for a unique archaeological resource. Construction, operation and maintenance, and decommissioning activities of the proposed project could result in substantial adverse changes to one or more unique archaeological resource in the project area through ground disturbance and other project-related activities. This impact would be* ***potentially significant****.*

Most of the cultural resources identified in Table 4.4-3 above have not yet been formally evaluated to determine if they qualify as unique archaeological resources under CEQA. Impacts to unique archaeological resources may be avoided by conducting studies to evaluate known resources and areas that are likely to contain buried or obscured resources. However, the possibility remains that it will not be feasible to avoid ground-disturbing work within the boundaries of all unique archaeological resources. The construction of improvements and ground disturbing work performed during ongoing operations may physically destroy archaeological features and artifacts, disrupt the scientific context and spatial patterns of the archaeological resource, or alter the visual appearance that conveys the significance of a unique archaeological resource. Additionally the introduction of new facilities that are inconsistent with the setting of these resources may diminish the significance of unique archaeological resources whose significance is derived in wholly or in part from its aesthetic qualities and historical associations. Thus this impact is **potentially significant**.

Mitigation Measure CUL-2: Consider the Location of Unique Archaeological Resources during Project Design, Avoid Resources to the Extent Feasible, Communicate with Native American Tribes, and Prepare and Implement Treatment for Impacted Resources

Cultural resources that qualify as unique archaeological sites in the project area would probably also meet one or more of the criteria for historical resources and would be subject to Mitigation Measures CUL-1b and CUL-1c. The following actions will further reduce the potential for impacts on unique archaeological resources. To the extent feasible, these actions shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.

- PG&E shall consider the locations of the unique archeological resources described above during the design of the physical improvements necessary for the proposed project and avoid impacts to those resources to the extent feasible. DTSC shall review the plans for the final design of the project and compare such plans to the location of the resources to assist in and enforce the avoidance of identified resources to the extent feasible.

- Upon selection of the final design and location for physical improvements, PG&E shall retain a qualified cultural resources consultant to prepare a cultural resources study that assesses the potential for the construction, operations, or decommissioning of proposed improvements to result in significant impacts on unique archeological resources. “Significant impacts” as used here means the potential for construction to demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR. DTSC shall review this study to ensure avoidance has been implemented to the extent feasible.

- If the study determines that the construction of physical improvements would result in significant impacts on unique archeological resources, and avoidance of the resource is not feasible, PG&E shall prepare and DTSC shall review a treatment plan that identifies measures to reduce these impacts. The treatment plan shall identify which criteria for listing on the CRHR contribute to the affected resource's significance and which aspects of significance would be materially altered by construction, operations, or decommissioning. However, if avoidance is not feasible, the Plan shall provide for reasonable efforts to be made to permit the resource to be preserved in place or left in an undisturbed state. Methods of accomplishing this may include capping or covering the resource with a layer of soil. To the extent that resource cannot feasibly be preserved in place or not left in an undisturbed state, excavation as mitigation shall be restricted to those parts of resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a unique archaeological resource if the treatment plan determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource. The plan shall require communication with Native American tribes that attach cultural significance to the Topock Cultural Area with regard to their perspectives and wishes for the treatment of the resources.

- PG&E shall retain a qualified cultural resources consultant and shall invite the participation of Native American tribal monitors to observe ground-disturbing activities and shall invite the participation of Native American tribal monitors, during those activities, including repairs necessary during operations and decommissioning activities, to ensure that identified unique archeological resources are avoided, to the extent feasible, during actual construction. The cultural resources consultant shall provide training to brief construction personnel on the locations of identified resources, values associated with the identified resources, responsibility for reporting suspected unique archeological resources, and procedures for suspension of work in the immediate vicinity of the discovery, and shall use exclusionary fencing, flagging, or other appropriate physical barriers to mark the boundaries of identified resources. The cultural resources consultant shall invite Native American tribes to participate in this training.

- PG&E shall retain a qualified cultural resources consultant and shall invite Native American tribal monitors to periodically conduct yearly inspections (or less frequently if agreed upon) identified unique archeological resources to determine if they have been impacted by ongoing operations activity relative to their condition prior to the project. If deterioration caused by ongoing operations is detected, PG&E shall develop and implement a treatment plan to reduce or avoid further degradation.

Timing:	PG&E shall complete the inventory and evaluation of all resources in the project area prior to completion of the final project design and shall avoid impacts to unique archeological resources to the extent feasible. PG&E shall consider the locations of identified resources during the design of the proposed project. DTSC shall review the proposed plans relative to the mapped location of identified unique archaeological resources sufficiently prior to finalization of the designs to enforce the avoidance of resources to the extent feasible. PG&E shall retain a qualified cultural resources consultant to conduct the study to identify appropriate treatment and implement treatment prior to relevant project activities that would result in significant impacts on historical resources. PG&E shall conduct a study to determine if the selected design would result in significant impacts on cultural resources prior to construction. PG&E shall invite Native American monitors to observe activities during construction and retain consultants to inspect identified resources during ongoing operations.
Responsibility:	PG&E shall retain the cultural resources consultants necessary to perform the studies and monitoring identified above and shall invite the participation of Native American tribal monitors during those activities. DTSC shall review these studies and treatment to ensure that they are adequate and shall approve these studies or suggest edits and revisions. PG&E shall retain consultants to monitor

ground-disturbing activity during construction, inspections during relevant operations and maintenance, and development of additional studies or plans to evaluate new discoveries or treat discoveries or deterioration of identified resources. DTSC shall review these studies and plans. PG&E and DTSC shall coordinate their cultural management activities with the Bureau of Land Management to minimize the duplication of efforts or implementation of conflicting management goals.

Significance after Mitigation: These measures would reduce but not completely avoid the potential for significant impacts on unique archaeological resources. Because it may be necessary to construct physical improvements in the location of such resources to achieve the project objective the proposed project retains the potential to result in significant impacts on these resources. While avoidance, monitoring and treatment would diminish these impacts this mitigation may not completely avoid such impacts. For example because archaeological deposits often contain information relevant to archaeological research in the spatial associations of artifacts contained in the deposit, studies and excavations may not completely capture all of this information and thus may not completely avoid the impact. While documentation or study of these resources in their current state would capture some of the significance and feeling associated with these resources it would not preserve the status quo but instead would simply record it for posterity. Thus this impact is **potentially significant and unavoidable.**

IMPACT CUL-3 Directly or Indirectly Destroy a Unique Paleontological Resource or Site or Unique Geologic Feature. *The construction of wells (extraction, injection, and IRZ construction), water conveyance pipelines and other utility pathways, reductant storage facilities, and the grading of access roads throughout the project area may affect paleontological resources through ground disturbance activities. This impact would be potentially significant.*

Given the regional location of the project area within the Colorado River valley, there is the potential for unique paleontological resources to occur within the project area. Pleistocene Quaternary alluvium units, Bouse Formation, and Chemehuevi Formation all have the potential to contain fossils, some of which may be considered unique under CEQA. Excavations in the igneous and metamorphic rocks of the more elevated terrain in the southern portion of the proposed project area will not encounter any significant vertebrate fossils. Shallow excavations in the active and recent fluvial deposits around the Colorado River and Sacramento Wash have low potential to adversely impact fossil resources. Excavations within Bouse Formation deposits could encounter significant fossil deposits. The Chemehuevi Formation and Quaternary lake sediments have yielded significant fossils within the boundaries of the proposed project area. Because of this, the project site is deemed of high sensitivity for paleontological resources. Ground-disturbing activities, which could occur during all phases of the proposed project, would have the potential to encounter, and therefore affect, unique paleontological resources, resulting in a **potentially significant** impact. **(IMPACT CUL-3)**

Mitigation Measure CUL-3: Directly or Indirectly Destroy a Unique Paleontological Resource or Site or Unique Geologic Feature.

A paleontological investigation including a detailed survey of the project area by a qualified paleontologist, shall be conducted to refine the potential impacts to unique paleontological resources within the project area and determine whether preconstruction recovery of sensitive resources and/or construction monitoring would be warranted. If construction monitoring is determined to be warranted, ground-altering activity would be monitored by a qualified paleontologist to assess, document, and recover unique fossils. Monitoring shall include the inspection of exposed surfaces and microscopic examination of matrix in potential fossil bearing formations. In the event microfossils are discovered, the monitor shall collect matrix for processing. In the event paleontological resources are encountered during earthmoving activities, recovered specimens shall be prepared by the paleontologist to a point of identification and permanent preservation. The monitor shall be empowered to halt construction activity in the immediate vicinity of the encountered paleontological resources for a sufficient interval to allow recovery of significant unearthed fossil remains. Paleontological resources of scientific value shall be identified and curated into an established, accredited, professional museum repository in the region with permanent retrievable paleontological storage. To the extent feasible, this mitigation measure shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.

Timing:	The paleontological investigation under Mitigation Measure CUL-3 shall be implemented before construction activities begin. If deemed necessary, monitoring of ground-disturbing activities in areas that could contain unique paleontological resources would be conducted during construction.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	The paleontological investigation and construction monitoring by a qualified paleontologist, as appropriate, would ensure that all paleontological resources encountered during construction and grading activities would be documented, recovered, and curated at an appropriate facility, reducing the impact to **less than significant**.

IMPACT CUL-4	Disturbance of Human Remains, Including Those Interred Outside of Formal Cemeteries. *Ground-disturbing activities required for all project phases may disturb as-yet undiscovered human remains, including Native American burial remains (i.e., human remains and grave goods). This impact would be* ***potentially significant****.*

Ground-disturbing activities would occur during all phases of the proposed project. While none of the approximately 80 documented sites in the project area have been found to contain human remains, these ground-disturbing activities would have the potential to encounter previously undiscovered human remains associated with past uses of the project area. The absence of identified burials and grave goods associated with known cultural resources does not provide a strong indication that such resources do not exist because few of these sites have been systematically excavated. The density of cultural resources in the project area (approximately 80 resources total) instead suggests that there is the potential to encounter human remains during ground-disturbing construction because at least some of the identified resources may contain human remains. The disturbance of these remains could damage such remains. This impact is thus **potentially significant**.

Mitigation Measure CUL-4: Complete Inventory Efforts, Train Construction Personnel and Monitor Ground-Disturbing Construction, Stop Work in the Event of a Discovery of Human Remains, Comply with State Law Regarding Discoveries

Ground disturbance activities may disturb as-yet undiscovered human remains or Native American burials and associated grave goods. PG&E shall retain a qualified cultural resources consultant and invite designated Native American tribal monitor(s) to train construction personnel in the identification of human remains so that they may aid in the identification of such resources. In the unlikely event human remains are uncovered over the course of project construction, operation and maintenance, and/or decommissioning activities, the following procedures shall be followed to ensure compliance with all applicable state and federal laws:

- The construction contractor shall immediately suspend work within the vicinity of the discovery and determine if the remains discovered are human or nonhuman. This determination shall be made by a qualified archaeologist with skill in the identification of human osteological (bone) remains.

- The cultural resources monitor or construction contract shall protect discovered human remains and/or burial goods remaining in the ground from additional disturbance.

- The archaeologist or construction contractor shall contact the San Bernardino County Coroner and PG&E project personnel immediately. In Arizona, the archaeologist and construction contractor will follow Arizona laws and implementing regulations. Human remains found on federal land would require the notification of the BLM Havasu City field office and compliance with applicable federal laws and regulations, including the Native American Graves Protection and Repatriation Act.

- The San Bernardino County Coroner will make determine if the remains are of recent origin and if a investigation of the cause of death is required (California Health and Safety Code Section 7050.5). If the coroner determines that the human remains are not Native American and not evidence of a crime, project personnel shall coordinate with a qualified archaeologist(s) to develop an appropriate treatment plan. This may include contacting the next-of-kin to solicit input on subsequent disposition of the remains. If there is no next-of-kin, or recommendations by the next-of-kin are considered unacceptable by the landowner, the landowner will reinter the remains with appropriate dignity in a location outside the project area and where they would be unlikely to be disturbed in the future.

- In the event that the San Bernardino County Coroner determines that the human remains are Native American and not evidence of a crime, project personnel shall contact the NAHC so that a most likely descendent (MLD) can be identified as required under California Public Resources Code Section 5097.98.

- The MLDs shall inspect the area in which the human remains were found and provide treatment recommendations to the landowner and project personnel in accordance with the provisions of California Public Resources Code Section 5097.98. The treatment may include reburial, scientific removal of the discovered human remains and relinquishment to the MLD, nondestructive analysis of human remains and/or other culturally appropriate treatment. If the MLD so requests, the landowner would reinter the remains with the appropriate dignity in a location outside the area of disturbance in a location unlikely to be disturbed in the future.

- To the extent feasible, this mitigation measure shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.

Timing:	Mitigation Measure CUL-4 shall be implemented in concert with ground-disturbing activities throughout the remediation process to the extent that human remains and associated grave goods are discovered.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Despite a mitigation plan that includes compliance with applicable state laws and regulations, and the involvement of qualified archaeologists, the NAHC, and MLDs, when appropriate, disturbance of human remains, including possible Native American burials and grave goods, to the extent that any discovered human remains and grave goods are removed from the site, this would result in an unavoidable impact to the resource. Therefore, impacts on unknown human remains would remain **significant and unavoidable**.

4.5 GEOLOGY AND SOILS

This section provides a discussion of existing conditions related to geology, soils, and seismicity in the project area and surrounding vicinity; describes applicable federal, state, regional, and local regulations and policies; and analyzes the potential temporary, short-term, and long-term impacts of the proposed project on geologic resources. A discussion of cumulative impacts on geology and soils is provided in Chapter 6, “Cumulative Impacts,” of this EIR. Impacts on mineral resources are discussed in Chapter 5, “Other CEQA Sections.”

Information pertaining to geology and soils provided in this section was obtained, in part, through a review of the *Final Report, RCRA Facility Investigation/Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California, Volume 1—Site Background and History* (CH2M Hill 2007a) and the *Final Report, RCRA Facility Investigation/Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California Volume 2—Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigation* (CH2M Hill 2009a).

4.5.1 EXISTING SETTING

The following sections discuss the existing topography, geology, soils, and seismic conditions associated with the project area.

4.5.1.1 TOPOGRAPHY

The project area is located within a north-sloping alluvial terrace and floodplain along the northern margin of the Chemehuevi Mountains (Exhibit 4.5-1). Within the project area, elevations range from 455 feet above mean sea level (msl) along the Colorado River to approximately 1,200 feet msl south and southwest of the project area. The surface topography of the project area is characterized by deeply dissected alluvial terraces at elevations from 500–650 feet msl. The compressor station is located on an alluvial terrace at approximately 600–625 feet msl. One of the largest incised channels in the project area is Bat Cave Wash, a north-south dry wash (ephemeral) stream adjacent to the compressor station. The upper end of Bat Cave Wash is located at approximately 480 feet above msl, which is approximately 60–85 feet below the compressor station’s elevation. Bat Cave Wash slopes toward the north. A small drainage, the East Ravine, extends from the southeastern part of the compressor station toward the Colorado River. A narrow and sinuous feature, the East Ravine is incised approximately 50 feet below the surrounding terrain. In the project area, a floodplain with an average width of 500 feet borders both sides of the Colorado River. The floodplain is less than 40 feet above the river’s elevation.

4.5.1.2 REGIONAL AND LOCAL GEOLOGY

Regional Geology

The project area is in the Basin and Range geomorphic province, characterized by parallel fault-block mountains, separated by alluvial valleys (Exhibit 4.5-2). The dominant geologic feature in the vicinity of the project area is the Chemehuevi Mountains, one of several metamorphic and plutonic basement core complexes exposed in southeastern California and western Arizona (Miller et al. 1983, cited in CH2M Hill 2007a:2-2; Miller and John 1999, cited in CH2M Hill 2007a:2-2 and 2-3). The project area lies upon a north-sloping piedmont terrace along the northern margin of the Chemehuevi Mountains. The mountains are composed of metamorphic and plutonic basement rocks of Precambrian (1.5–4.5 billion years Before Present [B.P.]) and Mesozoic (144–248 million years B.P.) age. Miocene-age (5.3–24 million years B.P.) sedimentary and volcanic rocks unconformably overlie the basement rocks (John 1987, cited in CH2M Hill 2007a:2-3 and CH2M Hill 2008:3-3; Miller and John 1999, cited in CH2M Hill 2007a:2-2 and 2-3). Near-surface sedimentary units in the project area consist of Tertiary- and Quaternary- to Recent-age alluvial fan deposits, Pliocene lacustrine (lakebed) deposits, and fluvial deposits of the Colorado River ranging from Tertiary and Quaternary age to recent times.

Structural Geology

The Chemehuevi detachment fault, a low-angle normal fault, is the most prominent structural feature in the area and is part of series of faults exposed within and surrounding the Chemehuevi Mountains, and separating the rocks in the lower plate's core complex (Precambrian- and Mesozoic-age metamorphic and igneous rocks) from the pre-Tertiary metamorphic and plutonic rocks and Miocene-age sedimentary and volcanic rocks in the upper plate (John 1987, cited in CH2M Hill 2007a:2-3 and CH2M Hill 2008:3-3; Howard, John, and Nielson 1997, cited in CH2M Hill 2008:3-4 through 3-8). A Miocene-age conglomerate underlies a major unconformity that separates the bedrock formations from overlying unconsolidated alluvial and fluvial deposits (Metzger and Loeltz 1973, cited in CH2M Hill 2008:3-3 through 3-8). The alluvial and fluvial deposits have a gentle (5–10 degrees) northward structural dip, which contrasts with the up-to-40-degree northeastward dip of the Miocene conglomerate in the area east of the compressor station. The generalized geology and hydrogeology of the project area are depicted on Exhibit 4.5-3.

Several minor north-trending lineaments (linear topographic features) are evident in the upland alluvial terraces as defined primarily by drainage and erosional gullies. The Bat Cave Wash and the minor surface drainage lineaments most likely reflect the older underlying structural features (e.g., local jointing and shear zones) within the local bedrock (CH2M Hill 2008).

Site Stratigraphy

The site stratigraphy described herein and depicted in Exhibit 4.5-4 is consistent with the informal site-specific terminology provided in the Resource Conservation and Recovery Act (RCRA) facility investigation/remedial investigation (RFI/RI) prepared by CH2M Hill (2006a, 2006b, 2007a, 2007b, 2007c).

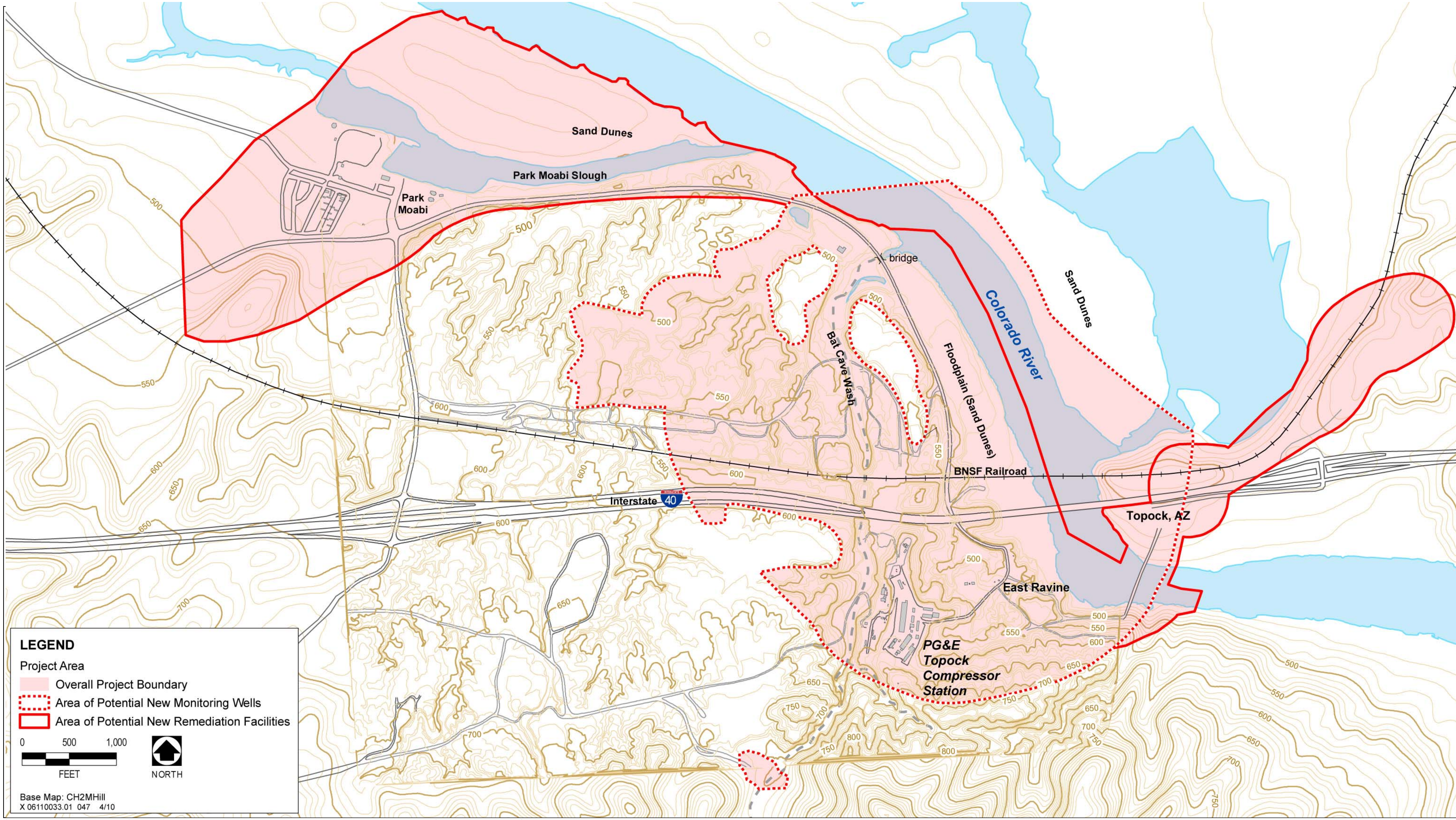
The following paragraphs provide a summary of the formation and composition of the rocks in the project area (lithology) and the topographic location of the various rock layers and their interrelationships (stratigraphy). Geological formations are summarized in Table 4.5-1.

Bedrock

The consolidated bedrock consists of pre-Tertiary metamorphic and igneous rock (primarily grayish metadiorite, gneiss, and granitic rocks) and the Miocene Conglomerate. The Miocene Conglomerate (the informal geologic name for this project area) is typically a massively bedded, brick-red to brown, cemented conglomerate and gravelly sandstone, characterized by poorly sorted angular rock fragments derived from the local metamorphic and igneous bedrock exposed in the Chemehuevi Mountains. In the region, the Miocene Conglomerate formation includes megabreccia (cemented rocks with embedded fragments larger than 1 meter) deposits (John 1987, cited in CH2M Hill 2007a:2-3 and CH2M Hill 2008:3-3; Howard, John, and Nielson 1997, cited in CH2M Hill 2008:3-4 through 3-8; Miller and John 1999, cited in CH2M Hill 2007a: 2-2 and 2-3).

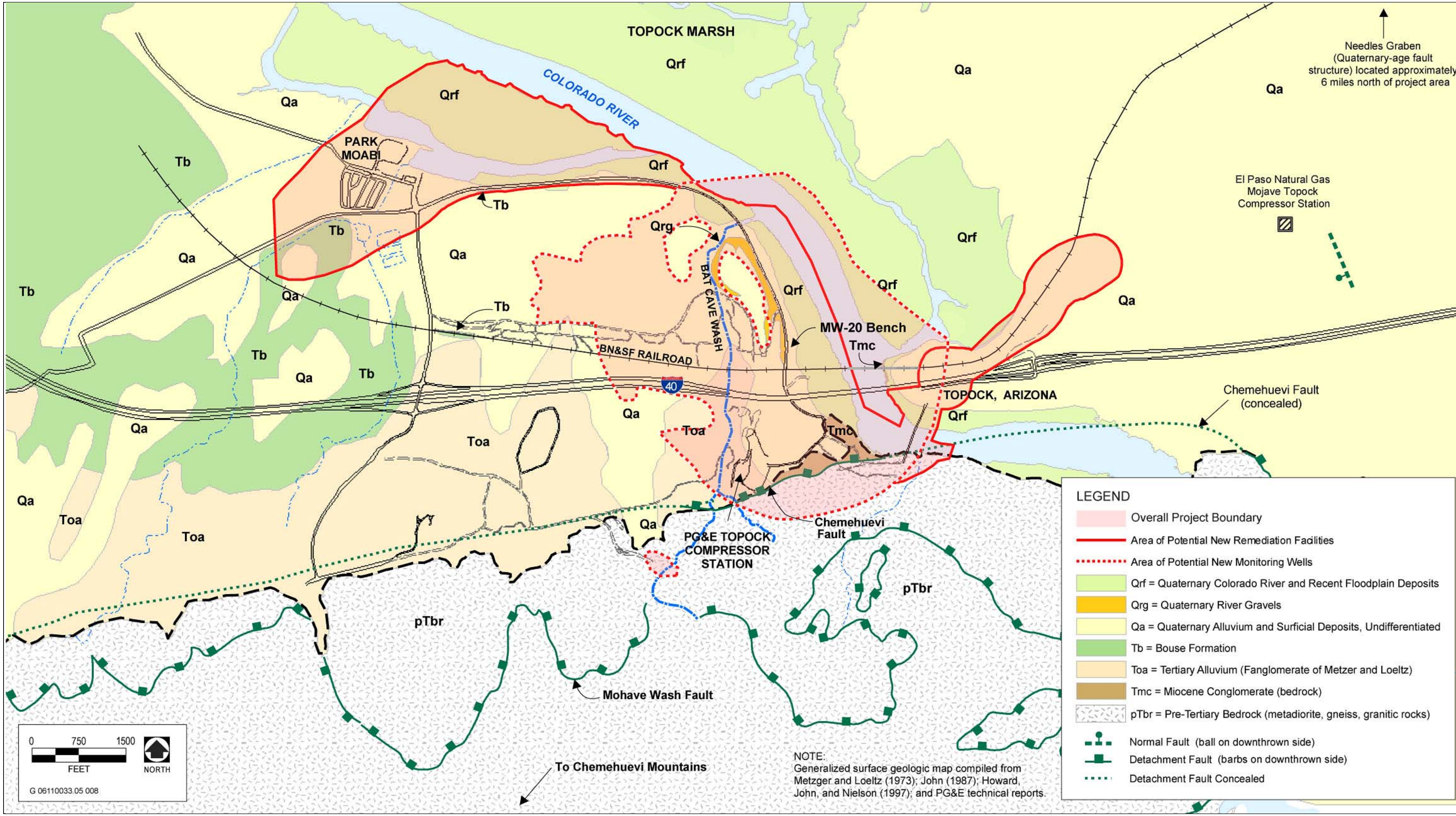
Tertiary Alluvium

Tertiary alluvium refers to the oldest, undeformed alluvial deposits that overlie the Miocene Conglomerate and older bedrock formations in the project area. These alluvial fan deposits, termed “Tertiary Fanglomerate” by Metzger and Loeltz (1973, cited in CH2M Hill 2008:3-3 through 3-8), are composed primarily of moderately consolidated sandy gravel and silty/clayey gravel. In surface outcrops west of the compressor station, the Tertiary alluvium is exposed as deeply dissected alluvial terraces with steep canyon walls. Based on hydrogeologic characteristics observed in the drilling investigations, the Tertiary alluvium sequence is subdivided into three stratigraphic units: a basal depositional unit of alluvium (previously referred to as either “Basal Saline unit” or “reworked Miocene Conglomerate”), and overlying lower and upper units of Tertiary alluvium. A lower (Toa1) and upper (Toa2) unit have been identified through the interpretation of spinner velocity logs and geophysical logs. The subdivision between Toa1 and Toa2 is based on contrasts in hydraulic permeability observed in well testing and variations in geophysical log responses.



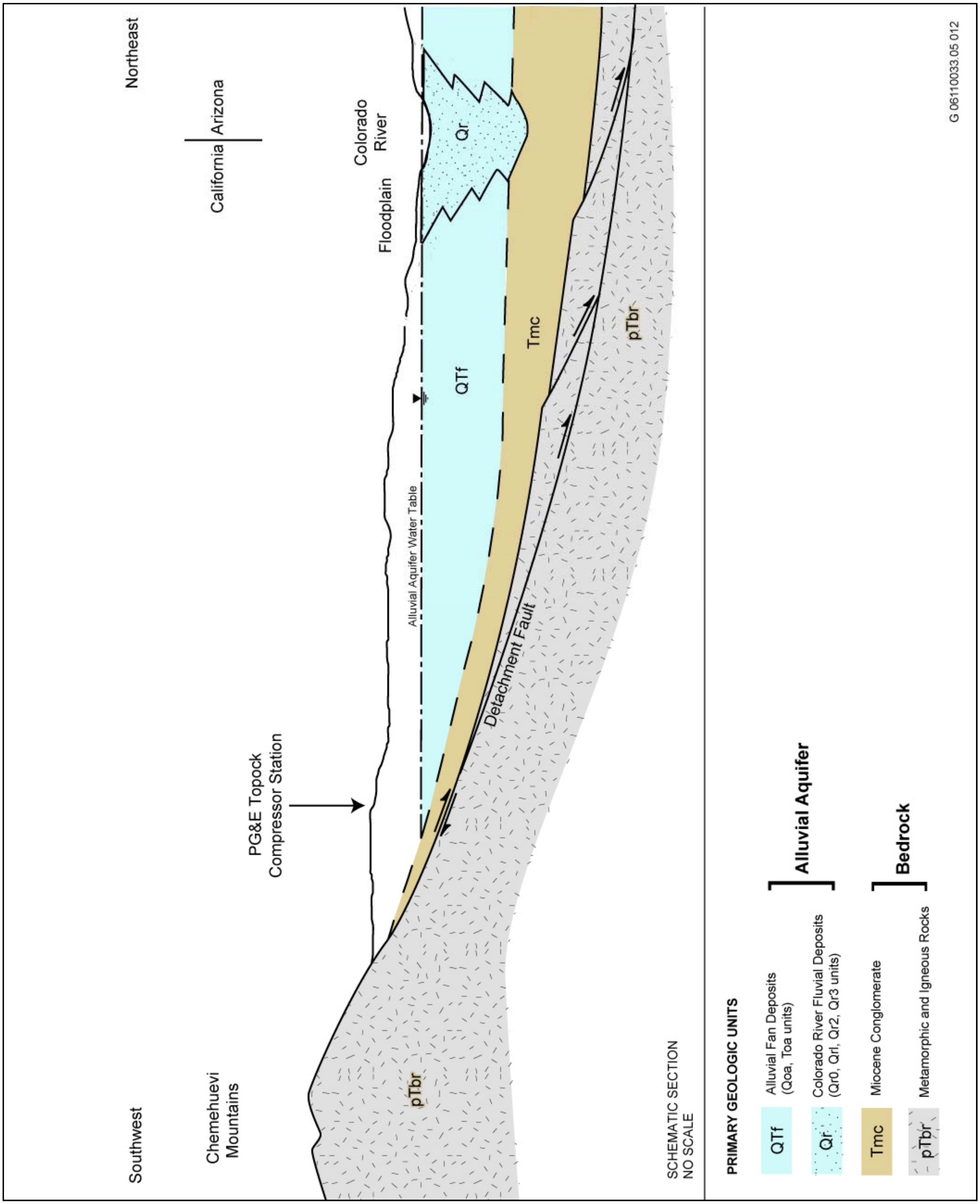
Source: Topographic data from E & E, Inc., 1994, with additional aerial topographic mapping flown April, 2004 (CH2M Hill)

Topographic Map and Project Area **Exhibit 4.5-1**



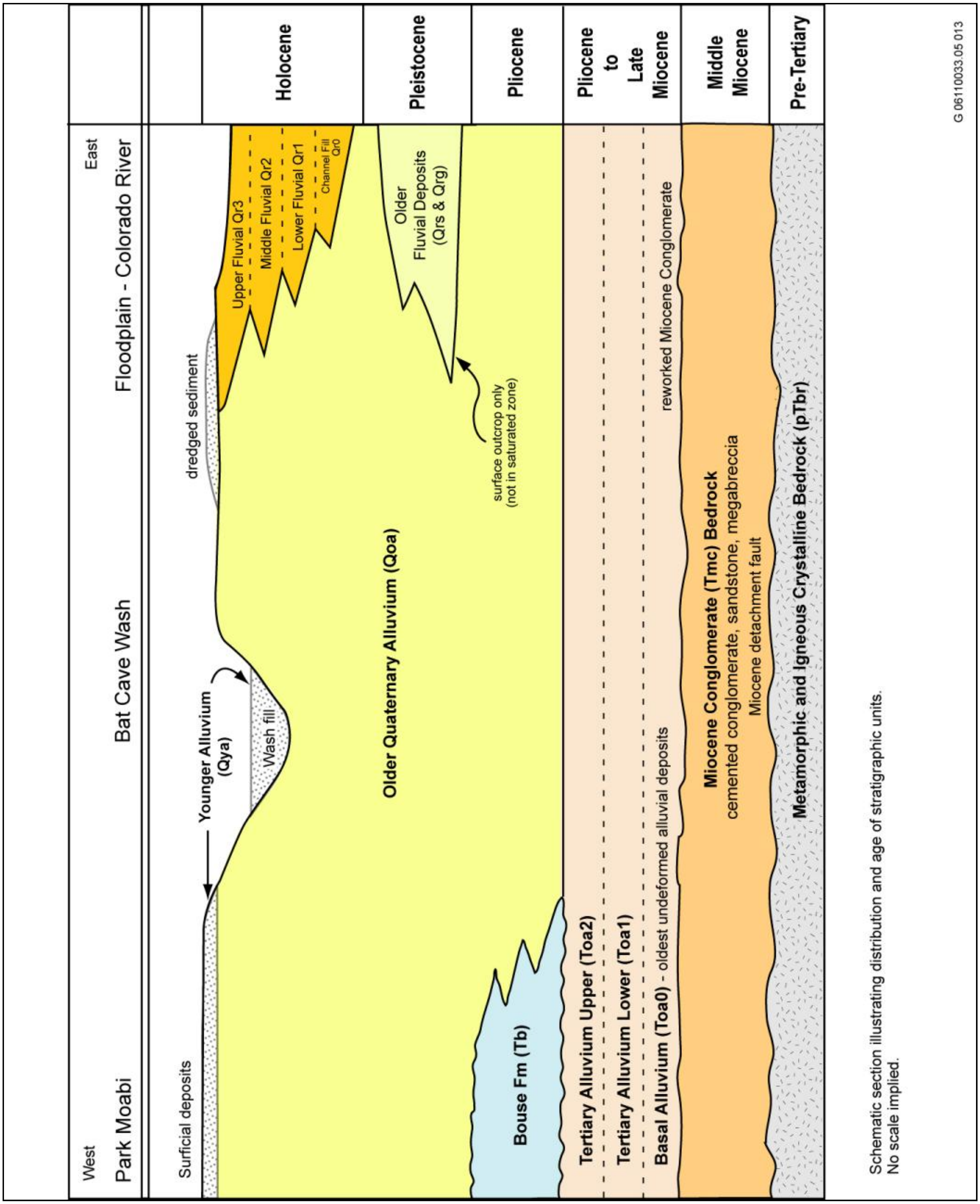
Source: CH2M Hill 2007b:Figure 3-5

Geologic Map and Project Area **Exhibit 4.5-2**



Source: CH2M Hill 2007b:Figure 3-9

Regional Hydrogeologic Cross Section **Exhibit 4.5-3**



Source: CH2M Hill 2007c:Figure 3-7

Site Stratigraphy **Exhibit 4.5-4**

Table 4.5-1
Geologic Formations in the Project Area

Stratigraphic Age	Site Geologic Units					
	Alluvial Deposits		Characteristics	Fluvial Deposits		Characteristics
Holocene	**Younger Alluvium**	**Qya**	Unconsolidated sandy gravel and silty/clayey gravel (youngest alluvial deposits and surficial deposits, undifferentiated).	**Upper Fluvial Sand and Silt** (floodplain area)	Qr3	Unconsolidated sand and silty sand (no gravel), massive bedded, very well-sorted; contains fine-grained organic matter.
				Middle Fluvial Deposits (floodplain area)	Qr2	Unconsolidated sand, clay, and minor gravelly sand, interbedded; clay/silt lenses exhibit both brown and gray (reduced) appearance.
				Lower Fluvial Deposits (floodplain area)	Qr1	Unconsolidated sandy gravel and gravelly sand, minor silty gravel (gravel content >15%); subrounded to very well-rounded pebbles.
				Colorado River Channel Fill (fluvial deposits in paleo-channel)	Qr0	Fluvial channel-fill sediments that occur below elevation 360 feet msl (deepest river deposits encountered in floodplain borings). Per Caltrans, I-40 bridge borings include moderately consolidated to dense, fine to coarse sand and sandy gravel.
Pleistocene	**Older Quaternary Alluvium**	**Qoa**	Unconsolidated sandy gravel and silty/clayey gravel (alluvial fan deposits). Comprises moderately dissected alluvial terraces; terrace/wash slopes are moderate-angle (i.e., 45 degrees).	**Older Fluvial Sediments** (surface outcrop)	Qrs	Pinkish to tan, weakly to moderately consolidated fine sand, silt/clay, with minor pebble gravel; contains root casts (paleosol); outcrops occur as remnants on alluvial terraces as high as elevation 670 feet msl (Old Ponds site).
				Older River Gravels (surface outcrop)	Qrg	Moderately consolidated to cemented, sandy pebble to boulder gravel; subrounded to very well-rounded clasts from distant sources and fluvial transport (unit outcrops west of MW-20 bench).
Pliocene	**Bouse Formation (Tb)** pre-Colorado River lacustrine and deltaic deposits: well bedded, moderately indurated green clay, siliceous claystone, sandstone, and basal marl.					

Table 4.5-1
Geologic Formations in the Project Area

Stratigraphic Age	Site Geologic Units				
	Alluvial Deposits		Characteristics	Fluvial Deposits	Characteristics
Pliocene to Late Miocene	**Tertiary Alluvium—Upper**	**Toa2**	Moderately consolidated sandy gravel, gravelly sand, and silty/clayey gravel (oldest alluvial fan deposits). Comprises deeply dissected alluvial terraces; terrace canyon walls are vertical/steep.	= Tertiary Fanglomerate of Metzger and Loeltz (1973, cited in CH2M Hill 2008:3-3 through 3-8)	
	Tertiary Alluvium—Lower	**Toa1**			
Late Miocene	**Basal Alluvium**	**Toa0**	Moderately consolidated silty sand, clayey/silty gravel, and minor gravelly sand. Consists of 100% reddish detritus of Miocene conglomerate unit (reworked Tmc deposits) in floodplain area. In other site areas, Toa0 is well-consolidated alluvium, lacks reddish color, and exhibits high-induction geophysical log response.		
Angular Unconformity (post-extension erosion)					
Middle Miocene	**Miocene Conglomerate**	**Tmc**	Consolidated conglomerate and sandstone containing rock fragments and megabreccia derived from Chemehuevi Mountains bedrock.		
Unconformity and detachment faulting					
Pre-Tertiary	**Metamorphic/ Igneous Bedrock**	**pTbr**	Metadiorite, gneiss, and granitic bedrock exposed in Chemehuevi Mountains and underlying the groundwater basin.		

Notes:
Caltrans = California Department of Transportation; msl = mean sea level
Bedrock formations shaded gray generally exhibit low permeability and yield water from fractures. Within the project area, younger alluvium and older fluvial and river deposits occur above the water table. Stratigraphic age assignments from published geologic reports and are generalized for units in the project area.
Source CH2M Hill 2008:Table 3-1

The basal depositional unit of alluvium (Toa) has been defined in the site drilling locations based on sediment characteristics (grain sorting and angularity), color, and weathering. Geophysical induction logs generally indicate much higher salinity in the basal alluvium unit, and boring logs note the presence of more reddish material that is often (although not always) finer grained than most of the overlying deposits of Tertiary alluvium.

The stratification and depositional features of the alluvial fan deposits of the Tertiary alluvium stratigraphic unit are evident in the alluvial terrace/wash slopes at the site. Based on surface geologic mapping and published reports (Metzger and Loeltz 1973, cited in CH2M Hill 2008:3-3 through 3-8), the Tertiary alluvium was derived from the Chemehuevi Mountains and deposited as a series of coalescing alluvial fans in a north-northeast direction across the project area. Given this depositional setting, the axes of the fan channels in the alluvial sequence are inferred to be generally oriented in a north-northeast direction.

Bouse Formation

The Bouse Formation, which consists of interbedded clay, claystone, and sandstone, is exposed in dissected alluvial terraces and local outcrops in the western portion of the project area. Where present, the Bouse unit separates the Tertiary alluvium from younger (Quaternary-age, approximately the last 1.8 million years) alluvial deposits. The Bouse represents a lacustrine deposit left by a large Pliocene-age (1.8–5.3 million years B.P.) lake that covered a large portion of the Mohave Valley (Metzger and Loeltz 1973, cited in CH2M Hill 2008:3-3 through 3-8; Howard, John, and Nielson 1997, cited in CH2M Hill 2008:3-4 through 3-8; Howard and Malmon 2007, cited in CH2M Hill 2008:3-7 through 3-8). Most of the Bouse was eroded by the Colorado River during Pleistocene and Holocene time (present day to 1.8 million years ago). The Bouse Formation is preserved in outcrops on the western and eastern flanks of the historical river floodplain. The Bouse Formation is present in outcrops and in the subsurface drilling locations in the western portion of the project area, but it has not been encountered in any of the site borings in the central and eastern portions of the project area.

Quaternary Alluvium

Older Quaternary (Pleistocene-age) alluvium, consisting of unconsolidated, sandy gravel and silty/clayey gravel, is exposed in the moderately dissected alluvial terraces in the project area. The older Quaternary alluvium overlies either the Bouse Formation (where preserved in the western area) or the Tertiary alluvium (where the Bouse was removed by erosion). In outcrops, Quaternary alluvium is distinguished from older Tertiary alluvium by alluvial terrace/wash slopes with moderate angles (e.g., 45-degree slopes).

Younger alluvium includes unconsolidated, sandy gravel, and silty/clayey gravel alluvial deposits of Holocene and Recent age. This stratigraphic unit includes the youngest alluvial deposits (alluvium in streams and washes, recent alluvial/talus deposits, and windblown sand).

Fluvial Deposits

Fluvial deposits of the Colorado River are present in surface outcrops and underlying the present Colorado River floodplain and channel. Based on geologic mapping and published reports (Metzger and Loeltz 1973, cited in CH2M Hill 2008:3-3 through 3-8; Howard, John, and Nielson 1997, cited in CH2M Hill 2008:3-4 through 3-8; Howard and Malmon 2007, cited in CH2M Hill 2008:3-7 through 3-8), the Colorado River's fluvial deposits within the project area are grouped into an older sequence (assumed to be Pleistocene age) and a younger sequence (Holocene to Recent age). The relative age and informal stratigraphic unit descriptions of the fluvial deposits defined for this EIR are shown in Table 4.5-1.

Older fluvial sediments and river gravel, designated as units Qrs and Qrg in Table 4.5-1, are exposed only in surface outcrops (above the water table) at the project area. The older river gravels include sandy, pebble-cobble gravel containing well-rounded clasts (i.e., fragments) of rock types from both distant and local sources and reflect fluvial deposits of the early (Pleistocene-age) Colorado River. Fluvial deposits of fine-grained sand and silt/clay (Qrs) also occur in surface outcrop remnants on alluvial terraces within the project area (above the water table).

The younger Colorado River fluvial deposits occur within the saturated zone underlying the floodplain and the present Colorado River channel and Topock Marsh area. The younger fluvial deposits have been subdivided into four depositional units (Qr0, Qr1, Qr2, and Qr3), from oldest to youngest. Available information indicates that the sediments in the younger fluvial sequence include sandy gravel, gravelly sand, well-sorted fine sand, and silt/clay deposits, which vary in thickness and distribution in the floodplain area. Colorado River deposits dominate the subsurface area from the floodplain near the topographical flat area surrounding existing monitoring well 20, informally referred to as the MW-20 bench eastward to the far edge of the Topock Marsh. The thickness of these deposits ranges from near zero to approximately 250 feet. The maximum thickness has been observed in the seismic survey of the river conducted by the U.S. Geological Survey (USGS). The many borings and geophysical logs in the Topock floodplain have provided a detailed picture of the variable thickness and grain size of the deposits. Qr0 represents the channel-fill fluvial sediments that occur below approximately 360 feet msl.

Older fluvial sediments, designated as Qrg and Qrs in Table 4.5-1, are exposed in surface outcrops at the Topock site. These deposits (assumed to be Pleistocene age) occur solely above the water table. Similarly, the dredged sand on the floodplain and surficial alluvial deposits (grouped as “younger alluvium” in Table 4.5-1), occur above the average water table at the site.

4.5.1.3 SOILS

The project area is located within the Colorado River Desert Soil Survey Area as defined by the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture. A published soil survey for this area has not been completed. Thus, soil descriptions at the site have been inferred from the *County of San Bernardino 2007 General Plan* (County General Plan) (San Bernardino County 2007), the *Soil Survey of Mohave County, Arizona, Southern Part* (NRCS 2006), and CH2M Hill (2007b). Soils in the vicinity of the site are underdeveloped and are primarily fine to coarse grained alluvium or colluvium.

According to the County General Plan (San Bernardino County 2007:Figure 6-10c), the portions of the project site at lower elevations are generally characterized by the Gilman soil series and higher elevation areas are generally characterized by the Calvista soil series. The compressor station is situated between these units; however, no maps are available for the Colorado River Mohave Desert portion in the vicinity of the proposed project. The compressor station and the area to the northwest are characterized by the Gilman soil series (Gunsight very gravelly loam, 2 to 15% slope/Gunsight very gravelly sandy loam, 10 to 40% slopes equivalent, for Mohave County, Arizona). The parent material for Gunsight very gravelly loam is alluvium derived from mixed rock sources. This soil’s drainage class is somewhat excessively drained and has moderately rapid permeability (2–6 inches per hour) (NRCS 2006:51 and 52 and Table 15). The soil has an available water capacity of approximately 6 inches. Runoff from this soil ranges from low to medium. Shrink-swell potential is low. Table 4.5-2 provides a description of the soils in the project area.

In the northeastern and eastern portions of the project area are floodplain sand bars (Lagunita sand, 0 to 1% slopes equivalent, for Mohave County, Arizona) along the banks of the Colorado River, which are characterized primarily by sand and loamy sand surface textures. The soil’s parent material is alluvium derived from mixed rock sources. This soil’s drainage class is excessively drained and the soil has rapid permeability (6–20 inches per hour) (NRCS 2006:61 and Table 15). Lagunita sand has an available water capacity of 3 inches and has a negligible runoff class. Shrink-swell potential is low. This soil can support vegetation because of the relatively shallow depth of the water table, which fluctuates daily.

Table 4.5-2 Descriptions of Soil Mapping Units in the Project Area												
Map[1]	Soil Series Name	USDA Texture	Shrink-Swell Potential	Permeability (in/hr)	Drainage	Erosion Hazard	Erosion Factors[2]			Land Capability[3]	pH	Plasticity Index[4]
							Kw	Kf	T			
71	Lagunita Series	Sand	Low	6.0–20.0	Excessively	High water erosion hazard; low wind erosion hazard	0.1	0.1	5	IIIs	7.9–8.4	NP-5
56	Gunsight Series	Very gravelly sandy loam	Low	2.0–6.0	Somewhat excessively	Slight water erosion hazard; moderate wind erosion hazard	0.1–0.17	0.24–0.17	4	VIIc	7.9–8.4	NP-5
57	Gunsight Series	Very gravelly loam	Low	2.0–6.0	Somewhat excessively	Slight water erosion hazard; moderate wind erosion hazard	0.1–0.17	0.28–0.17	4	VIIc	7.9–8.4	NP-5
90	Quilosota Series	Extremely gravelly sandy loam	Low	0.6–2.0	Somewhat excessively	Moderate permeability; slight water erosion hazard	0.05–0.1	0.24	1	VIIc	7.9–8.4	NP-5

Notes: in/hr = inches per hour; NP-5 = Not plastic; USDA = U.S. Department of Agriculture

Data expressed in the table are subject to revision when the Natural Resources Conservation Service's soil survey for this area is published; this work has been updated but not released.

1 The map unit numbers corresponds to map units in the Mohave County, Southern Part, Arizona soil survey.

2 Ranges of numbers within this column correspond to erosion at the surface to the soil profile's depth. Erosion factors are defined as follows:
Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.
Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.
Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

3 The land capability unit classification is a system shows the general suitability of soils for most kind of field crops.

Source: Data based on NRCS 2006:51, 52, 61, 72 , and Table 15, extrapolated to California side of the Colorado River by AECOM in 2008

The entire area immediately south of the project area is the Calvista soil series (Quilotosa Rock Outcrop Complex, 20 to 60% slopes equivalent, for Mohave County, Arizona), which is characterized by very shallow to shallow soil depth (approximately 9–12 inches) (NRCS 2006:72 and Table 15) and may be exposed as bedrock. The parent material is alluvium and colluvium derived from igneous and metamorphic rock. The typical surface texture is extremely gravelly sandy loam. This soil is somewhat excessively drained and has moderately rapid permeability (2–6 inches per hour). Its runoff class is very high. Shrink-swell potential is low. This soil is typically barren but may have sparse vegetation growing in cracks and crevices or in thin layers of alluvium or colluvium.

4.5.1.4 SEISMICITY

Numerous active, potentially active, and inactive faults exist in southern California. As defined by the California Geological Survey, active faults are faults that have ruptured during the Holocene (approximately the last 11,000 years). Potentially active faults are those that show evidence of movement during Quaternary time (approximately the last 1.6 million years), but for which evidence of Holocene movement has not been established. Inactive faults have not ruptured in the last approximately 1.6 million years.

Surface Faulting

The approximate locations of major faults in the southern California region and their geographic relationships to the project site are shown in Exhibit 4.5-5. Table 4.5-3 summarizes pertinent information regarding major active fault zones in the region.

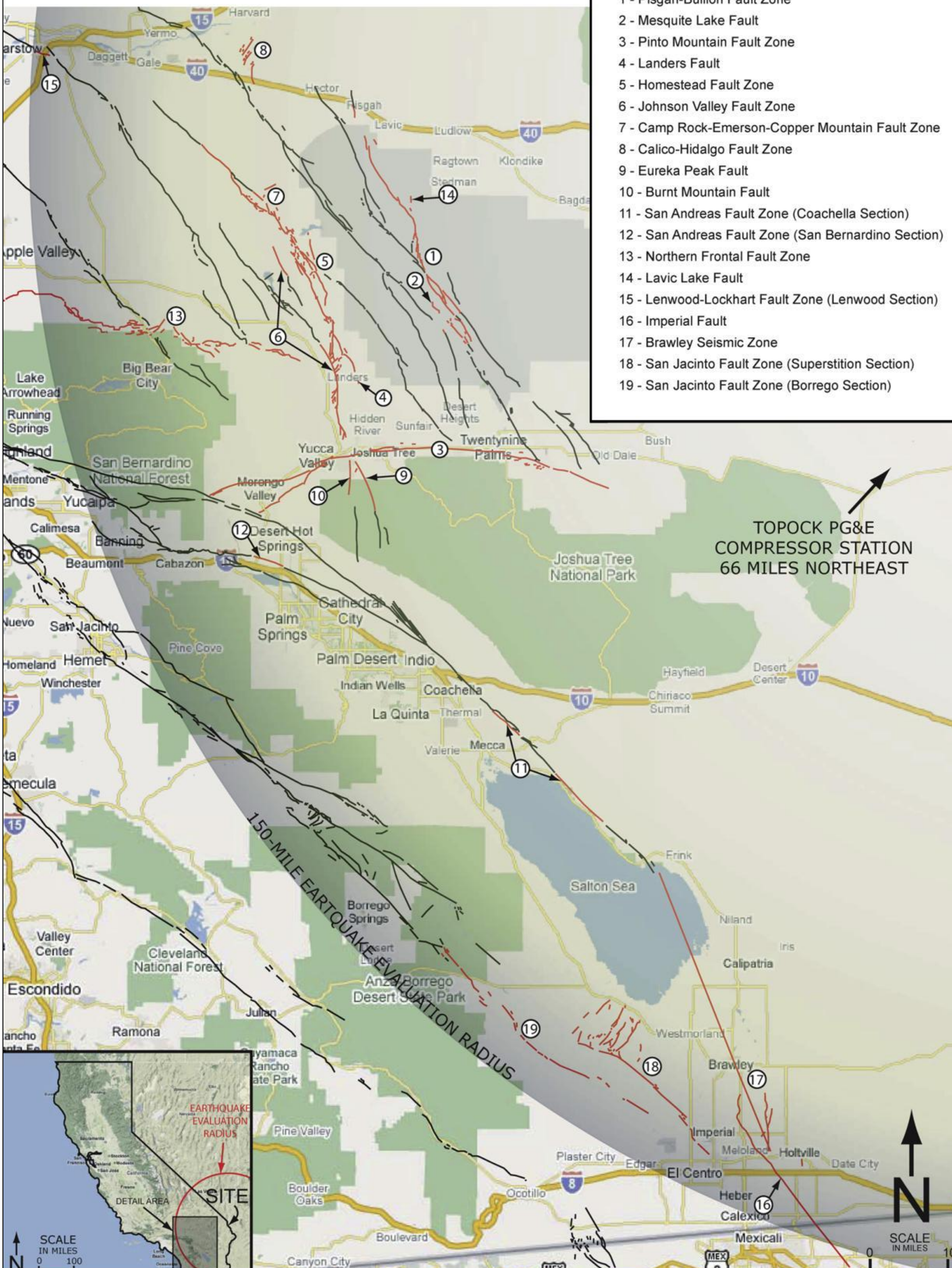
Table 4.5-3
Major Regional Active Faults

Fault Name	Moment Magnitude (Minimum–Maximum)	Fault Type	Approximate Slip Rate (mm/yr)	Peak Ground Acceleration (*g*)	Approximate Distance from the Site in Miles
Pinto Mountain Fault Zone	6.5–7.5	Sinistral	1.0	0.011	93.5
Pisgah-Bullion Fault Zone	6.0–7.1	Dextral	0.8	0.011	94.6
Mesquite Lake Fault	6.0–7.0	Dextral	Not Reported	0.011	94.6
Camp Rock–Emerson–Copper Mountain Fault Zone	6.0–7.3	Dextral	0.5	0.008	103.3
Calico-Hidalgo Fault Zone	6.4–7.1	Dextral	0.5–2.6	0.010	103.5
Lavic Lake Fault	7.1	Dextral	Not Reported	0.003	106.3
Landers Fault	4.8–5.3	Dextral	0.5	0.010	113.3
Homestead Fault	6.0–7.0	Dextral	0.5	0.010	114.2
Johnson Valley Fault Zone	6.5–7.3	Dextral	0.5	0.006	114.3
Eureka Peak Fault	5.5–6.8	Dextral	0.6	0.004	115.1
San Andreas Fault Zone (Coachella Section)	6.8–8.0	Dextral	20–35	0.008	115.6
Burnt Mountain Fault	6.0–6.5	Dextral	0.5	0.004	116.1
Brawley Seismic Zone	<5.0–6.5	Dextral	20	0.004	116.9
North Frontal Fault Zone	6.0–7.1	Thrust	1.0	0.005	119.6
San Andreas Fault Zone (San Bernardino Section)	6.8–8.0	Dextral	20–35	0.007	130.9
Imperial Fault	6.0–6.7	Dextral	15–20	0.009	139.1
San Jacinto Fault Zone (Superstition Section)	6.5–7.5	Dextral	7–17	0.008	140.1
San Jacinto Fault Zone (Borrego Section)	6.5–7.5	Dextral	7–17	0.008	144.0
Lenwood-Lockhart Fault Zone (Lenwood Section)	6.5–7.4	Dextral	0.8	0.003	148.2

Notes:
g = local acceleration attributable to gravity; mm/yr = millimeters per year
Sources: USGS 2008, SCEDC 2009

MAJOR REGIONAL ACTIVE FAULTS WITHIN 150 MILES FROM THE PG&E COMPRESSOR STATION

1 - Pisgah-Bullion Fault Zone
2 - Mesquite Lake Fault
3 - Pinto Mountain Fault Zone
4 - Landers Fault
5 - Homestead Fault Zone
6 - Johnson Valley Fault Zone
7 - Camp Rock-Emerson-Copper Mountain Fault Zone
8 - Calico-Hidalgo Fault Zone
9 - Eureka Peak Fault
10 - Burnt Mountain Fault
11 - San Andreas Fault Zone (Coachella Section)
12 - San Andreas Fault Zone (San Bernardino Section)
13 - Northern Frontal Fault Zone
14 - Lavic Lake Fault
15 - Lenwood-Lockhart Fault Zone (Lenwood Section)
16 - Imperial Fault
17 - Brawley Seismic Zone
18 - San Jacinto Fault Zone (Superstition Section)
19 - San Jacinto Fault Zone (Borrego Section)



No.	Moment Magnitude	Fault Type	Slip Rate (Approximate)	Peak Site Acceleration (g)	Approximate Distance from Site in miles
1	6.0-7.1	Dextral	0.8 mm/yr	0.011	94.6
2	6.0-7.0	Dextral	Not Reported	0.011	94.6
3	6.5-7.5	Sinistral	1.0 mm/yr	0.011	93.5
4	4.8-5.3	Dextral	0.5 mm/yr	0.010	113.3
5	6.0-7.0	Dextral	0.5 mm/yr	0.010	114.2
6	6.5-7.3	Dextral	0.5 mm/yr	0.006	114.3
7	6.0-7.3	Dextral	0.5 mm/yr	0.008	103.3
8	6.4-7.1	Dextral	0.5-2.6 mm/yr	0.010	103.5
9	5.5-6.8	Dextral	0.6 mm/yr	0.004	115.1
10	6.0-6.5	Dextral	0.5 mm/yr	0.004	116.1
11	6.8-8.0	Dextral	20-35 mm/yr	0.008	115.6

No.	Moment Magnitude	Fault Type	Slip Rate (Approximate)	Peak Site Acceleration (g)	Approximate Distance from Site in miles
12	6.8-8.0	Dextral	20-35 mm/yr	0.007	130.9
13	6.0-7.1	Thrust	1.0 mm/yr	0.005	119.6
14	7.1	Dextral	Not Reported	0.003	106.3
15	6.5-7.4	Dextral	0.8 mm/yr	0.003	148.2
16	6.0-6.7	Dextral	15-20 mm/yr	0.009	139.1
17	<5.0-6.5	Dextral	20 mm/yr	0.004	116.9
18	6.5-7.5	Dextral	7-17 mm/yr	0.008	140.1
19	6.5-7.5	Dextral	7-17 mm/yr	0.008	144.0

LEGEND
HISTORICALLY ACTIVE FAULTS (<200 YEARS)
IDENTIFIED CENOZOIC FAULTS

Sources: Google Maps (c); USGS and CGS, 2006, Quaternary fault and fold database for the United States; Southern California Earthquake Data Center; EQFAULT

G 06110033.05 015

Source: U.S. Geological Survey and the California Geological Survey 2006

Locations of Major Faults in Southern California **Exhibit 4.5-5**

The nearest historically active faults (active within the past 200 years, as defined by the Alquist-Priolo Earthquake Fault Zoning Act [see "State Plans, Policies, Regulations, and Laws" in Section 4.5.2, "Regulatory Background," below]) are the Pinto Mountain and Pisgah-Bullion fault zones, both located approximately 94 miles west-southwest of the site. The Pisgah-Bullion fault zone is a more than 62-mile-long, northwest-trending dextral strike-slip fault zone that is part of a complex of similarly oriented dextral faults within the Eastern California (or Mojave) Shear Zone. In its northern reaches, the fault zone displaces volcanic and volcanoclastic rocks of Pleistocene age along the Pisgah fault and of Tertiary age along the Bullion fault. Also affected are younger fan deposits, with multiple indicators of late-Pleistocene to Holocene dextral displacement. The southern branches of the fault zone (East and West Bullion faults) are not as well defined and are largely concealed by late-Quaternary deposits, except near their northern juncture, where historic ground rupture has helped define their location. The East Bullion fault regains definition at its southern end as it approaches the Pinto Mountain fault. The only estimate of slip rate comes from offset lava flows along the Pisgah fault, which suggest a dextral rate of 0.03 inch per year (USGS 2008). The most recent movement along the fault was along the Lavic Lake section in 1999, which produced a 7.1 magnitude earthquake (Jennings and Saucedo 1999).

Seismic Ground Shaking

The California Integrated Seismic Network (CISN) is a partnership among federal and state agencies and universities involved in California earthquake monitoring. The CISN is dedicated to serve the emergency-response, engineering, and scientific communities. The CISN publishes maps and data that track the frequency and magnitude of ground shaking events throughout California. The California Geological Survey has identified the peak ground acceleration, which is the measure of how hard the earth shakes in a given geographic area, for the project area to have a 2% probability of exceeding 6% of the acceleration of gravity in 50 years (Peterson et al. 2008: Figures 38 and 40). Hence, the project area has a remote chance of being subject to a low-magnitude earthquake (moment magnitude of 3.0 or less).

Ground Failure/Liquefaction

Liquefaction is a phenomenon in which soil loses its shear strength for short periods of time during an earthquake. This is likely to occur in loose to moderate saturated porous soils with poor drainage. Ground shaking of sufficient duration could result in the loss of grain-to-grain contact due to the rapid increase in pore water pressure, which causes the soil to behave as a fluid for short periods of time. The effects of liquefaction may include excessive total and/or differential settlement for structures founded in the liquefying soils. Soils that are susceptible to liquefaction are typically cohesionless, with a grain-size distribution of a specified range (generally sand and silt), loose to medium density, below the groundwater table, and subjected to a sufficient magnitude and duration of ground shaking. Soils in the project area are somewhat excessively drained and have rapid permeability (NRCS 2006: Table 15) and the project area is within an arid climate and receives approximately 4.53 inches of annual rainfall (WRCC 2006, cited in CH2M HILL 2007c: A-2). These soil and climate conditions do not typically provide the adequate parameters for liquefaction. Additionally, much of the project area has a relatively deep groundwater table, further reducing the chance of liquefaction within the project area due to the absence of saturated soil conditions. An exception is along the banks of the Colorado River, where fine-grained and saturated soil conditions have the potential for liquefaction.

Subsidence and Settlement

Subsidence is the phenomenon in which soils and other earth materials underlying a site settle or compress, resulting in a lower ground surface elevation. Because of underdeveloped soils contained in unconsolidated sediments, unconsolidated sediments are prone to subsidence and settlement when saturated with water. The Lagunita sand, 0 to 1% slopes equivalent, located along the Colorado River floodplain would be a candidate for subsidence. However, the region is arid and not prone to high amounts of precipitation. This lack of widespread saturation into soils in the project area above the Colorado River may cause minor localized subsidence, but in an insufficient amount to quantify. Groundwater-induced hydrocompaction is not anticipated to be of concern in the project area because soils are situated upon near-surface bedrock that is not influenced by hydrocompaction. Based on a review of the NRCS soil survey for Mohave County, Arizona (NRCS 2006:Table 17b), the soils in the project area have 0% potential for subsidence.

Erosion

Erosion is defined as a combination of processes in which the materials of the earth's surface are loosened, dissolved, or worn away, and transported from one place to another by natural agents. Two types of soil erosion exist: wind erosion and water erosion. Erosion potential in soils is influenced primarily by loose soil texture and steep slopes. Loose soils can be eroded by water or wind forces, whereas soils with high clay content are generally susceptible only to water erosion. The potential for erosion generally increases as a result of human activity, primarily through the development of structures and impervious surfaces and the removal of vegetative cover.

Erosion in the project area is evident and characterized by incised drainage channels, notably Bat Cave Wash. Pebble- to cobble-sized angular rock from the area south of the project site is transported to the lower elevations of the Bat Cave Wash during periods of high precipitation. The incision of the underlying rock strata to create the Bat Cave Wash is evidence of these brief yet powerful periods of channeled rainfall.

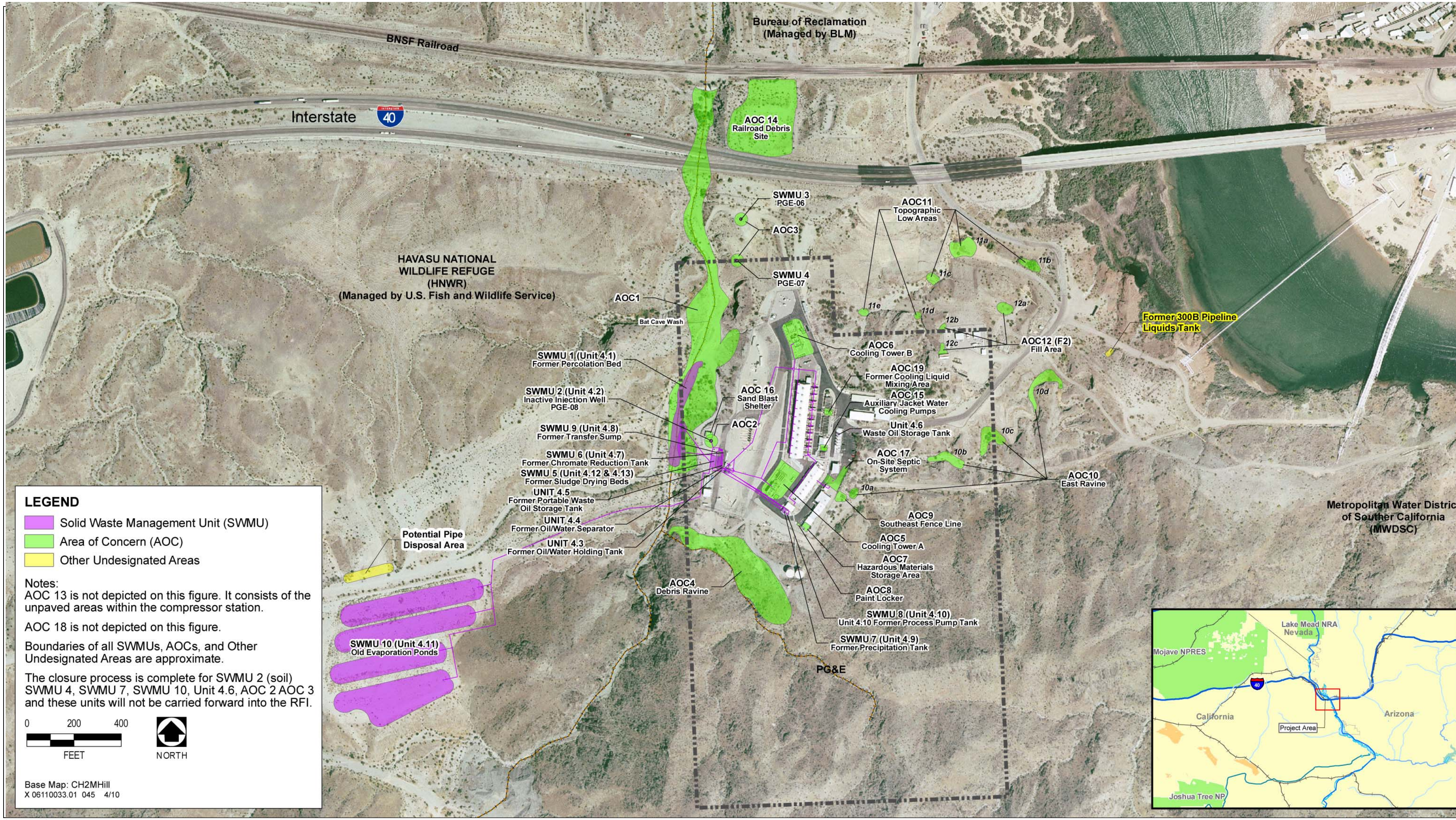
Expansive Soils

Expansive soils consist primarily of clayey soils that have a potential for substantial volume changes (shrinking and swelling) with moisture fluctuations. Infrastructure, structures, and pavements can deteriorate when not designed to withstand the soil pressures exerted by expansive soils. Clay content in local soils averages 5 to 18% (NRCS 2006:Table 15). The clay content in soils of the project area can be as low as 0% in the Lagunita sand type, and as high as 20% in the Gunsight very gravelly loam type (NRCS 2006:Table 15). Shrink-swell potential is low (NRCS 2006:52, 61, and 72) and no expansive soils were observed in the vicinity of the proposed project.

4.5.1.5 CONTAMINANTS IN SOILS AND THEIR SOURCE

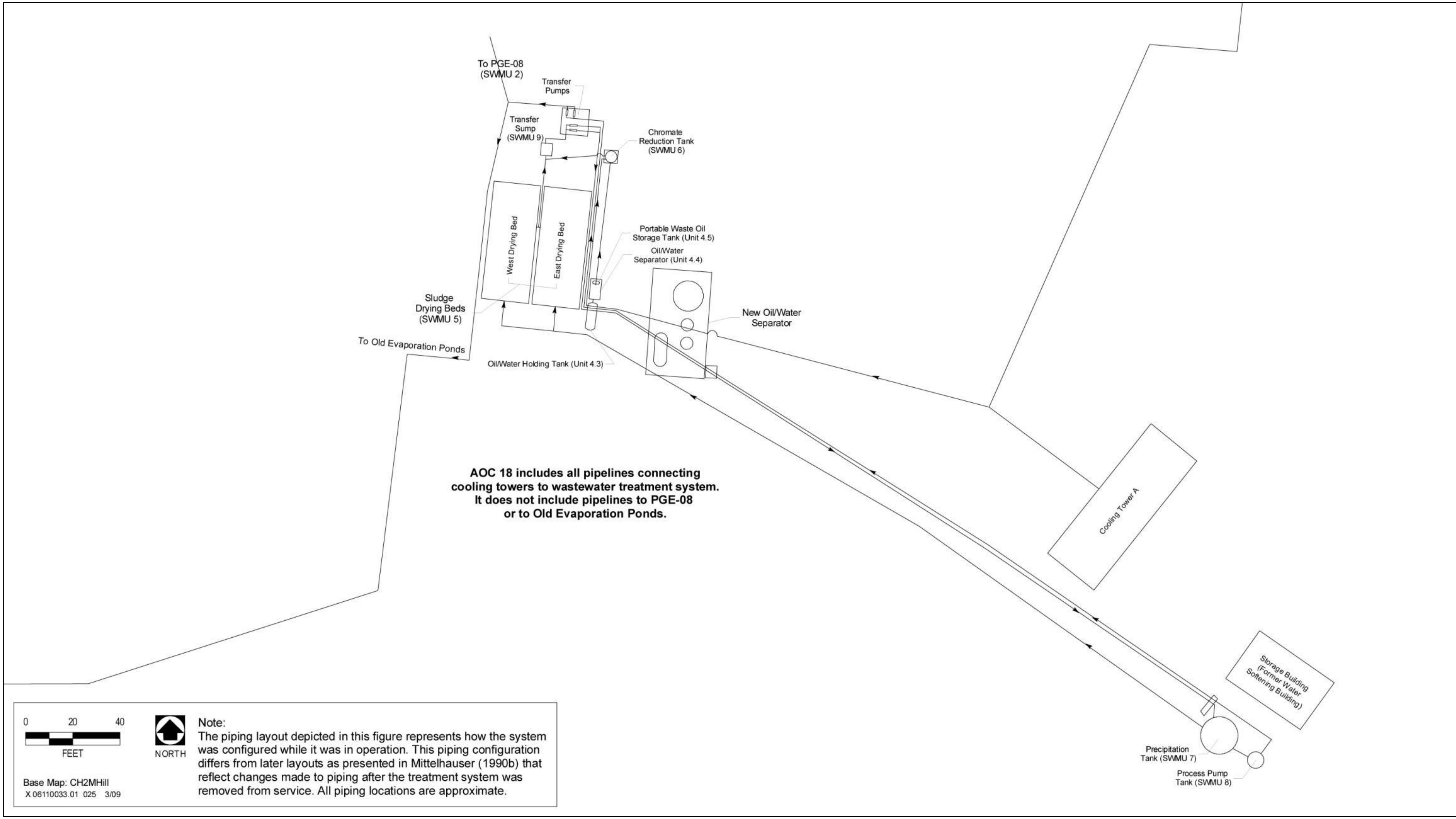
Investigation of soil contamination associated with compressor station operations is still ongoing and reports of results are forthcoming. This includes soils data already collected as part of the conditionally approved Part A Work Plan which focused on areas outside the compressor station fence line. Evaluation of the Part A data will result in updated characterization of AOCs and will likely result in further soil characterization. The results of the most recent Part A investigation activities have not yet been formally reported by PG&E. Part B soil characterization (focusing on areas within compressor station fenceline) is planned for 2011. Additional AOCs will be identified and documented in the revised RFI/RI Volume 1 addendum and will be investigated as part of the process. AOC boundaries may expand as a result of site characterization activities. The following discussion of the potential and known sources of soils contamination provides a foundation for evaluation of potential impacts associated with encountering contaminated soils and development of mitigation measures.

During the course of site investigation activities the, following areas of concern (AOCs) and solid waste management units (SWMUs) have been identified by PG&E and DTSC at or near the compressor station (see Exhibits 4.5-6 and 4.5-7). A SWMU is defined as any unit that has been used for treatment, storage, or disposed of solid waste at any time, irrespective of whether the unit is or ever was intended for the management of solid waste (40 CFR Part 264, Subpart S). An AOC includes any area having a probable release of a hazardous waste or hazardous constituent that is not from a SWMU and is determined to pose a current or potential threat to human health or the environment. The history, location, and contaminants that are or might be found (referred to as chemicals of potential concern [COPCs]) at a particular AOC or SWMU are described below and were derived from the *Revised Final RCRA Facility Investigation and Remedial Investigation Report, Volume 1, Site Background and History, PG&E Topock Compressor Station, Needles, California* (CH2M Hill 2007a); the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part A, Topock Compressor*



Source: CH2M Hill 2007b

Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and Other Undesignated Areas **Exhibit 4.5-6**



Source: Data adapted by AECOM in 2009

SWMUs Associated with the Former Two-Step Wastewater Treatment System **Exhibit 4.5.7**

Station, Needles, California (CH2M Hill 2006a); and the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part B, Topock Compressor Station, Needles, California* (CH2M Hill 2007c). Please note that DTSC did not require PG&E to investigate several SWMUs/AOCs based on site characterization activities completed at the respective locations (CH2M Hill 2007a:5-1 through 5-6). DTSC considers the RCRA and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process complete at SWMU 2 (soil only), SWMU 3, SWMU 4, SWMU 7, SWMU 10, Unit 4.6, AOC 2 and AOC 3 (CHM Hill 2007a:5-1). Additional AOCs identified after the Revised Final RFI/RI Volume 1 (CH2M Hill 2007a) will be incorporated into an addendum to Volume 1.

As illustrated on Exhibits 4.5-6 and 4.5-7, a total of 14 SWMUs, 20 AOCs, and 2 undesignated areas have been identified in the project area (CH2M Hill 2007a:ES-4 and ES-5). There are 8 SWMUs and AOCs for which site investigation and closure processes are complete (CH2M Hill 2007a:ES-5). In a letter dated July 13, 2006, DTSC requested further investigation for eight units that have previously been closed (DTSC 2006a). These eight units consist of 5 units associated with the former hazardous waste management system (SWMUs 5, 6, 8, and 9, and AOC 18), and three units associated with the former oily water treatment system (Units 4.3, 4.4, and 4.5) (CH2M Hill 2007a:5-6). DTSC also requested additional investigation at the previously closed Former 300B Pipeline Liquids Tank. There are also 20 SWMUs, AOCs, and other undesignated areas in this group that will be carried forward in the RCRA Corrective Action and CERCLA site investigative programs and reported in Volume 3 of the RFI/RI (CH2M Hill 2007a:ES-6). For most of the SWMUs, AOCs, and other undesignated areas in this group, data have been collected during site investigative activities dating to the start of the RFI in 1996. The SWMUs, AOCs, and other undesignated areas that require further investigation and/or will be carried forward in the RCRA Corrective Action and CERCLA site investigative programs are as follows (CH2M Hill 2007a:5-17):

- SWMU 1—Former Percolation Bed
- SWMU 2—Inactive Injection Well (PGE-08) (for groundwater only)
- SWMU 5—Sludge Drying Beds
- SWMU 6—Chromate Reduction Tank
- SWMU 8—Process Pump Tank
- SWMU 9—Transfer Sump
- Unit 4.3—Oil/Water Holding Tank
- Unit 4.4—Oil/Water Separator
- Unit 4.5—Portable Waste Oil Holding Tank
- AOC 1—Area around Former Percolation Bed
- AOC 4—Debris Ravine
- AOC 5—Cooling Tower A
- AOC 6—Cooling Tower B
- AOC 7—Hazardous Materials Storage Area
- AOC 8—Paint Lockers
- AOC 9—Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10—East Ravine
- AOC 11—Topographic Low Area
- AOC 12—Fill Area
- AOC 13—Unpaved Areas within the Compressor Station
- AOC 14—Railroad Debris Site
- AOC 15—Auxiliary Jacket Water Cooling Pumps
- AOC 16—Sandblast Shelter
- AOC 17—On-Site Septic System
- AOC 18—Former Two-Step Wastewater Treatment System Piping
- AOC 19—Former Cooling Liquid Mixing Area
- AOC 20—Industrial Floor Drains
- Undesignated Area 1—Potential Pipe Disposal Area.
- Undesignated Area 2—Former 300B Pipeline Liquids Tank.

Additional AOCs to be identified within an addendum to the RFI/RI Volume 1 will also be carried forward in the RCRA Corrective Action and CERCLA site investigative programs.

SWMU 1/AOC 1 (Percolation Bed and Bat Cave Wash)

The former percolation bed (SWMU-1) and Bat Cave Wash (AOC-1) are addressed as a single investigation area because they are coincident and related chemically and historically (CH2M Hill 2007c:4-19).

From 1951 to about 1964, chromium bearing cooling tower blowdown was directly released into Bat Cave Wash and some blowdown flowed downstream (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-3). The wash continues north to the Colorado River. From 1964 through 1970, the blowdown wastewater was discharged to a former percolation bed that measured approximately 17,600 square feet (Prudhomme, pers. comm., 1968; cited in CH2M Hill 2007a:4-3 and 4-9). The former percolation bed was located within Bat Cave Wash immediately west of the compressor station and was constructed by scraping the wash alluvium from the bottom of the wash into shallow berms (CH2M Hill 2007a:3-18). Wastewater was released to the percolation bed through a pipe that ran from the sludge-drying bed area in the lower yard of the compressor station down the slope into Bat Cave Wash. The bed was not lined, and discharged blowdown water in this area was allowed to percolate into the ground and/or evaporate. The berms were periodically moved within the same general area and the crust that formed on top of the surface soil was scraped from the bottom of the bed (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-3).

Wastewater discharged to Bat Cave Wash consisted primarily of cooling-tower blowdown (about 95%) with some effluent from an oil/water separator (OWS) and other facility maintenance operations (about 5%) (Technical and Ecological Services 1993, cited in CH2M Hill 2007a:4-3). During the late 1960s, an average of about 48,500 gallons per day (gpd) of cooling tower blowdown was discharged to Bat Cave Wash, with a high of about 64,300 gpd in July and a low of about 25,600 gpd in February (Prudhomme, pers. comm., 1968; cited in CH2M Hill 2007a:4-3 and 4-9).

From 1951 until 1964, cooling-tower blowdown was not treated before being released to the wash. The cooling-tower blowdown contained Cr(VI). From 1964 to 1969, the cooling-tower blowdown was treated with a one-step system to reduce Cr(VI) in the wastewater to trivalent chromium [Cr(III)] before discharge to the percolation bed. Although the process converted Cr(VI) to Cr(III), the concentration of total chromium [Cr(T)] was not affected. Beginning in late 1969, cooling-tower blowdown was treated with a two-step system to reduce Cr(VI) to Cr(III) and then to remove Cr(III) from the wastewater before discharge to Bat Cave Wash (Prudhomme, pers. comm., 1968; cited in CH2M Hill 2007a:4-3 and 4-9). The continuous discharge of wastewater to Bat Cave Wash ceased in May 1970 when injection well PGE-08 was brought online.

The COPCs for soils within SWMU-1/AOC-1 consist of Title 22 metals [including Cr(VI)], pH, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs) (CH2M Hill 2007a:4-5).

Title 22 metals are listed in the California Code of Regulations, Title 22, Division 4.5, Chapter 11, Article 3 based on characteristics of toxicity as defined under Section 66261.24. The following metals are identified as Title 22 metals: antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc. The presence of a Title 22 metal in soils or wastes at concentrations exceeding the respective levels identified in Section 66261.24 would constitute a hazardous waste based on the toxicity.

SWMU 5 (Sludge-Drying Beds)

The former sludge-drying beds were located within the compressor station fence line in the southern part of the lower yard (Exhibit 4.5-7). The sludge-drying beds were constructed in 1951 along with the rest of the compressor station. The two sludge-drying beds were located directly adjacent to one another. The closure report for this unit indicates that each bed was approximately 20 feet wide by 50 feet long. Both beds sloped longitudinally, with the upper end at grade level and the lower end about 2 feet below grade. The walls and floors of both beds were constructed of 8-inch-thick concrete. A drain line ran from the beds to the transfer sump (SWMU 9) to facilitate the removal of liquids (Mittelhauser Corporation 1990, cited in CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33).The drying beds were used from 1951 until April 1962 to dehydrate lime sludge generated by a water-conditioning process used at the facility (PG&E 1962, cited in CH2M Hill 2007a:4-9; Prudhomme, pers. comm., 1968, cited in CH2M Hill 2007a:4-3 and 4-9). From 1964 through 1969, a treatment pond constructed within one of the beds was used to treat chromium-bearing wastewater. Wastewater was allowed to flow through the pond and was injected with sulfur dioxide to reduce Cr(VI) to Cr(III) before discharge. From 1969 through October 1985, the drying beds were used to dehydrate chromic hydroxide sludge generated by the two-step wastewater treatment system (SWMUs 6–9) before disposal. Use of both sludge-drying beds ceased in October 1985 and most of the beds were removed by February 1989 (Mittelhauser Corporation 1990, cited in CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33).

The COPCs planned to be evaluated in soils for SWMU-5 are TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-10).

SWMU 6 (Chromate Reduction Tank)

The chromate reduction tank was formerly located within the facility's fence line in the southern end of the lower compressor station yard. The chromate reduction tank was approximately 10 feet high and 5 feet in diameter, with a capacity of 1,500 gallons (PG&E 1982, cited in CH2M Hill 2007a:4-10, 4-13, and 4-14; Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). The steel, open-top tank was set partially below grade within a pit that measured 10 feet wide by 10 feet long by 6 feet deep. The pit was supported on all four sides with wooden retaining walls; however, the bottom of the pit was not lined or paved (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). Cooling-water blowdown containing chromium flowed by gravity from the cooling towers to the chromate reduction tank via a 3-inch-diameter steel pipe. A maximum combined flow of 30,000 gpd was discharged continuously from the cooling towers into this tank (Mittelhauser Corporation 1986, cited in CH2M Hill 2007a:4-11 and 4-33).

The chromate reduction tank was a component of the two-step wastewater treatment system installed at the compressor station in late 1969. This system consisted of the chromium reduction tank to reduce Cr(VI) in the wastewater to Cr(III) (Step 1) and a precipitation tank for removing chromium from the wastewater (Step 2). This system also employed the sludge-drying beds to dry precipitated solids, as well as miscellaneous transfer tanks and sumps, pumps, piping, and valves. The two-step treatment system remained in service from 1969 through October 1985, when the use of a chromium-based inhibitor in the cooling water was replaced with a phosphate-based inhibitor. Wastewater in the tank was injected with sulfur dioxide gas to maintain the pH between 2.9 and 3.2. Within this pH range, Cr(VI) was reduced to Cr(III). Treated wastewater was then discharged by gravity flow into the transfer sump (SWMU 9, Unit 4.8).

The chromate reduction tank was removed from service in October 1985. Starting in November 1985, the tank was reportedly used as a holding tank for an unspecified period of time. As a holding tank, it also received treated effluent from the OWS (Unit 4.4) before the treated effluent was discharged to the evaporation ponds. The chromate reduction tank was removed during Phase 2 of the hazardous waste management facilities closure process between November 1989 and March 1990 (Mittelhauser Corporation 1990, cited in CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33). The COPCs planned to be evaluated in soils for SWMU-6 are TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-11).

SWMU 8 (Process Pump Tank)

The process pump tank was part of the two-step cooling-water blowdown treatment system, and was located within the facility's fence line on the southern end of the lower yard. The process pump tank consisted of a 1,500-gallon-capacity steel holding tank about 8 feet high and 5.5 feet in diameter (PG&E 1982; Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). The tank had an open top and was situated on a concrete pad.

The process pump tank was used as a temporary holding tank for wastewater discharged from the precipitation tank (SWMU 7, Unit 4.9). From May 1970 to December 1973, effluent was discharged primarily to injection well PGE-08 (SWMU 2); however, after Pond 1 (SWMU 10, Unit 4.11) was constructed in late 1971, it also received some of the discharged wastewater. From December 1973 to October 1987, the effluent was discharged to the old evaporation ponds (SWMU 10, Unit 4.11). No indication of a release was observed during a facility inspection performed as part of the RCRA facility assessment (RFA) (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). The process pump tank was removed from service along with the rest of the treatment system in October 1985 (CH2M Hill 2007c). The COPCs planned to be evaluated in soils for SWMU-8 are TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a: 4-13).

SWMU 9 (Transfer Sump)

The transfer sump was part of the two-step cooling-water blowdown treatment system, and was located within the facility's fence line in the southern end of the lower Station yard. The transfer sump was a prefabricated concrete septic tank with a capacity of 1,500 gallons (PG&E 1982, cited in CH2M Hill 2007a:4-10, 4-13, and 4-14; Mittelhauser Corporation 1990, cited in CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33). The sump was about 3 feet in diameter and 20 feet deep, of which 18.5 feet was set below grade. The sump was also fitted with a concrete cover.

From 1969 to October 1985, effluent containing chromium from the chromate reduction tank (SWMU 6, Unit 4.7) was routed through the transfer sump to the precipitation tank (SWMU 7, Unit 4.9). Around 1974, the transfer sump also started to receive treated effluent water from the OWS, either directly or through the chromate reduction tank (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). From November 1985 to October 1989, the transfer sump received nonhazardous (i.e., phosphate-based) cooling-water blowdown, and the effluent from the transfer sump was discharged directly to the old evaporation ponds (SWMU 10, Unit 4.11). Oily sludges and solids that accumulated in the transfer sump were periodically removed and transported to an off-site disposal facility (Kearny 1987, cited in CH2M Hill 2007c:4-10, 4-12 through 4-14, and 4-16 through 4-18). The transfer sump was removed from service in October 1989. Physical removal of the transfer sump occurred during Phase 2 of the hazardous-waste-management facilities closure process between November 1989 and March 1990 (Mittelhauser Corporation 1990, cited in CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33). The COPCs planned to be evaluated in soils for SWMU-9 are TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a: 4-14).

AOC 4 (Debris Ravine)

The Debris Ravine is located on PG&E property south of the compressor station, outside the facility's fence line. The Debris Ravine is a narrow, steep-sided arroyo that drains into Bat Cave Wash at the southwest corner of the facility. The bottom of the ravine consists mainly of bedrock, with a thin veneer (i.e., less than 1 foot thick) of sediments and debris. The southern portion of the lower yard just above the ravine has historically been used to store and/or dispose of scrap and debris.

Historical operations in this area are not well documented; however, over the years noticeable amounts of scrap and debris have ended up on the northern slope and at the bottom of the ravine. Wood, metal (e.g., cans, machine parts, rebar, wire), concrete, transite siding, and white powder have all been identified in the ravine. A former employee reported disposing of 200–300 bags of lime in this area after the old lime softening process was discontinued (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-23). Other employees have reported that domestic garbage has been disposed of at the Debris Ravine (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-23). Glass, wood, and a partially melted graduated cylinder have been identified on the slope of the Debris Ravine, east of the scrap storage area. PG&E has also indicated that burning occurred in the area as evidenced by debris containing melted metal waste and ashy material.

In October through August 2008, soil samples were collected from the Debris Ravine and analyzed for Title 22 and Contract Laboratory metals, Cr(VI), PAHs, SVOCs, and VOCs. A subset of samples was also analyzed for polychlorinated biphenyls, pesticides, and asbestos. Samples were collected from soil (stained and unstained), white powdery material, burnt material, and wooden debris. In December 2008, at the request of DTSC and the Department of the Interior (DOI), one sample was collected at each of two areas containing burnt material (encountered along the north slope of the AOC 4 and the upper debris area) for dioxins/furans analysis. Due to conditions of steep slopes and loose debris encountered in the field that constrained investigation, the full extent of contaminated fill material and debris is not determined.

In May 2009, the US DOI released an Action Memorandum requesting a time-critical removal action under CERCLA (42 U.S. Code [USC] Sections 9601 et seq.), to address the substantial threat of release of hazardous substances. The COPCs for soils within AOC 4 are detailed within the U.S. DOI Action Memorandum, dated May 28, 2009, regarding a *Request for Time-Critical Removal Action Number 4 at AOC 4 Debris Ravine, Pacific Gas and Electric Topock Compressor Station* (DOI 2009) and include Cr(VI), dioxins, metals, and polynuclear aromatic hydrocarbons (PAHs) (DOI 2009:9, 10, and 15). Under DOI direction and oversight, PG&E began sampling and removal of contaminated materials at AOC-4 in January 2010. Work is expected to continue through spring 2010.

AOC 5 (Cooling Tower A)

AOC 5 encompasses the cooling tower, the site of the former chemical shed, the site of the sulfuric acid tank, and the site of the current cooling-water-treatment product tanks. A portion of AOC 5 is unpaved (covered with gravel), but it is bounded on all sides by pavement.

Operations in this area consist of the storage, handling, and use of cooling-water additives. From 1951 to 1985, chromium-based corrosion inhibitors were used to treat the cooling water. From 1985 to the present, nonhazardous phosphate-based inhibitors, scale-control agents, and biocides have been used. Sulfuric acid has been used from 1951 to the present to control the pH of the cooling water. The major features located in this AOC are discussed below.

Original Cooling Tower A

The original Cooling Tower A was a coil shed tower constructed along with the rest of the compressor station in 1951. The original tower was replaced with a new tower in 2001. The cooling tower is used to cool compressed natural gas and lubricating-oil cooling water. Limited soil sampling conducted in the unpaved areas in the vicinity of the cooling tower indicated that Cr(T), Cr(VI), zinc, and copper are present at concentrations exceeding the expected background. One of the four samples contained Cr(T) at a concentration above the U.S. Environmental Protection Agency's (EPA's) industrial preliminary remediation goals.

Former Chemical Shed

The former chemical shed was located about 15 feet east of Cooling Tower A. The shed was used to store chromium-based cooling-water additives used in the cooling tower from 1951 to 1985. The shed was demolished in the summer of 2000 as part of the construction involved in replacing Cooling Tower A. Stained soils beneath the former chemical storage shed were observed after its demolition (Wong, pers. comm., 2000a, cited in CH2M Hill 2007a:4-21). The stained soils were reportedly limited to a small area about 4 feet by 4 feet square. The stained soils were excavated by the construction crew and transported off-site. Confirmation soil samples were not collected. However, this area is recommended for further sampling as part of AOC 5. After removal, the area was backfilled with clean fill and partially covered by the new cooling-tower pad.

Sulfuric Acid Tank

Sulfuric acid is used at this site to control the pH of the cooling water in Cooling Tower A. The original tank was an unlined, steel aboveground storage tank (AST) with a capacity of 2,600 gallons. The tank was located within a concrete secondary containment area. In 1984, the original tank was replaced with a new epoxy-lined AST of the same size and capacity (PG&E 1984, cited in CH2M Hill 2007a:4-23).

Chemical Storage Tanks

Three ASTs currently exist at the southern end of the cooling tower and are used to store phosphate-based cooling-water treatment products. The tanks are constructed of polyethylene and have secondary containment.

The COPCs for soils within AOC-5 consist of Title 22 metals, including Cr(VI), and pH (CH2M Hill 2007a:4-22).

AOC 6 (Cooling Tower B)

The area encompasses the cooling tower, the site of the former chemical shed, the site of the sulfuric acid tank, and the site of the current cooling-water treatment product tanks. AOC 6 is partially unpaved (covered with gravel), but is bounded on all sides by pavement. A former employee stated that he had observed cooling water from Cooling Tower B overflowing and discharging into the AOC 11 area (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-23).

Operations in this area consist of the storage, handling, and use of cooling-water additives. Operations in this area began in 1954 with the construction of a two-cell cooling tower. From 1954 to 1985, chromium-based corrosion inhibitors were used to treat the cooling water. From 1985 to the present, nonhazardous, phosphate-based inhibitors, scale control agents, and biocides have been used. Sulfuric acid has been used from 1954 to the present time to control the pH of the cooling water. The major features located in this AOC are discussed below.

Cooling Tower B

The original Cooling Tower B was a coil shed tower constructed as a two-cell unit in 1954 to support the expansion of the compressor station. Cooling Tower B was subsequently expanded to a four-cell tower in 1958. The original tower was replaced with a new tower in 2002. The cooling tower is used to cool compressed natural gas and lubricating-oil cooling water.

Former Chemical Shed

The former chemical shed was located about 15 feet east of Cooling Tower B. The shed was used to store the chromium-based cooling-water additives used in the cooling tower from 1954 to 1985. The shed was demolished in the winter of 2001 in conjunction with the installation of the new cooling tower. Stained soil was observed beneath the shed after it was removed. Limited soil sampling indicated that Cr(T), Cr(VI), copper, and zinc were present at concentrations exceeding the expected background. Two samples contained Cr(T) above EPA's industrial preliminary remediation goal. The stained soil was removed, generating five drums of material that were shipped off-site for disposal. The excavation was backfilled with clean soil.

Sulfuric Acid Tank

Sulfuric acid has been used at this site to control the pH of the cooling water in Cooling Tower B. The original tank was an unlined steel AST with a capacity of 2,600 gallons. The tank was located within a concrete secondary containment area. In 1984, the original tank was replaced with a new epoxy-lined AST of the same size and capacity (PG&E 1984, cited in CH2M Hill 2007a:4-23).

Chemical Storage Tanks

Three ASTs are currently located just east of the cooling tower and are used to store phosphate-based cooling-water treatment products. The tanks are constructed of polyethylene and have secondary containment.

The COPCs for soils within AOC-6 consist of Title 22 metals, including Cr(VI), and pH (CH2M Hill 2007a:4-23).

AOC 7 (Hazardous-Materials Storage Area)

A hazardous-materials storage building and loading dock is located in the southeastern portion of the facility, inside the facility's fence line. This facility is concrete lined and equipped with secondary containment walls. The area currently serves as the storage area for hazardous wastes generated at the facility (e.g., oily rags, used oil filters). This area has been used for the collection and storage of hazardous materials since at least the early to mid 1980s (Riddle, pers. comm., 2004, cited in CH2M Hill 2007a:4-18, 4-23, and 4-24). The area is also used to store chemical products used at the compressor station (e.g., lubricants, parts cleaning compounds, and small quantities of solvents). This area has apparently always been used to store chemicals (Riddle, pers. comm., 2004, cited in CH2M Hill 2007a:4-18, 4-23, and 4-24), although the types of chemicals stored there are unknown. A roof was installed over the storage area during in the 1960s (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). Review of aerial photographs suggests that this area was unpaved until at least the mid-1950s.

The COPCs for soils within AOC-7 consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, PCBs, SVOCs, and VOCs (CH2M Hill 2007a:4-24).

AOC 8 (Paint Locker)

A small paint storage locker is located within the fence line in the southeastern portion of the facility. The steel locker measures about 5 feet wide by 5 feet long. The locker has tight-fitting doors and was designed for the fire-safe storage of flammable materials. Large-scale painting activities at the compressor station are handled by outside crews (Riddle, pers. comm., 2004, cited in CH2M Hill 2007a:4-18, 4-23, and 4-24). Therefore, only small quantities of paint and thinners used for minor touch-up work are stored in this shed. Paint is stored both in spray cans and in 1- to 5-gallon cans. Nonchlorinated paint thinners are also stored in 1-gallon cans. About 100 gallons of paint and thinners are routinely stored in this shed. No evidence of any release is present in or around the shed.

The COPCs for soils within AOC-8 identified by PG&E consist of some metals (e.g., lead), TPH, and VOCs (CH2M Hill 2007a:4-24).

AOC 9 (Southeast Fence Line)

AOC 9 is located in the southeast portion of the facility, just south of the visitor parking lot and immediately east (outside) of the fence line. It is also located in the vicinity of the leachfield and septic tank associated with the auxiliary building.

In the spring of 2000, PG&E informed DTSC that a worker at the compressor station had encountered a small amount of discolored surface soil just outside the fence line on the southeast side of the facility (Wong, pers. comm., 2000b, cited in CH2M Hill 2007a:4-24). The discolored soil was located on an extremely steep slope. It was uncovered by erosion, which caused a storm drain pipe to break off near the top of the ravine. The pipe was replaced and extended into the East Ravine, and the end was covered with gravel.

The storm drain is believed to be connected to a trench that could have received runoff from leaks originating from the auxiliary jacket cooling-water (AJCW) pumps (AOC 15). Two employees indicated that leaks from the AJCW system had entered a pipe trench in the nearby road in the past (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-24). The trench system leading to the storm drain at AOC 9 and/or another nearby storm drain may also have captured a portion of the steam-cleaning runoff from the washrack before the area was contained by berms (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-23). AOC 9 is also located in the vicinity of the leachfield and septic tank associated with the laboratory. Review of aerial photographs indicates that this area was formerly unpaved.

Approximately 1.5 cubic yards of stained soil was removed and shipped off-site for disposal. Site conditions (the steepness of the terrain) limited the feasible extent of excavation. Confirmation samples indicated that residual Cr(T) and Cr(VI) still remained in the soil; however, other metals and pH appear to be at background levels (Wong, pers. comm., 2000c, cited in CH2M Hill 2007a:4-25).

The COPCs for soils within AOC-9 consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-25).

AOC 10 (East Ravine)

East Ravine is a small ravine located on the southeast side of the compressor station. The ravine is approximately 1,600 feet long and runs eastward to the Colorado River. Portions of the East Ravine are on PG&E property outside the compressor station's fence line, and other portions of the ravine are located on property owned by Havasu National Wildlife Refuge (HNWR). The East Ravine was designated as an AOC in a 2001 letter report from DTSC (2001).

The East Ravine contains two human-made impoundments of unknown origin and construction date. The largest impoundment is formed by a constructed earthen dam. A smaller impoundment is formed by a dirt road embankment that was built across the drainage channel in the lower portion of the East Ravine. Because of the impoundments, surface water flowing from most of the length of this ravine (west of the lower dirt road) currently does not appear to reach the Colorado River. The drainage for this ravine includes runoff from the compressor station's access road, runoff from the mountains to the south, and runoff from the compressor station itself.

Three subareas (Subareas 10b, 10c, and 10d) where water and soil collect, either within low-gradient areas along the ravine course or behind impoundments, have been identified within the East Ravine. Subarea 10b, a natural drainage depression, is located in a flat area in the upper portion of the ravine. The middle drainage depression (10c) is the largest and is located behind a dam that was built across the ravine. This small dam stands approximately 9 feet above the fine-grained soils trapped behind it. Approximately 1 foot below the top of the dam is a culvert to allow water flow. This culvert is now collapsed, but erosion on the downhill side shows that water has flowed through this culvert in the past. Aerial photographs from 1964 and 1967 show what appears to be water ponded behind this dam. The construction date and purpose of this small dam are unknown. Prior soil investigations indicated that fine-grained sand and silt behind the dam are more than 2 feet thick and that a thin greenish gray layer with significantly elevated chromium occurs within the shallow soils in this area. A layer of white fine-grained material, less than 2 inches thick and similar in appearance to the white material in Bat Cave Wash and at the railroad debris site (see description of AOC 14 below), was found at a depth of less than 1 foot in Subarea 10c. This white material was just on top of, or within a few inches of, underlying coarser material. The third subarea, Subarea 10d, is the easternmost impoundment, formed by the construction of an access road.

The road embankment that forms the easternmost drainage depression has no visible culvert, and there is no evidence of erosion that would suggest that water has flowed over the top of the road from one side to the other.

During a site visit in May 2006, a storm drain was noted leading from the southeastern portion of the compressor station and discharging into the East Ravine upstream of the previously identified subareas. A small area of stained soil (possibly old hydrocarbon staining) was noted at the discharge of the storm drain. Although discharge from the steam-cleaning area has always been directed to the oily-water treatment system, this storm drain may have captured some runoff from the steam-cleaning area before the steam-cleaning area was fully contained by berms (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35).

The natural runoff from the southeastern portion of the facility eventually flows to the East Ravine. In addition, during larger rain events, runoff would sometimes enter the East Ravine from the compressor station's access road. A portion of larger spills near the compressor station's access road also could potentially have entered the East Ravine (i.e., if the runoff did not evaporate before it reached the lower portions of the access road). The runoff from the compressor station and its access road may have contained dissolved and suspended materials that could have been incidentally released at the facility.

The runoff accumulates in low-lying areas in the ravine, where the suspended and dissolved constituents would tend to concentrate and deposit on the surface soils. Volatile constituents would not be expected to remain in the runoff as it flows down the ravine; however, less volatile constituents may have been transported to the low-lying areas and deposited.

The COPCs for soils within AOC-10 consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-27).

During the recent East Ravine Groundwater Investigation nine soil sample were collected from two well locations and analyzed for COPCs, and their results were reported in Appendix A of the Final CMS/FS (CH2M Hill 2009b, included in Appendix CMS of this EIR). These results will be combined with previous soil data and evaluated in the forthcoming Part A soils data gaps evaluation. Soil sample results from East Ravine Groundwater Investigation indicated that highly elevated concentrations of Cr(T) [4,000 milligrams per kilogram (mg/kg) and Cr(VI) (150 mg/kg)] were detected in one soil sample collected from one well location. PAHs, SVOCs, TPHs, and VOCs were all less than laboratory reporting limits.

AOC 11 (Topographic Low Areas)

The five topographic low areas that compose AOC 11 were identified based on aerial photographs, a site reconnaissance performed by Ecology and Environment (E&E) (Ecology and Environment 2000, cited in CH2M Hill 2007a:4-27 and 4-28), and a site reconnaissance conducted during preparation of the *RCRA Facility Investigation / Remedial Investigation, Volume 1* (CH2M Hill 2007a:4-27). AOC 11 was designated as an AOC in a 2001 DTSC letter report (DTSC 2001). Low areas 11a, 11b, 11c, and 11d are located on HNWR property, and 11e is located on PG&E property. Three of these low areas were previously identified by E&E and labeled as L4a (11a), L4b (11b), and L5 (11d). Low areas 11c and 11e were identified during the May 2006 site reconnaissance. E&E had identified one additional low area (L6) as part of AOC 11. L6 is located on the east side of Bat Cave Wash immediately north of the road leading into Bat Cave Wash. L6 is fully contained within and has been incorporated into AOC 1.

Based on observation during a site visit, at least three apparent storm drain outlets could potentially discharge to AOC 11. It is not known whether all of these storm drains are currently active. A former employee reported that he observed a release from Cooling Tower B that entered the Northeast Ravine containing AOC 11

(Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). Stormwater runoff from the northeastern portion of the compressor station would also have flowed to AOC 11. In addition, stormwater runoff from Interstate 40 (I-40) also discharges to AOC 11.

Low areas 11c and 11e are associated with the remnants of two small former dams identified in the Northeast Ravine. Small amounts of fine-grained soils appear to be present behind the upper dam, and a larger volume of fine-grained soil is present behind the lower dam. These dams may have been constructed to prevent stormwater damage to a gas pipeline and a former access road to the compressor station (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35).

The original plant access road ran through the low area now identified as 11a. A stormwater pipe that captures runoff from I-40 and National Trails Highway discharges into AOC 11 (specifically 11a) north of this low area, immediately south of the I-40 overcrossing. Substantial flow from the I-40 stormwater pipe has been observed. After storm events, water pools in Subarea 11a and does not appear to readily percolate.

The topographical low areas may act as collection and deposition sites for constituents entrained in runoff from the compressor station and surrounding areas. Volatile constituents would not be expected to remain in the runoff as it flows down the ravine; however, less volatile constituents may have been transported to the low-lying areas and deposited.

The COPCs for soils within AOC-11 consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-28).

AOC 12 (Fill Area)

AOC 12 consists of three subareas located near the Transwestern Intertie gas pipeline site east of the compressor station. These three subareas (identified as 12a, 12b, and 12c [CH2M Hill 2007a:Figure 4-1]) were identified through employee interviews as locations that may contain buried debris. Subarea 12a was reportedly a disposal area for construction-related debris; however, other materials may have been disposed in this area. A few small pieces of concrete are visible at the surface in the area identified as 12a. The exact nature of the materials placed into this area and the date(s) of placement are unknown. Initially, Subarea 12a was the only disposal area identified in AOC 12 (Ecology and Environment 2000, cited in CH2M Hill 2007a:4-28 and 4-29).

Two potential disposal locations were recently identified from interviews with former employees (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). No debris is visible at these two sites. These two locations are adjacent to the northwestern corner (Subarea 12b) and southwestern corner (Subarea 12c) of the Transwestern Intertie facility. Subarea 12b reportedly was used to bury asbestos-containing material (ACM) and two drums of unused unknown chemicals (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). Subarea 12c was apparently a small ravine (about 6 feet deep) that was reportedly used to bury ACM and possibly other debris (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). Subareas 12a and 12b are located on property owned by HNWR, and Subarea 12c is located on both HNWR and PG&E property.

The COPCs for soils within AOC-12 consist of Title 22 metals [including Cr(VI)], pH, asbestos, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-29).

AOC 13 (Unpaved Areas within the Compressor Station)

AOC 13 consists of current and formerly unpaved areas within the fence line of the compressor station. These areas could have been affected incidentally by facility activities. In addition, former employees have reported, and existing documentation suggests, that pipeline liquids and/or waste oil were sprayed on station roads for dust control (PG&E 1980, cited in CH2M Hill 2007a:4-18 and 4-29; Russell, pers. comm., 2006b, cited in

CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). Currently, the unpaved areas are located in various strips and patches among buildings and structures at this active facility. Most of the unpaved areas within the fence line that are not part of another SWMU, AOC, or other undesignated areas lie within the lower yard on the west side of the facility. Formerly unpaved areas that are now paved or covered by buildings include much of the upper yard, including most of the area east of the main station buildings (i.e., east of the compressor and auxiliary buildings). E&E identified numerous subareas within AOC 13; however, given that stormwater runoff is likely to have traversed various areas, that pipeline liquids could have been sprayed in various areas, and that potential spills of cooling water could have occurred in various areas, AOC 13 will be addressed as one unit across the entire station.

The COPCs for soils within AOC-13 consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-29 and 4-30).

AOC 14 (Railroad Debris Site)

The railroad debris site (AOC 14) is located about 1,000 feet north of the compressor station and is currently bounded by the Burlington Northern Santa Fe railroad tracks to the north, I-40 to the south, Bat Cave Wash to the west, and the former access road to the location to the east of this AOC. Bat Cave Wash is located approximately 100 feet below the railroad debris site.

Historical operations at this area and the source of the debris are mostly unknown. The railroad debris site occupies approximately 1.5 acres and first appears in an aerial photograph dated 1947, before the establishment of the compressor station. In that photograph, a mound of soil apparently related to construction of the rail line is present on the site. In subsequent aerial photographs dated 1955, a white patch and other materials are present on this site. A dirt road that runs from the north end of the compressor station to this area is also visible on the 1955 aerial photographs. A similar white patch can be seen on aerial photographs from the same period (mid-1950s) on the ground adjacent to the sludge-drying beds (SWMU 5). The white material is probably dehydrated lime sludge from the Permutit® water-conditioning system. Former employees report that the lime sludge was trucked to the railroad debris site and sprayed on the ground (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). AOC 14 currently contains miscellaneous construction debris, including chunks of asphalt, railroad ties, and piping. ACM has also been identified at this site.

Employee reports suggest that a removal action for some of the white powdery material was conducted in the mid-1990s; however, no documentation regarding the removal has been found (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). The contours of the site suggest that some excavation may have occurred in the southern portion of the area. The southern two-thirds of the area are somewhat lower in elevation than the surrounding areas, and a long, low soil mound/berm is present immediately north of this area. Some white powdery material remains in the embankment adjacent to I-40, and it appears that a thin lens of additional material has been uncovered by erosion on the southern side of the soil mound. In addition, a 1998 investigation of the area indicated that a layer of white powdery material is present below the current soil surface to approximately 5 feet below ground surface (bgs) (Wong, pers. comm., 1999, cited in CH2M Hill 2007a:4-30). This layer has variable thickness and, in some areas, is underlain and overlain by a mix of the white powdery material and gravel.

An ACM removal action was completed at this location in 1999 (Wong, pers. comm., 1999, cited in CH2M Hill 2007a:4-30). In November 1998, during soil sampling at AOC 14, a small amount of friable construction debris and transite were found. The friable material contained more than 1% asbestos. The transite was nonfriable, and after sampling, the transite was left in the trench and covered with clean fill material. PG&E removed the friable ACM on April 14, 1999, and disposed of the material at an appropriate landfill.

The COPCs for soils within AOC 14 consist of Title 22 metals [including Cr(VI)], asbestos, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-31).

AOC 15 (Auxiliary Jacket Cooling-Water Pumps)

The AJCW pumps are part of the AJCW system and are located within the facility's fence line north of the auxiliary building. The AJCW system is a closed-loop cooling-water system for the generator engines. The pumps are used to circulate the cooling water through the system. The AJCW system was subject to occasional leaks because of the failure of pump and valve seals. Two employees indicated that in the past, leaks from the AJCW entered a pipe trench in the road near the AJCW system (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). The trench led to a storm drain that discharged in the area of AOC 9.

The ground surface in the immediate vicinity of the pumps is unpaved but covered with gravel; the area outside the containment berm is paved. No soil in this area is currently exposed; however, aerial photos from 1967 and earlier indicate that the area immediately adjacent to the AJCW system was unpaved. Intervening aerial photographs do not provide sufficient resolution to determine when the area was first paved. Chromium-based cooling-water additives were used in this system from 1951 through 1985. In 1985, this system was converted to using nonhazardous, molybdate-based cooling-water additives. Incidental leaks and spills have occurred and may have resulted in impacts on the soil beneath the pumps. Historic information indicates that concentrations of molybdenum as molybdate (MoO_4) typically ranged from 300 to 800 parts per million (ppm) (Betz 1987, 1989, 1990; cited in CH2M Hill 2007a:4-31 and 4-34); concentrations of chromium as chromate ranged from several hundred to more than 1,000 ppm (concentrations decreased with time).

The COPCs for soils within AOC-15 consist of Title 22 metals [including Cr(VI)] and pH (CH2M Hill 2007a:4-31).

AOC 16 (Sandblast Shelter)

The sandblast shelter is located near the injection well PGE-08. The area is and has historically been unpaved. The sandblast shelter was used to prepare metal at the facility for protective coating. Most of the sand blasting conducted at Topock consisted of removing paint from plant equipment. No other information is available regarding this site.

The COPCs for soils within AOC-16 consist of Title 22 metals (CH2M Hill 2007a:4-32).

AOC 17 (On-Site Septic System)

AOC 17 consists of the on-site septic system that serves the auxiliary building and other nearby buildings (the technical maintenance building, weld shop, garage, and maintenance shop). The auxiliary building includes the electric generators (P-Units), air compressors, electric switchgear, battery room, laboratory, mechanics' office, machine shop, locker room, and crew lunchroom. The septic system consists of a septic tank and associated leachfield. The septic tank associated with the laboratory is reportedly located 4 feet northeast of the air drying building and is buried 4 feet deep (Russell, pers. comm., 2006b, cited in CH2M Hill 2007c:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). An undated hand sketch shows the approximate location of the leachfield. Aerial photos from 1967 and earlier clearly indicate that the area around the septic tank and leachfield was unpaved. Although review of the aerial photograph from 2004 shows that the area was paved, aerial photographs between 1967 and 2004 do not have sufficient resolution to determine at what point the area was paved.

This septic system received wastes from the facility's laboratory. The plant's cooling water was routinely sampled to monitor its chemical content and pH. Test chemicals consisted of indicator reagents, which were supplied by the cooling-water-treatment chemical company. Once the cooling water was tested, the laboratory waste (testing solutions and small amounts of cooling water) was discharged into the septic system. Approximately 1 pint per day of test chemicals was disposed of into the septic system connected to the facility's laboratory. Incidental releases of maintenance-type chemicals could therefore also have entered the septic system.

The COPCs for soils within AOC 17 consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-32).

AOC 18 (Combined Wastewater Transference Pipelines)

AOC 18 consists of the pipelines that were used to connect the cooling towers to numerous parts of the wastewater system: SWMU 1 (former percolation bed), SWMU 2 (inactive injection well PGE-08), SWMU 5 (sludge-drying beds), SWMU 6 (chromate reduction tank), SWMU 7 (precipitation tank), SWMU 8 (process pump tank), SWMU 9 (transfer sump), and SWMU 10 (old evaporation ponds) and Units 4.3 (oil/water holding tank), 4.4 (oil/water separator), and 4.5 (portable waste oil storage tank). Several of these pipelines were removed when the hazardous-waste management system was closed, although some may still be in active use. Limited information regarding these pipelines is available, and no as-built drawings are available. According to information provided as part of a separate closure of the original oil/water separator system, the pipelines associated with the facility's industrial drains all drain to the OWS system and are addressed separately as part of AOC 20 (industrial floor drains) below (CH2M Hill 2007a:4-33).

Wastewater pipelines at the site were made of polyethylene, polyvinyl chloride (PVC), aluminum, cast iron, and vitrified clay (Mittelhauser Corporation 1986, cited in CH2M Hill 2007a:4-11 and 4-33). These pipelines were used only to convey wastewater. Pipelines for gas transmission and stormwater are separate systems.

The hazardous-waste management system and the related piping were closed, and piping was pressure tested for leaks as part of the closure process, as described in the Phases 1 and 2 closure certification report for hazardous-waste management facilities (Mittelhauser Corporation 1990, cited in CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33). The pipes that were removed as part of the closure operations are not part of the RCRA facility investigation process.

The closure plan for the hazardous-waste treatment system (Mittelhauser Corporation 1986, cited in CH2M Hill 2007a:4-11 and 4-33) designated, by letter, each of the pipelines that conveyed wastewater to the former two-step wastewater treatment system, through the system, and from the system to the old evaporation ponds.

Except for the vitrified-clay-sludge pipeline and other short sections, the pipelines that were inactive when the wastewater treatment system was closed were pressure tested and inspected, and the wastewater from the pressure test was sampled. The wastewater samples were analyzed for Title 22 metals, pH, and fluoride.

Most of the wastewater pipelines passed within the limits of the test. Only one pipeline failed and was removed along with most of the other inactive pipelines. During removal of some pipes, staining was visible below some sections of pipe. The interior of most of the pipelines had a visible green sludge and they were disposed of as hazardous waste. Several sections of pipeline were not removed because they were inaccessible, sufficiently decontaminated, and still active, or they were long and difficult to remove. Pipelines A-3, G-2, and G-3 have been extensively flushed since 1985 when cooling-water treatment with chromate ceased. As part of the closure process, soil was removed from five areas with metals concentrations greater than the background defined by Mittelhauser Corporation (CH2M Hill 2007a:4-33). A second round of confirmatory sampling was conducted to determine whether the site was cleaned to these background standards. In each location, the analytical results were well below background standards. Pipeline H, the vitrified-clay pipeline, was not pressure tested. After contaminated soils (visible green and white soils) identified in the vicinity of the pipeline were removed, a second round of soil sampling was conducted for each section of the pipeline to confirm that the area was clean. A sample was also taken where a portion of the pipeline had been removed a few years earlier.

The original OWS system was closed around 1990 (Mittelhauser Corporation 1990, cited in CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33), and there was some characterization of leaks near the pipelines associated with the OWS system. The OWS system's 3-inch-diameter underground piping was removed as part of the closure. Water from the OWS system flowed into this pipe and discharged into the chromate reduction tank. During the closure, leaks in the OWS system appeared to have occurred. Piping was removed where accessible, but some sections of the pipe were capped and left in place.

The COPCs for soils within AOC 18 consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-34).

AOC 19 (Former Cooling Liquid Mixing Area)

AOC 19 was initially defined as consisting of the concrete pad area associated with the former shed for mixing cooling additives. AOC 19 was identified by routine inspection in January 2006. During the most recent test of the eyewash shower located in this area, droplets of green liquid were observed on the concrete pad below the eyewash shower (McCurdy, pers. comm., 2006, cited in CH2M Hill 2007a:4-28, 4-34). Recent information regarding potential leaks from the jacket cooling-water (JCW) system (Russell, pers. comm., 2006b; cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35) has led to the inclusion of the adjacent pumps and tank area in AOC 19. AOC 19 is located directly east of the compressor building and consists of the footprint of the JCW area. The former cooling-additive-mixing shed is located within this footprint between the JCW pumps and the JCW tanks. The pad from the former shed currently exists and is located adjacent to a smaller concrete pad that presently serves as a base for an exterior emergency safety shower for employees.

The JCW system originally was designed with a hot well (a large rectangular concrete structure, partially below grade) that acted as a surge tank for the JCW system. Cooling-water additives for this system were chromium based until October 1985; since 1985, the additive package has been molybdenum based. Historic records (Betz 1987, 1989, 1990, 1991; cited in CH2M Hill 2007a:4-31 and 4-34) indicate that concentrations of molybdenum as molybdate typically ranged from 300 to 800 ppm. The water was pumped from the hot well into the heat exchangers. There was no overflow control system on the hot well, and employees stated that the hot well periodically overflowed. The hot well was approximately 10 feet deep, with about half that height above ground. The area covered by the hot well was about twice the area covered by the current concrete containment area for the jacket water tanks. The hot well was abandoned in place and replaced with JCW tanks (which still exist) before 1990. In the early 1990s, a construction project began to provide secondary containment in the area. During the construction, remnants of the old hot well were discovered.

A cleanup project was conducted to remove the hot-well remnants. The remaining concrete and the soil contained in the hot well were removed, and the concrete debris and soil were sampled. Cr(T) and Cr(VI) were detected in all soil and concrete samples. Because of the solubility of the chromium, the concrete was characterized as hazardous waste. No soil samples were collected under the hot well.

The JCW system was also subject to occasional leaks from pump and valve seal failure. The cooling water would flow onto the gravel area near the hot well and pumps. Larger leaks could sometimes result in releases onto the paved area between the JCW system and the visitor parking lot/warehouse, and potentially down the main entrance road leading to the compressor station (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). The area around the JCW tanks/former hot-well area and the JCW pumps is unpaved but covered with gravel. Therefore, leaks from the hot wells, pumps, and valves could have entered the soil in this area.

The chemical additive shed was located between the JCW pumps and tanks/hot well. In the past, powdered coolant chemicals were mixed here and reportedly hand-added to the hot well (Russell, pers. comm., 2006b, cited in CH2M Hill 2007a:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35). The pad from the shed remains; it is adjacent to an eyewash station/emergency shower. Upon discovery of the droplets of green-colored water, sampling was conducted in the area. The affected area was covered with visqueen to minimize employee contact, and a wooden pad was installed over the concrete pad to minimize human exposure and to allow the safety shower to remain in operation. The area around the former shed/concrete pad is unpaved. Incidental spills during the mixing of the chemicals, and potentially during the manual addition of the chemicals, could have affected the soil in this area.

The COPCs for soils within AOC 19 consist of Title 22 metals [including Cr(VI)] and pH (CH2M Hill 2007a:4-35).

AOC 20 (Industrial Floor Drains)

AOC 20 was identified at the request of DTSC (2007). AOC 20 consists of the industrial floor drains within the compressor station's buildings and other industrial structures and facilities within the compressor station's upper yard that are routed to the OWS system (see Exhibit 4.5-8). AOC 20 does not include the miscellaneous floor drains in areas such as lavatories that drain to one of the three septic systems at the compressor station.

Several of the industrial buildings within the compressor station are equipped with floor drains that capture liquids released to the floor of the building, and convey the liquid to the OWS system. In addition, other industrial facilities, such as the steam-cleaning area and the main jacket water-surge tanks, are equipped with drains that capture overflow and spills. A pipe trench that extends from just north of the steam-cleaning area to the east side of the compressor building also drains to the OWS system and has been included in this AOC. Collectively, these drains are referred to as industrial floor drains to distinguish their use and intent from the storm drains that are also present at the facility. Industrial floor drains are found in the compressor building, auxiliary building, JCW pumps, oil storage tank area, steam rack (steam-cleaning area), and fire water pump building (former water softener building).

Pipelines that are connected to the OWS system were historically made primarily of vitrified clay. Currently, the system contains a variety of pipe materials, including reinforced fiberglass, PVC, cast iron, and acrylonitrile-butadiene-styrene. The aboveground lines are all welded carbon steel pipe (PG&E 1991, cited in CH2M Hill 2007d: 4-36). No sampling of the industrial floor drains has been conducted. Many of the pipes leading from the industrial floor drains to the OWS system are located under building floors and machinery, and/or are buried below ground and largely inaccessible.

The liquids potentially discharged to the industrial floor drains would consist primarily of liquids present within the industrial buildings and facilities. Liquids used in the operations in the industrial buildings included lubricating oil, oily water from the steam-cleaning area and compressor and generator engine steam-cleaning, JCW, and lubricating-oil cooling water. The other two sources of liquids are the rainwater that collected in the pipe trench and hose-down water used when the pipe trench was cleaned. Drainage from the various cooling-water systems would have contained chromium compounds and, later, molybdenum. No records exist of any specific releases to the industrial floor drains; however, both are expected to have captured incidental drips and spills during plant operations, as well as occasional washing liquid from floor cleaning within the buildings.

The COPCs for soils within AOC 20 consist of Title 22 metals [including Cr(VI)], TPH, PAHs, and VOCs (CH2M Hill 2007a:4-36).

Unit 4.3 (Oil/Water Holding Tank)

The Unit 4.3 oil/water holding tank was not designated as a SWMU or an AOC by DTSC. The oil/water holding tank was part of the original oily-water treatment system that operated until 1989. Believed to have been installed in 1951, this cylindrical steel tank was about 15 feet long and 5 feet in diameter and had a capacity of 3,000 gallons. The tank was mounted horizontally on two concrete supports; the area beneath the tank was unpaved.

The oil/water holding tank was used to collect oily water from the compressor floor drainage (about 200,000 gallons per year), compressor engine-cleaning operations (about 10,000 gallons per year), and steam-cleaning operations (about 10,000 gallons per year) (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). In general, all oily water discharged to the oily-water system, as is the case today (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-23). Wastewater that was collected in this tank was discharged by gravity flow via an aboveground 3-inch-diameter steel pipe to the adjacent OWS (Unit 4.4).

Chemical analysis data for wastewater processed through the oil/water holding tank indicate that the wastewater contained 48 milligrams per liter (mg/l) of oil and grease (Brown and Caldwell 1986, cited in CH2M Hill 2007a:4-16 and 4-17). Detectable concentrations of some metals, including Cr(T), were also present in the wastewater. No indication of a release was observed during a facility inspection performed as part of the RFA (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18).

This oil/water holding tank was removed in conjunction with the sludge drying beds (SWMU 5) between November 1988 and February 1989 (Mittlehauser 1990a, cited in CH2M Hill 2007a: 4-16).

The COPCs for soils within this unit consist of Title 22 metals [including Cr(VI)], pH, TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-16).

Unit 4.4 (Oil/Water Separator)

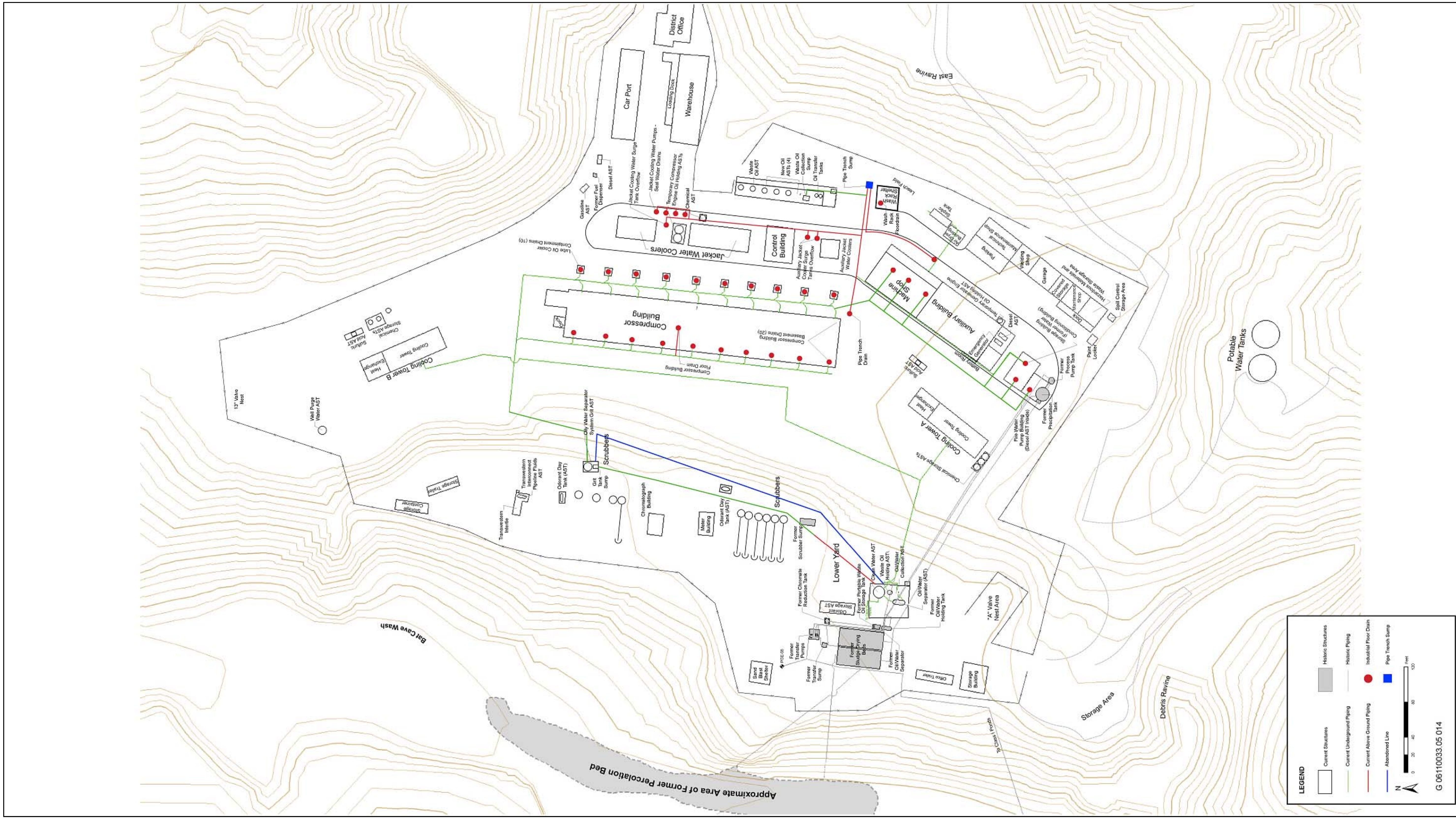
The former OWS (it has since been replaced with a new system) was identified by EPA in the RFA (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18) but was not subsequently designated as an SWMU or an AOC by DTSC. Part of the original oily-water treatment system, the former OWS was located adjacent to the oil/water holding tank (Unit 4.3) in the southern portion of the lower yard.

The former OWS was approximately 4.5 feet deep, 15 feet long, and 6 feet wide and was constructed of 6-inch-thick concrete (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). The unit was set below grade (i.e., the top of the unit was at grade). Installed in 1951, the unit reportedly received oily water from Unit 4.3 (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). The unit was equipped with an underflow weir to control discharges and a suction pump on the effluent end to collect and remove floating oil. The floating oil was transferred by flexible hose to a portable waste-oil storage tank (Unit 4.5). Before 1964, treated water from the OWS was directed to the transfer sump before discharge to Bat Cave Wash. From 1964 to 1969, effluent from the OWS may have been directed to a treatment pond and processed along with the cooling-water blowdown through the single-step chromium treatment system before discharge. From 1969 through October 1985, effluent from the OWS was routed to the chromate reduction tank and was processed along with the cooling-water blowdown through the two-step chromium treatment system before being discharged. In November 1985, the chromate reduction tank was converted into a holding tank (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18), and the discharge from the OWS was routed to either the holding tank or the transfer sump before discharge.

Chemical analysis data for wastewater processed through the OWS indicate that the wastewater contained 60 mg/l oil and grease (Brown and Caldwell 1986, cited in CH2M Hill 2007c:4-16 and 4-17). Detectable concentrations of some metals, including Cr(T), copper, and zinc, were also present in the wastewater. No indication of a release was observed during a facility inspection performed as part of the RFA (Kearny 1987, cited in CH2M Hill 2007c:4-10, 4-12 through 4-14, and 4-16 through 4-18).

This OWS was closed and removed between November 1989 and March 1990 (Mittlehauser 1990b, cited in CH2M Hill 2007c: 4-17).

The COPCs for soils within this unit consist of Title 22 metals [including Cr(VI)], TPH, PAHs, SVOCs, and VOCs (CH2M Hill 2007a:4-17).



Source: CH2M Hill 2007a:Figure 4-3

Industrial Floor Drain Layout **Exhibit 4.5-8**

Unit 4.5 (Portable Waste-Oil Storage Tank)

The portable waste-oil storage tank was identified by EPA in the RFA (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18) but was not subsequently designated as an SWMU or an AOC by DTSC. Located in the southern portion of the lower yard adjacent to the OWS (Unit 4.4), this enclosed steel tank was about 6 feet long and 2 feet in diameter and was mounted horizontally on a trailer (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18). The tank was connected to a suction pump within the OWS with a flexible hose. The portable tank was stationed on a concrete pad that was contained on three sides by a 6-inch-high curb. The fourth side of the pad was left open to allow removal of the unit.

The tank was used to collect floating oil from the OWS. When the tank was full, it was transported to the east side of the facility and placed next to the stationary waste-oil storage tank (Unit 4.6). Oil within the portable tank was then transferred to the stationary tank. Starting in 1975, oil within the stationary tank was periodically removed, initially sold for reuse, and later transported off-site for recycling (PG&E 1980, cited in CH2M Hill 2007a:4-18 and 4-29; Riddle, pers. comm., 2004, cited in CH2M Hill 2007a:4-18, 4-23, and 4-24).

The portable waste-oil storage tank was removed from service in 1989. During the removal of the transfer sump (SWMU 9) and the OWS (Unit 4.4), the portable tank was used to temporarily hold waste oil removed from the sump and OWS. The waste oil was subsequently removed from the portable tank, and the tank was then transported off-site for disposal (Mittelhauser Corporation 1990; CH2M Hill 2007a:4-9, 4-11, 4-13, 4-14, 4-18, and 4-33). No indication of a release associated with the portable waste-oil storage tank was observed during a facility inspection performed as part of the RFA (Kearny 1987, cited in CH2M Hill 2007a:4-10, 4-12 through 4-14, and 4-16 through 4-18).

The COPCs for soils within this unit consist of TPH, PAHs, and VOCs (CH2M Hill 2007a:4-18).

Unit 4.6 (Waste-Oil Storage Tank)

The portable waste-oil storage tank s identified by EPA in the RFA (Kearny 1987, cited in CH2M Hill 2007a:4-18) is not designated as a SWMU or AOC. The waste oil storage tank was installed in 1951 during facility construction and is approximately 20 feet high by 8 feet in diameter with a capacity of 7,500 gallons. Containment is present, and the waste oil tank remains in service for temporary storage of waste oil. Contents are periodically removed and transported off-site for recycling (CHM Hill 2007a:4-18).

DTSC is considering adding this and neighboring tankage to Part B site characterization activities.

Undesignated Area 1 (Potential Pipe Disposal Area)

During a site reconnaissance for the RFI/RI (CH2M Hill 2007a:4-36), an area just north of the gas pipeline road near the former evaporation ponds was identified as a potential historical disposal site for ACM. A former employee described 20-foot lengths of asbestos-covered metal pipes as having been buried in a trench immediately north of the pipeline road, across from the northern boundary of the former ponds.

In September 2008, a surface geophysical survey was performed to evaluate the potential presence of buried asbestos-wrapped metal pipes in this area. Results of the geophysical survey did not suggest the presence of buried metal pipes in this area; however, several small metallic anomalies and two undifferentiated utilities were observed in the area.

The COPC for this area is asbestos (CH2M Hill 2007a:4-36) and possibly other constituents that could have been associated with the piping when it was in operation.

Undesignated Area 2 (Former 300B Pipeline Liquids Tank)

PG&E’s 300B pipeline was formerly equipped with a 900-gallon-capacity aboveground drip tank. The drip tank was located on the HNWR east of the compressor station, south of the access road, immediately west of the pipeline access road adjacent to the Colorado River. The tank was 2 feet, 10 inches in diameter and 20 feet long and was above ground, located on two concrete saddle supports. The tank pad was unpaved (Trident 1995, cited in CH2M Hill 2007a:4-37). The tank was designed to capture pipeline liquids and was drained periodically (Russell, pers. comm., 2006a, cited in CH2M Hill 2007a:4-23). The tank was removed in 1995, and associated piping was emptied, disconnected, and capped at the abandoned ends (Trident 1996, cited in CH2M Hill 2007c:4-37). Trident Environmental Consultants conducted an investigation of the tank location in December 1994 (Trident 1995, CH2M Hill 2007a:4-37). Oil staining was observed below the center and southern portions of the tank, extending out a maximum of 6 feet from the footprint of the former tank (Trident 1995, CH2M Hill 2007a:4-37). The total stained area was estimated to be approximately 20 feet by 40 feet. Trident speculated that the oil had sprayed out of the southern outlet of the tank, and noted that oil staining was also observed on the near vertical embankment north of the tank location.

In 1994, oil-stained soil was observed underneath and immediately adjacent to a portion of the tank, and a site investigation was performed December 2, 1994. Samples were analyzed for TPH–motor oil by gas chromatography/flame ionization detector. Low levels of TPH–motor oil were detected at 1.2 and 2.0 feet bgs (Trident 1995, CH2M Hill 2007a:4-37).

Excavation of soil and confirmation sampling at the former tank location were performed between July and September 1996. On June 9, 1997, San Bernardino County issued a letter confirming the completion of the site investigation and remedial action of the contaminated soil at the site (CH2M Hill 2007a:4-51).

The COPCs for soils within this area consist of Title 22 metals, TPH, PAHs, PCBs, SVOCs, and VOCs (CH2M Hill 2007a:4-37).

4.5.2 REGULATORY BACKGROUND

The following sections present a summary of federal, state, and local plans, policies, regulations, laws, and ordinances related to geology, soils, and seismic conditions that are pertinent to the proposed project. The discussion of regulatory setting in Section 4.6, “Hazardous Materials,” provides a description of the RCRA beyond that provided below, as well as a description of CERCLA. These laws govern management of wastes generated during facility operation and the assessment and remediation of affected sites. The onsite portions of remedial actions taken under CERCLA authority must meet the substantive provisions of promulgated requirements that are applicable or relevant and appropriate to the actions (ARARs). Criteria, guidance, advisories, and proposed standards that are not legally binding are not ARARs, but may be considered and used as appropriate to ensure the protectiveness of the remedy. These are referred to as “To Be Considered” criteria (TBCs). DOI, as the lead agency for remedial actions taken under CERCLA authority, has established a list of ARARs and TBCs for the site, which is presented in the Final CMS/FS (CH2M Hill 2009b:3-3 through 3-6 and Appendix B, included in Appendix CMS of this EIR).

4.5.2.1 FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Clean Water Act

The Clean Water Act (CWA) (33 USC 1251 et seq.) includes provisions for reducing soil erosion for the protection of water quality. The CWA makes the discharge of pollutants from a point source to navigable waters unlawful, unless a permit was obtained under the provisions of the CWA. Regulation of discharges under the CWA also pertains to construction sites where soil erosion and storm runoff and other pollutant discharges could affect downstream water quality. The CWA is described in greater detail in Section 4.7, “Hydrology and Water Quality.”

National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) process, established by the CWA, is intended to meet the goal of preventing or reducing pollutant runoff. Under the NPDES process, projects involving construction activities (e.g., clearing, grading, or excavation) with land disturbance greater than 1 acre must file a notice of intent (NOI) with the applicable regional water quality control board (RWQCB) to indicate the project’s intent to comply with the state general permit for stormwater discharges associated with construction activity. This permit establishes conditions to minimize sediment and pollutant loading and requires preparation and implementation of a storm water pollution prevention plan (SWPPP) before construction. The NPDES process is described in greater detail in Section 4.7, “Hydrology and Water Quality.”

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act (42 USC 7701 et seq.) to “reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program” (42 USC 7702). To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). The National Earthquake Hazards Reduction Program Act (NEHRPA) significantly amended this program in November 1990 by refining the description of agency responsibilities, program goals, and objectives. The NEHRPA designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns FEMA several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, the National Science Foundation, and USGS.

Resource Conservation and Recovery Act

The RCRA, enacted in 1976 (42 USC 6901 et seq.), is the primary law governing the progress of hazardous wastes from their point of generation, their transport, and their treatment and/or disposal. Wastes generated from operation of the compressor station are handled and disposed of in accordance with applicable RCRA regulations. The remedial investigations and corrective actions are being conducted through the RCRA’s corrective action process under DTSC oversight. In February 1996, PG&E and DTSC entered into a corrective action consent agreement that required PG&E to perform a RCRA remedial investigation. Subsequent remedial investigations and corrective actions are being conducted through the RCRA process consistent with the terms of this agreement.

Additional details on RCRA regulations governing waste generation and handling are provided in Section 4.6, “Hazardous Materials.”

4.5.2.2 State Plans, Policies, Regulations, and Laws

Porter-Cologne Water Quality Control Act

State regulations, including the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) and Section 1600 of the California Fish and Game Code, have provisions to reduce soil erosion. The Porter-Cologne Act (California Water Code, Section 13000 et seq.) established the State Water Resources Control Board and nine RWQCBs that regulate water quality. The RWQCBs carry out the NPDES permitting process for point-source discharges and the CWA Section 401 certification program. This certification is administered in California by the State Water Resources Control Board, via the RWQCBs. No license or permit may be granted by a federal agency until certification required by Section 401 has been granted. Further, no license or permit may be issued if certification has been denied. Section 401 water quality certifications typically must obtain a CWA Section 404 permit. The Porter-Cologne Act is described in greater detail in Section 4.7, “Hydrology and Water Quality.”

California Building Code

The California Building Standards Commission (BSC) is responsible for coordinating, managing, adopting, and approving building codes in California. In July 2007, the BSC adopted and published the 2006 International Building Code as the 2007 California Building Code (CBC). This new code became effective on January 1, 2008, and updated all the subsequent codes under the California Code of Regulations Title 24. San Bernardino County has adopted the 2007 CBC. The State of California provides minimum standards for building design through the 2007 CBC (California Code of Regulations, Title 24). Where no other building codes apply, as here, Chapter 29 of the 2007 CBC regulates excavation, foundations, and retaining walls. The CBC applies to building design and construction in the state and is based on the federal Uniform Building Code used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with numerous more detailed or more stringent regulations.

The state earthquake protection law (California Health and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. The 2007 CBC replaces the previous "seismic zones" (assigned a number from 1 to 4, where 4 required the most earthquake-resistant design) with new Seismic Design Categories A through F (where F requires the most earthquake-resistant design) for structures designed for a project site. With the shift from seismic zones to seismic design, the CBC philosophy has shifted from "life safety design" to "collapse prevention," meaning that structures are designed for prevention of collapse for the maximum level of ground shaking that could reasonably be expected to occur at a site. Chapter 16 of the CBC specifies exactly how each seismic design category is to be determined on a site-specific basis through the site-specific soil characteristics and proximity to potential seismic hazards.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls. This chapter regulates the preparation of a preliminary soil report, engineering geologic report, geotechnical report, and supplemental ground-response report. Chapter 18 also regulates analysis of expansive soils and the determination of the depth to groundwater table. For Seismic Design Category C, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading. For Seismic Design Categories D, E, and F, Chapter 18 requires these same analyses plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also requires addressing mitigation measures to be considered in structural design. Mitigation measures may include ground stabilization, selection of appropriate foundation type and depths, selection of appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions. Peak ground acceleration must be determined from a site-specific study, the contents of which are specified in CBC Chapter 18.

Finally, Appendix Chapter J of the 2007 CBC regulates grading activities, including drainage and erosion control and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

California Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (Public Resources Code, Section 2690–2699.6) addresses strong ground shaking, liquefaction, landslides, or other ground failures as a result of earthquakes. This act is aimed at reducing the threat to public safety and minimizing potential loss of life and property in the event of a damaging earthquake event. This act directs the California Department of Conservation to identify and map areas statewide that are subject to earthquake hazards, such as liquefaction, earthquake-induced landslides, and amplified ground shaking. A product of the resultant Seismic Hazards Mapping Program, seismic zone hazard maps has been developed that identify zones of required investigation. The seismic zone hazard maps are to be used by cities and counties to adequately prepare the safety element of their general plans and protect public health and safety. Local agencies are also required to regulate development in any seismic hazard zones, primarily through permitting. Most developments designed for human occupancy within these zones must conduct site-specific geotechnical investigations to identify the hazard and develop appropriate mitigation measures. Permits for development projects are not issued until these investigations have been completed and mitigation measures have been developed to address identified issues. The seismicity of the project area and potential hazards are discussed under "Seismicity" in Section 4.5.1, "Existing Setting," above.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code, Section 2621 et seq.) was enacted in 1972 by the State of California to mitigate the damage caused by fault rupture during an earthquake. Under this act, faults throughout the state have been evaluated for surface-rupture potential during an earthquake event, and zones have been established around active faults (Hart and Bryant 1997). The faults near the project site are discussed under "Seismicity" in Section 4.5.1, "Existing Setting," and summarized in Table 4.5-3 above.

4.5.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

Section 65302(g) of the California Government Code requires that general plans include an element that identifies and appraises seismic and geologic hazards. The Public Safety portion of the County General Plan (San Bernardino County 2007) is composed of elements that relate to aspects of the county's natural and human-made environment that pose potential threats to human life or property.

The Safety Element restricts certain land uses, including handling of hazardous waste in fault hazard zones on page VIII-34. The project area is not located within a fault hazard zone; therefore, the County's hazardous-waste restrictions are not applicable to the proposed project.

4.5.3 Environmental Impacts and Mitigation Measures

4.5.3.1 Analysis Methodology

Geology and soils impacts resulting from implementation of the proposed project are evaluated by addressing seismic conditions and geological properties of the soils at the site with respect to federal, state, and/or San Bernardino County building and long-term maintenance requirements. Additionally, impacts and mitigation measures would be evaluated according to general terms and conditions of project implementation with PG&E and surrounding landowners.

4.5.3.2 Thresholds of Significance

Based on the CEQA Guidelines and the Conservation Element of the County General Plan, the proposed project would have a significant impact related to geology, soils, or seismicity if it would:

- significantly increase the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - i) rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
    - ii) strong seismic ground shaking;
    - iii) seismic-related ground failure, including liquefaction; and
    - iv) landslides.

- result in substantial soil erosion or the loss of topsoil;
- be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project (including expansive soils as defined in Table 18-1 of the Uniform Building Code), potentially resulting in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse.
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

The last threshold regarding soils capable of supporting the use of septic tanks or alternative waste water disposal, the proposed project does not include the use of septic tanks or additional wastewater disposal systems. Therefore this threshold is not considered further in this analysis.

4.5.3.3 IMPACT ANALYSIS

> Risks to People and Structures Caused by Seismic Hazards. *The proposed project would not create risks to people from seismic hazards because the site is not located within an earthquake fault zone. Surface rupture is, therefore, not expected to occur on the project site, and the potential for seismic activity in the area is considered low; therefore, this impact would be* ***less than significant****.*

The proposed project would result in the construction of remediation and monitoring wells, roads and utilities, and other associated infrastructure. In addition, the facilities associated with the proposed project would result in the construction of structures designed to house individuals (e.g., field trailers where operators could potentially be present for a 24-hour/7-days-a-week operation). The project area is not located within an earthquake fault zone as designated by the Alquist-Priolo Earthquake Fault Zone Act. The nearest historically active faults (active within the past 200 years, as defined by the Alquist-Priolo Earthquake Fault Zoning Act [see “State Plans, Policies, Regulations, and Laws” in Section 4.5.2, “Regulatory Background,” above]) are the Pinto Mountain and Pisgah-Bullion fault zones, both located approximately 94 miles west-southwest of the site. Because no known active faults are located on the site, the potential for surface rupture (cracking or breaking of the ground during an earthquake) would be less than significant.

The project area is located in an area considered by the California Geological Survey (Peterson et al. 2008: Figure 40) to be a relatively low intensity ground shaking zone. The California Geological Survey has identified the peak ground acceleration, which is the measure of how hard the earth shakes in a given geographic area, for the project area to have a 2% probability of exceeding 6% of the acceleration of gravity in 50 years (Peterson et al. 2008: Figure 38). The potential for seismic activity in this area is considered low because of the project area’s substantial distance from active faults. Facilities associated with the proposed project would not expose people to great risk of earthquake-related impacts, including the effects of strong ground shaking that could result in risks to people or damage to structures. Further, all proposed facilities would be constructed in accordance with the requirements of the Uniform Building Code, including requirements for seismic design and the policies and implementation measures of the County General Plan’s Safety Element (June 15, 2005).

In addition, because of the project area’s substantial distance from active faults and the low risk associated with ground shaking, any seismic-related earth failure, including liquefaction, is not expected to be substantial. Therefore, the proposed project would not increase the exposure of people or structures to potential substantial adverse effects related to earthquakes or seismic events, and impacts are considered **less than significant**. No mitigation is required.

Potential Impacts Associated with Landslides, Subsidence, and Unstable/Expansive Soils. *The project site is underlain by soils with a very low potential for shrink/swell and subsidence because of very low clay content. Furthermore, portions of the project area that are relatively flat would not be subject to the effects of landslides. Areas with abrupt elevation changes, such as along Bat Cave Wash, may be susceptible to localized rock falls, but not to widespread slope failure or landslides. This impact would be less than significant.*

The proposed project is located in a geological area that is relatively stable. A large portion of the project area is relatively flat and is therefore not susceptible to landslides, either on- or off-site. Portions of the project area with abrupt elevation changes may be susceptible to localized rock falls, but are not located adjacent to any hillsides or areas that could be subject to the effects of widespread slope failures or landslides. In addition, remediation and well facilities would be located in areas that are accessible for regular operation and maintenance, which would exclude locating facilities on steep, unstable hillsides. Subsidence, the sinking or settling of land, is caused by compaction of unconsolidated soils during a seismic event, compaction by heavy structures, erosion of peat soils, or groundwater depletion. Subsidence usually occurs over a broad area and is, therefore, not detectable at the ground surface. This normally occurs in areas underlain by alluvial soils. The soils present in the project area are generally sands and gravels that are moderately compacted. Seismicity hazards and peat soils are not present in the project area. Groundwater-induced hydrocompaction is not anticipated to be of concern because soils are situated upon near-surface bedrock that is not influenced by hydrocompaction. Based on a review of the NRCS soil survey for Mohave County, Arizona (NRCS 2006:52, 61, 72, Table 15), which contains soils consistent with those found elsewhere in the project are, the soils in the project area have no potential for subsidence. Soils found in the project area are generally identified as having low expansion properties by the NRCS because they have very low clay content. The proposed project would have **less than significant** impacts related to landslides, subsidence, and unstable or expansive soils. No mitigation is required.

IMPACT GEO-1 **Potential for substantial erosion or loss of top soils.** T*he proposed project could result in ground-disturbing activities that could alter the natural drainage patterns and erosion rates of the area. This would be a potentially significant impact.*

The proposed project would result in drilling up to 170 wells, including remediation, extraction, injection, and monitoring wells. It would involve grading of up to 6,000 linear feet of new roads, including unpaved roads for vehicle travel. It would also include the potential undergrounding of utility connections. These activities would involve excavation, trenching, backfilling, drilling, and grading of on-site soils. Depending on the ultimate locations and amounts of infrastructure required, these activities could occur anywhere within the project area, and could include vegetation removal. Disturbed areas would be exposed to wind and water erosion during construction activity. During wind events, which are not uncommon in the desert region, fine-grained surface soils may become airborne, creating dust. At sufficient concentrations, inhalation of particulate matter (i.e., dust) in human lungs can cause a variety of health problems. Further, wind-blown sediment can degrade sensitive equipment parts and processes. During winter storm events, rain of sufficient intensity could dislodge soil particles from the soil surface. Once particles are dislodged, and if excessive rainfall generates runoff, localized erosion could occur, which could lead to the degradation of on-site soils and nearby waterways, including the Colorado River. In addition, in areas that could be disturbed by project activities and that would be adjacent to existing sources of contamination, such as those within or adjacent to the SWMUs and AOCs, there is the potential to encounter contaminated soils. If these soils were eroded, they could contribute contaminants to receiving waters. This potential for increased erosion during construction and decommissioning activities, including potential for erosion from unpaved access roads, would be a **potentially significant** impact (**Impact GEO-1a**).

The proposed project may also result in differential compaction (i.e., where an area of soils is compacted at a much greater degree than surrounding soils and where the surrounding soils are more easily eroded) of soils caused by the substantial number of heavy, loaded trucks that would travel along unpaved or graded areas. The degree of differential compaction of soils at the site would vary because of truck weight, duration of traffic, and surface soil type along the truck travel routes; however, activities associated with the proposed project could result in substantial wearing of project area roadways, which could lead to changes to the drainage patterns, rutting, and locally greater erosion rates. Further, where utilities and water conveyance structures would be installed underground, the recompacted soils may cause changes to the existing drainage of the area and may prevent the infiltration of water in these areas. Because the project could result in the differential compaction of project area roadways and could alter the natural drainage patterns of the area, this would be a **potentially significant** impact (**Impact GEO-1b**).

Mitigation Measure GEO-1a. Construction, Operation and Maintenance, and Decommissioning Impacts Related to Erosion of Soils.

a. A DTSC-approved grading and erosion control plan, prepared by a California Registered Civil Engineer, shall be completed prior to implementation of any grading in areas of the site where there is a potential for substantial erosion or loss of top soils. The plan shall outline specific procedures for controlling erosion or loss of topsoil during construction, operation and maintenance, and decommissioning.

b. To ensure soils do not directly or indirectly discharge sediments into surface waters as a result of construction, operation and maintenance, or decommission activities, PG&E shall develop a SWPPP as discussed in mitigation measure HYDRO-1 of the “Hydrology and Water Quality” section of this EIR. The SWPPP shall identify best management practices (BMPs) that would be used to protect stormwater runoff and minimize erosion during construction. PG&E shall prepare plans to control erosion and sediment, prepare preliminary and final grading plans, and shall prepare plans to control urban runoff from the project site during construction, consistent with the substantive requirements of the San Bernardino County Building and Land Use Services Department for erosion control.

c. During road preparation activities, loose sediment shall be uniformly compacted consistent with the substantive San Bernardino County Building and Land Use Services Department requirements to aid in reducing wind erosion. Ongoing road maintenance including visual inspection to identify areas of erosion and performing localized road repair and regrading, installation and maintenance of erosion control features such as berms, silt fences, or straw wattles, and grading for road smoothness shall be performed as needed to reduce potential for erosion.

d. Regarding the potential for contaminated soils to be eroded and contribute contamination into receiving waters, Mitigation Measures GEO-2 and HAZ-2 shall be implemented. Mitigation Measure GEO-2 provides the provisions for mitigating erosion through BMPs which shall be implemented. Mitigation Measure HAZ-2 provides the provisions for safe work practices and handling of contaminated soils as investigation derived wastes.

Timing:	The grading and erosion control plan and the SWPPP shall be prepared by PG&E and approved by DTSC before any ground disturbing activities begin. Implementation of the construction practices and protocols detailed in the grading and erosion control plan, the SWPPP, and road preparation activities shall be implemented during project-related ground disturbing activities.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	The impact would be **less than significant** after implementing the measures detailed above because the grading and compaction measures along with erosion control measures would be in place and maintained to control the water and wind erosion of on-site soils.

Mitigation Measure GEO-1b. Construction, Operation and Maintenance, and Decommissioning Impacts Related to Differential Compaction of Soils.

a. BMPs shall be implemented during construction, operation and maintenance, and decommissioning activities to minimize impacts on the affected areas. Such BMPs could include, but would not be limited to, the following: uniform compaction of roadways created for accessing the project area as per San Bernardino County Building and Land Use Services Department requirements, returning areas adversely affected by differential compaction to preexisting conditions when these areas are no longer needed, and continuing maintenance of access roads, wellhead areas, and the treatment facility areas.

b. Work area footprints shall be minimized to the greatest extent feasible to limit the areas exposed to differential compaction. Where possible, existing unpaved access roads and staging/working areas shall be reused and maintained for different stages of the construction. New graded areas for staging or for access roads shall be compacted to a uniform specification, typically on the order of 90 to 95% compaction and consistent with substantive San Bernardino County Building and Land Use Services Department requirements to reduce differential compaction and subsequent erosion of site soils.

c. After the completion of the operation and maintenance phase, the disturbed areas which result in increased potential for compaction shall be returned to their respective preexisting condition by regrading consistent with the preconstruction slopes as documented through surveys that may include topographic surveys or photo surveys. The areas will be returned to the surrounding natural surface topography and compacted consistent with unaltered areas near the access roads or staging areas in question. The habitat restoration plan outlined in mitigation measure BIO-1 shall include restoration of native vegetation or other erosion control measures where revegetation would be infeasible or inadequate, for purposes of soil stabilization and erosion control of the project area.

Timing:	BMPs shall be implemented during the construction, operation and maintenance, and decommissioning activities.
Responsibility:	PG&E would be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	The impact would be **less than significant** after implementing the measures detailed above because unnatural erosion hazards caused by differential compaction will be addressed through uniform grading and compaction consistent with substantive San Bernardino County requirements, affected areas for which the project increased the potential for erosion over original site conditions will be returned to original site conditions, BMPs will minimize the effect of component stages, and the extent of areas affected will be minimized to the extent feasible.

This page is left intentionally blank.

4.6 HAZARDOUS MATERIALS

This section discusses existing hazardous materials within the project area and surrounding areas; describes applicable federal, state, regional, and local regulations and policies related to public health hazards; and analyzes the potential short-term and long-term impacts of the proposed project related to hazards and hazardous materials. The analysis of potential impacts related to hazardous materials focuses on public safety and potential effects of human contact with contaminated groundwater or soils, or hazardous materials associated with the remediation of groundwater that has been affected by past site operations. This section also discusses potential effects of human contact with hazardous materials/wastes associated with current site operations and implementation of the proposed project. Potential hazards and associated impacts from hazardous materials contained in air, ground or surface waters, and soils are described herein. Additional related information is contained in the following sections: Section 4.2, "Air Quality;" Section 4.5, "Geology and Soils;" and Section 4.7, "Hydrology and Water Quality." A discussion of cumulative impacts related to hazardous materials is provided in Chapter 6 of this EIR.

Key input on-site characteristics was derived from data and information presented in the following reports:

- *RCRA Facility Investigation/Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California* (Volumes 1 and 2) (CH2M Hill 2007a, 2009a);

- *Final Corrective Measures Study/Feasibility Study Report: PG&E Topock Compressor Station, Needles, California* (CH2M Hill 2009b, included in Appendix CMS of this EIR); and

- *Human Health and Ecological Risk Assessment Work Plan, Topock Compressor Station, Needles, California* (Arcadis 2008).

- *Human and Ecological Risk Assessment of Groundwater Impacted by Activities at Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1 and SWMU 2, Topock Compressor Station, Needles, California* (Arcadis 2009).

4.6.1 EXISTING SETTING

4.6.1.1 OVERVIEW OF HAZARDOUS MATERIALS AND WASTES

Under the California Health and Safety Code, Chapter 6.95, a hazardous material is "any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment." When a hazardous material is either intentionally disposed of or unintentionally discarded (such as a spill or other release) the hazardous material may create a hazardous waste.

Hazardous waste is defined in Title 22 of the California Code of Regulations (CCR) as a substance or combination of substances that may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating illness, or may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed (22 CCR Section 66261.10). Hazardous wastes are further classified according to four properties: toxicity, ignitability, corrosivity, and reactivity (22 CCR Chapter 11, Article 3), as described below:

- Toxic substances may cause short-term or long-lasting health effects that may be temporary or result in permanent disability or death. Examples of toxic substances include most heavy metals (including lead, chromium, and hexavalent chromium), pesticides, and organic compounds such as benzene (a carcinogenic component of gasoline).

- Ignitable substances, such as gasoline and many solvents that may be found in cleaning products or quick-drying glues are hazardous because of their flammable properties.

- Corrosive substances, such as sulfuric acid (battery acid) and lye (used in soap making and a component of liquid drain openers), can damage other materials or cause severe burns on contact with skin.

- Reactive substances, such as explosives, pressurized canisters, and pure sodium metal (which reacts violently when exposed to water), may cause explosions or generate gases or fumes.

4.6.1.2 Overview of Investigation Activities at the Compressor Station

Several phases of site investigation and characterization addressing groundwater were completed between June 1997 and June 2004, all of which are described and summarized in the Final RFI/RI Volume 2 (CH2M Hill 2009a). Since 2005, ongoing groundwater investigations have been conducted in accordance with the Monitoring Plan for Groundwater and Surface Water Monitoring Program (Arcadis 2008). The Topock Groundwater and Surface Water Monitoring Program was initiated in 1998 as a continuation of the RFI groundwater investigations and continues today to monitor the effectiveness of IM-3 and to verify that a landward gradient is maintained. Surface water and groundwater quality data are summarized in Hydrology and Water Quality, Sections 4.7.1.2 and 4.7.1.3, respectively.

The first investigation to assess concentrations of Cr(VI) and other COCs in groundwater at the compressor station, which was initiated and conducted under the RCRA Corrective Action Program, occurred in 1997. Beginning in the 1980s, a RCRA facility assessment identified solid waste management units (SWMUs) through investigations and remedial activities. Closure activities began in 1988 for some SWMUs and other hazardous waste management facilities identified in Part A of the RCRA permit application submitted in 1980. As a result of the terms of the Corrective Action Consent Agreement (CACA) entered into by PG&E and DTSC in 1996, subsequent investigation and remedial action included groundwater well installation; sampling and monitoring of soil, sediment, groundwater, and surface water; and initiation of interim remediation measures at the site, among other activities. The CACA is a voluntary agreement between DTSC, as the lead regulatory agency, and PG&E, as the responsible party, in which PG&E commits to investigate the nature and extent of contamination at and surrounding the site, and to take appropriate corrective action. Based on findings from investigations and/or identified data gaps, DTSC is authorized under the CACA to issue directives to PG&E for additional work.

4.6.1.1 Hazardous Materials and Wastes at the Compressor Station

Hazardous materials have been used and hazardous wastes have been generated at the compressor station since it became operational in 1951 (refer to Chapter 2). As a result of routine use, handling, and spills or releases from existing and former processing units, pipes, or land disposal areas, hazardous materials also have been found in media (groundwater or soil), both on-site and in the project area.

The hazardous materials and wastes fall into three main categories:

- Groundwater contamination of Cr(VI) associated with historic chromium use as a cooling water additive and blowdown or discharge of chromium-bearing water;

- Operations-related chemicals and wastes resulting from the historic and current compressor station operations; and

- IM-3 chemicals and treatment process related wastes—chemicals used and waste products resulting from the operations of the IM-3 Facility.

These hazardous materials and wastes are discussed in the following sections.

Groundwater Contamination

The principal constituents of concern (COCs) in groundwater at the site are Cr(VI) and Cr(T), which are the result of past wastewater disposal practices in Bat Cave Wash and as identified in the East Ravine. Nearly all of the Cr(VI) releases to alluvial groundwater at the site are believed to have occurred during the period between 1951 to 1964 when untreated wastewater from the compressor station was discharged to Bat Cave Wash (CH2M Hill 2009b:2-10, included in Appendix CMS of this EIR). Chromium is a chemical found in air, soil, water, and food. There are two common forms of chromium: trivalent chromium [Cr(III)], which is considered an important mineral needed in small amounts for health human growth, and Cr(VI), which is considered harmful to human health at elevated concentrations and under certain exposure conditions. DTSC considers that Cr(VI) has carcinogenic health effects via the inhalation and ingestion pathways and noncarcinogenic heath effects via the ingestion pathway. For the proposed project, the health effects via the ingestion pathway are applicable and the estimated non-carcinogenic hazard is driven largely by Cr(VI) (Arcadis 2009:ES-17). Selenium, molybdenum, and nitrate were found during the groundwater risk assessment at concentrations that contribute to a hazard quotient greater than 1 at localized areas within the plume (CH2M Hill 2009b:2-9, included in Appendix CMS of this EIR).

From 1951 through 1985, PG&E added chromium to the water circulating in the cooling towers at the compressor station to inhibit corrosion, minimize scale, and control biological growth that affected the mechanical equipment. From 1951 to 1964, untreated wastewater (also known as “blowdown”) containing Cr(VI) was discharged directly to Bat Cave Wash, a natural wash located adjacent to the western boundary of the compressor station. During this period, an area of groundwater contaminated with Cr(VI), known as a plume, began to form. Beginning in 1964, PG&E began to treat the wastewater to convert Cr(VI) to trivalent chromium [Cr(III)]. Cr(III) is essentially insoluble and tends to bind to soil, so is not as easily transported to groundwater. In approximately 1964, PG&E constructed a percolation bed in the wash by creating soil berms that impounded the discharged wastewater and allowed it to percolate into the ground and/or evaporate (CH2M Hill 2007a:3-18 and 4-3). In 1969, PG&E began treating the wastewater using a two-step process that converted Cr(VI) to Cr(III) and then removed the Cr(III).

Beginning in May 1970, wastewater discharges to Bat Cave Wash ceased, and treated wastewater was discharged to an injection well located on PG&E property, known as PGE-8. The well facilitated the injection of the treated wastewater into the subsurface at depths in excess of 405 feet below ground surface. In 1973, PG&E discontinued use of injection well PGE-8, and wastewater was discharged exclusively to a set of four, single-lined evaporation ponds located about 1,600 feet west of the compressor station.

PG&E replaced the Cr(VI)-based cooling water treatment products with nonhazardous phosphate-based products in 1985, at which time PG&E discontinued operation of the wastewater treatment system. Use of the four, single-lined evaporation ponds continued from 1985 to 1989. In 1989, the single-lined ponds were replaced with four new, Class II (double-lined) ponds. The wastewater treatment system and the single-lined ponds were physically removed and closed between 1988 and 1993. The four, Class II double-lined ponds are still in use. The disposal of wastewater from ongoing operations at the compressor station is regulated by the State of California’s Colorado River Basin Regional Water Quality Control Board (RWQCB), a department under the California Environmental Protection Agency (Cal/EPA).

The Cr(VI) groundwater plume has been defined as chromium-bearing groundwater exceeding a regional background (or naturally occurring) value of 32 micrograms per liter (μg/l), or 32 parts per billion (ppb). Plume interior concentrations exceed 1,000 μg/l in the shallow and mid-depth zones and exceed 10,000 μg/l in the deep zone; the maximum Cr(VI) concentration is 15,700 μg/l (CH2M Hill 2009b:Figures 2-10, 2-11, and 2-12, included in Appendix CMS of this EIR); groundwater impacts are summarized in Section 4.7.1.3. Based on testing data to date, the majority of the Cr(VI) plume resides predominantly in the more permeable alluvial/fluvial deposits, with the southernmost portion extending into an area of less permeable bedrock known as the East Ravine (Exhibits 4.7-10 through 4.7-12). The contaminated groundwater plume underlies an area of approximately 175 acres (CH2M Hill 2009b:2-1 and 2-11, included in Appendix CMS of this EIR) and extends approximately 2,800 feet down gradient of the former cooling water disposal area in Bat Cave Wash toward the Colorado River, which is adjacent to and east of the contaminated groundwater plume (Exhibit 3-3). The thickness of the plume varies from approximately 50 to over 150 feet (CH2M Hill 2009b:2-11, included in Appendix CMS of this EIR). Extensive monitoring efforts indicate that the contaminated groundwater plume is not discharging into the Colorado River.

Section 4.7, "Hydrology and Water Quality," provides information on the hydrologic (surface water and groundwater) setting and summarizes water quality data that has been collected over the assessment history. The plume extent and groundwater sample locations are shown on Exhibits 4.7-10, 4.7-11, and 4.7-12. Cr(VI) or hexavalent chromium is the primary contaminant of concern in the project area, and the proposed project focuses on Cr(VI) remediation to reduce impacts on potential receptors and to restore groundwater quality. Plume interior concentrations will require decreases of 1 to 2 orders of magnitude to reach background levels. In addition to Cr(VI), groundwater in certain areas and depths within the project area has been identified to contain contaminants including molybdenum, selenium, and nitrate. These substances have been detected at elevated concentrations in localized areas at select monitoring wells and may be related to site operations. However, due to the relatively limited sampling data and lower risks compared with Cr(VI) at this site, these substances would be further monitored through performance groundwater sampling throughout the remedy. Furthermore, it is anticipated that molybdenum, selenium and nitrate will be cleaned up with any of the remedial alternatives proposed by PG&E. Because molybendum, selenium, and nitrate are dissolved chemicals subject to the same process used to treat the Cr(VI) and the localized areas of impact lie within the chromium plume, these COCs would likely be treated concurrent with the Cr(VI) treatment. Table 4.6-1 summarizes the concentrations of these metals in groundwater over the period from July 1997 through September 2008 (CH2M Hill 2009a).

Table 4.6-1
Summary of COPCs in Groundwater Plume, July 1997 through September 2008

Metal	Maximum Concentration	Percentage of Samples Exceeding Background	Applicable Water Quality Standard – Most Stringent
Hexavalent Chromium	15,700 μg/L	38.3%	Not assigned
Molybdenum	301 μg/L	24.9%	Not assigned
Selenium	155 μg/L	11.1%	50 μg/L
Nitrate (as Nitrogen)	32 mg/L	Not Calculated	10 mg/L

Source: CH2M Hill 2009a: Tables 6-6 and 6-8

Operations-Related Materials and Wastes

In addition to the historic use of chromium for compressor station operations, other chemicals have been or are currently used for operation. Volume 1 of the RI/RFI provides a summary of the chemical products usage and water management for the compressor station and is the source of the hazardous materials and waste summary provided below (CH2M Hill 2007a: Table 3-1 and 3-2).

Historic hazardous materials and wastes generated at the compressor station include, but are not limited to:

- molybdenum-based water treatment chemicals, used from 1985 to 2006, in closed-loop cooling systems with wastes transferred to the single-lined evaporation ponds until 1989 and to double lined ponds from 1989 to 2006;

- sulfuric acid that resulted in sulfuric acid sludge, generated in 1984 and disposed of off-site at a Class 1 Facility;

- gasoline and diesel fuels, paint and paint-related materials, to waste oil storage tank or removed in an oil-water separator from treated waste water streams. The treated water discharged to Bat Cave Wash from 1951 to 1970, injected into PGE-08 1970 to 1973, and to single-lined evaporation ponds from 1971 to 1989.

Chromium hydroxide sludge generated during waste water treatment processes was generated between approximately 1969 and 1983. This sludge was first transferred to the sludge drying beds for dehydration prior to disposal. In 1970, the Regional Water Quality Control Board issued Order 70-73 specifying the disposal requirements for the chromium hydroxide sludge at the Needles Landfill. No specific documentation exists for 1971 and 1972; PG&E records indicate 166500 gallons of sludge were disposed at Needles Landfill between 1973 and 1983. No sludge was sent after 1983 based on California Department of Health Services directives (CH2M Hill 2007a:3-19 and 3-20).Current hazardous materials and wastes generated at the compressor station include, but are not limited to:

- waste oils, transported off-site for recycling;

- gasoline and diesel fuels, paint and paint-related materials, contained in waste oil tanks for disposal since 1989 or removed in an oil-water separator from treated waste water streams. The treated water discharged to double-lined evaporation ponds; and

- polychlorinated biphenyls (PCBs) previously contained in some compressor condensates, transported off-site as PCB-containing material if concentration >5 ppm, if <5 ppm removed with waste oil stream.

- A potentially hazardous waste consists of phosphate-based corrosion inhibitors, biocides containing sodium hypochlorite and sodium bromide, used from 1985 to 1989 and transferred to the double-lined evaporation ponds.

According to 2009 hazardous waste tracking reports compiled by DTSC, the compressor station generated approximately 49,591 pounds of hazardous waste (DTSC 2010a, 2010b). The largest volume waste streams are listed below:

- used oil—5,700 pounds,
- other inorganic solids—42 pounds (landfill disposal),
- other organic solids – 33,720 pounds (landfill disposal),
- contaminated soils – 8,460 pounds (landfill disposal),
- unspecified sludge waste—1,629 pounds (landfill disposal), and
- PCBs/materials containing PCBs—40 pounds.

Those hazardous wastes identified above are either sent to the permitted Chemical Waste Management landfill in Kettleman Hills, California (the Kettleman Hills landfill), or to various other appropriately permitted outlets for recycling, treatment, or disposal (CH2M Hill 2005:12-1 and 12-2).

Various intrafacility pipelines have been used or are currently in use in the compressor station for in-plant transfers of materials and waste streams. These pipelines were or are involved in the transfer of liquids associated with the cooling towers, evaporation ponds, injection well, groundwater and the treatment system, stormwater management, cooling tower blowdown treatment system, oil/water separator, and transfer sumps. These in-plant pipe sections include both aboveground and belowground sections typically made of polyethylene, polyvinyl chloride, aluminum, cast iron, coated steel, or vitrified clay. Some portions were removed at the time of closure of the connected process unit (i.e., Area of Concern [AOC] 18)[1]; however, other pipe sections are still in use (CH2M

[1] AOC 18 includes pipelines that were used to connect the cooling towers to the wastewater system including SWMUs 1 (Former Percolation Bed), 2 (Inactive Injection Well PGE-08), 5 (Sludge Drying Beds), 6 (Chromate Reduction Tank), 7 (Precipitation Tank), 8 (Process Pump Tank), 9 (Transfer Sump), and 10 (Old Evaporation Ponds) and Units 4.3 (Oil/Water Holding Tank), 4.4 (Oil/Water Separator), and 4.5 (Portable Waste Oil Storage Tank). Several of these pipelines were removed at the time of the closure of the hazardous waste management system, although some may still be in active use. There is limited information regarding these pipelines.

Hill 2007a, 2007b). Because hazardous materials have been or continue to be distributed through these pipelines, there is the potential for hazardous materials to have impacted soils in the project area.

In addition to the above materials and wastes, naturally occurring hazardous materials may be present in pipeline liquids. Radon 222 (Rn-222) is a radioactive gas that may be present in some natural gas formations and as a result may be present at the project site in collected pipeline liquids. Products of the radioactive decay may include polonium-210 (Po-210) and lead-210 (Pb-210) both of which are solids. Although Rn-222, Po-210, and Pb-210 may be present in pipeline liquids, pipeline liquids have not been placed in the on-site water treatment system. Prior to 1975, pipeline liquids may have been sprayed on station roads and unpaved areas for dust control. After 1975, pipeline liquids and waste oil were transported offsite for recycling (CH2M Hill 2007a).

Hazardous Materials and Wastes Related to the IM-3 Groundwater Extraction System

In addition to those historical and current operations at the compressor station, DTSC has directed PG&E to take actions, which include operation of the existing IM-3 Facility, to treat the contaminated groundwater plume. Operations of the IM-3 Facility produce two primary residual waste streams:

(1) Chromium reduction treatment system waste solids, or sludge, is created during the treatment process to precipitate the dissolved chromium [Cr(VI) and Cr(T)] from the extracted groundwater. This sludge is considered a hazardous waste due to its toxicity, and is disposed off-site in a hazardous waste disposal facility. The chromium reduction process at IM-3 utilizes iron added as ferrous chloride and hydrochloric acid to facilitate the reduction of Cr(VI) to Cr(III) and sodium hydroxide to maintain the appropriate pH necessary to drive the precipitation of the Cr(III) and Fe(III) as solids, thus removing these metals from the extracted groundwater within the clarifier stage of the IM-3 system (CH2M Hill 2006: 3-1 through 3-3). Ferrous chloride is a designated hazardous material and is a strong corrosive. Sodium hydroxide and hydrochloric acid are strong corrosives that have severe health effects at high concentrations. The reduction process generates the chromium-enriched sludge that is a hazardous material due to the toxicity resulting from the high concentrations of metals. The IM-3 Facility generated 201,470 pounds of hazardous waste in 2007. The great majority of the hazardous waste (200,763 pounds) was chromium-enriched sludge generated during the groundwater treatment process, which is sent as accumulated for disposal at the Kettleman Hills landfill.

(2) The reverse osmosis treatment is used to remove the naturally occurring total dissolved solids (TDS) in the extracted groundwater so that it may be reinjected after Cr(VI) removal (CH2M Hill 2006). The reverse osmosis process produces nonhazardous waste brine water. This brine water is placed in on-site tanks and then trucked to Phoenix, Arizona for off-site treatment and disposal. The present volume of brine waste is approximately 1.5 million gallons per year, or over 241 truck shipments per year (Doss, pers. comm., 2010a).

Areas of Potential Soil Contamination Identified

SWMUs and areas of concern (AOCs) are areas where hazardous contaminants may be present in the soils. To date, 14 SWMUs, 20 AOCs, and 2 undesignated areas have been identified in the project area as a result of investigation activities conducted under the CACA or in subsequent DTSC directives. The two undesignated areas were a potential pipe disposal area and a former pipeline liquids tank. The RCRA corrective action and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) closure processes have been completed at six SWMUs [SWMUs 2 (soils only), 3, 4, 7, and 10 and Unit 4.6] and two AOCs (AOC-2 and AOC-3) (Arcadis 2008). Additional investigation is required for the remaining SWMUs and AOCs, as well as for the undesignated areas.

A summary of the locations of the SWMUs, and AOCs, and the potential contaminants that may be associated with these areas is provided in Section 4.5.1.5. Exhibits 4.5-6, 4.5.-7, and 4.5-8 show the locations of the SWMUs and AOCs.

The distribution of contaminants in soils within the project area has not been fully determined. Work plans for two separate soil investigations that are intended to evaluate the nature and extent of chemicals of potential concern (COPCs) in soil have been submitted to DTSC for review and comment[2]. DTSC provided conditional approval of the RFI/RI Soil Investigation Work Plan Part A on August 10, 2007. The results from investigations conducted under this work plan will be provided in Volume 3 of the comprehensive RFI/RI report, which is anticipated to be completed in late 2012 or early 2013. Because the extent of soils impacts is yet to be fully characterized, the remedial alternatives are unknown at this time. Investigation of soil contamination associated with compressor station operations is still ongoing and reports of results are forthcoming. This includes soils data already collected as part of the conditionally approved Part A Work Plan which focused on areas outside the compressor station fence line. Evaluation of the Part A data (anticipated in summer 2010) will result in updated characterization of AOCs and will likely result in further soil characterization. Part B soil characterization (focusing on areas within compressor station fence line) is planned for 2011. Current soils status is discussed in Section 4.5.1.5. The impacts analysis focuses on groundwater remediation and the cumulative impacts analysis examines soil remediation in a more conceptual manner.

On August 16, 2005, PG&E reported a release of 1,000 gallons of nonhazardous wastewater from the compressor station including cooling tower blowdown into Bat Cave Wash (CH2M Hill 2007a:3-32). Section 3.1.8 of the Resource Conservation and Recovery Act (RCRA) facility investigation/remedial investigation (RFI/RI), Volume 1 (CH2M Hill 2007a: Table 3-5 and Figure 3-7) identifies a number of other incidental releases at the project site that should similarly be considered potential RECs pending the results of soil sampling. Refer to Section 4.5.1.5 for additional information on sources of soils impacts and investigation status.

4.6.1.2 HAZARDOUS MATERIALS AND WASTES RELATED TO OTHER USES WITHIN OR NEAR THE PROJECT AREA

The project area is crossed by several underground natural gas pipelines: two main natural gas pipelines (Line 300A and Line 300B) operated by PG&E and four other pipelines in the area operated by other gas companies, including El Paso Natural Gas Company and Transwestern Gas Pipeline Company. These pipelines extend in an east to west direction on both the north and south sides of the compressor station, with another pipeline routing east of the compressor station oriented southeast to northwest before directing to the west near the Burlington Northern and Santa Fe Railway (BNSF) tracks (See Exhibit 4.5-6).

Major transportation corridors located near the site include Interstate 40 (I-40) and the BNSF. I-40 crosses the Colorado River and runs in an east and west direction to the north of the compressor station and south of the IM-3 Facility. U.S. Highway 95 (U.S. 95) partially runs coincident with I-40 and represents a separate route west of the compressor station. The BNSF crosses the Colorado River and extends westerly and then northerly toward the city of Needles west of Moabi Regional Park (Exhibit 4.5-2).

Along with transportation and gas infrastructure, there is evidence of numerous commercial activities in this area, on both sides of the Colorado River. For example, a restaurant and a gas station (now demolished) were located on the California side of the Colorado River along National Trails Highway north of the PG&E compressor station. A rock quarry operation (now inactive) was also located nearby. Further, there are anecdotal stories/accounts of past military-related operations in areas north of the Compressor Station. There is also evidence of past and present commercial activities on the Arizona side of the river. Any activities associated with the construction, usage, maintenance, and/or operation of such infrastructures could be potential sources of contamination to soils within the Project area.

[2] Two work plans, Part A and Part B, are being prepared to describe collection of additional soil data to complete site characterization activities at the SWMUs, AOCs, and other undesignated areas identified in the Revised Final RFI/RI Volume 1. Investigation areas outside the compressor station fence line are addressed in Part A (CH2M HILL 2006a). Investigation areas within the compressor station fence line are addressed in Part B.

4.6.1.3 HAZARDOUS WASTE FACILITIES/PROPERTIES IDENTIFIED ON CORTESE LIST

According to an environmental database report ordered for this EIR, prepared by Environmental Data Resources, Inc. (EDR) and dated December 8, 2008, two sites appearing on the Cortese list are identified as being located in the project area: (1) the PG&E Topock Compressor Station itself, and (2) the San Bernardino County Moabi Regional Park recreational facility, located about 0.25 miles east-northeast of the compressor station. This facility is listed in the EDR report on the leaking underground storage tank (LUST) database as having had a release of gasoline. The leak initially was reported on May 28, 1987 (EDR 2008). According to the GeoTracker[3] database, the release involved gasoline that impacted soil only (not groundwater). The case was closed in August 2006.

The Cortese List is compiled by the DTSC in accordance with California Government Code Section 65962.5 and includes the following:

- all hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code;
- all land designated as hazardous waste property or border zone property pursuant to Article 11 of Chapter 6.5 of Division 20 of the Health and Safety Code;
- all information received by the DTSC pursuant to Section 25242 of the Health and Safety Code on hazardous waste disposals on public land;
- all sites listed pursuant to Section 25356 of the Health and Safety Code; and,
- all sites included in the Abandoned Site Assessment Program. (www.calepa.ca.gov/SiteCleanup/CorteseList/Background.htm) The compressor station is listed as a hazardous waste facility subject to corrective action.

The compressor station is listed in the EDR Report on multiple databases. The significant listings associated with the Site appeared on the following databases:

- CA LDS (California Land Disposal Sites)–this list identifies sites under the Land Disposal program for waste discharges to land for treatment, storage and disposal in waste management units.
- CHMIRS–(California Hazardous Material Incident Reporting System)–this list contains information on reported hazardous material incidents (accidental releases or spills).
- ENVIROSTOR–this list is prepared by the DTSC's Site Mitigation and Brownfields Reuse Program and identifies sites that have known contamination or sites for which further investigation may be required.

Air Emissions Associated with Hazardous Materials/Wastes in Project Area

A review of the Toxic Release Inventory System[4] (TRIS) database revealed that air emissions involving releases of hazardous materials and/or wastes in the project area have not been reported.

---

[3] GeoTracker is a database and geographic information system (GIS) that provides online access to environmental data. It tracks regulatory data about leaking underground fuel tanks, Department of Defense sites, Spills-Leaks-Investigations-Cleanups sites, and landfill sites. The database also contains information about public drinking water wells. GeoTracker uses commercially available software to allow users to access data over the Internet.

[4] The TRIS database is a publicly available EPA database that contains information on toxic chemical releases and waste management activities reported annually by certain private industries as well as federal facilities.

4.6.2 Regulatory Background

The proposed project would be subject to compliance with all applicable statutory and regulatory requirements related to avoidance and minimization of hazards and hazardous materials/wastes to health, safety, and the environment (see Section 2.3). The regulations, for example, are designed to limit the risk of upset during the use, transport, handling, storage, and disposal of hazardous materials. The applicable federal, state, and local requirements are summarized below.

The on-site portions of remedial actions taken under CERCLA authority must also meet the substantive provisions of promulgated requirements that are applicable or relevant and appropriate to the actions (ARARs). Criteria, guidance, advisories, and proposed standards that are not legally binding are not ARARs, but may be considered and used as appropriate to ensure the protectiveness of the remedy. These are referred to as "To Be Considered" criteria (TBCs). DOI, as the lead agency for remedial actions taken under CERCLA authority, has established a list of ARARs and TBCs for the site, which is presented in the Final CMS/FS (CH2M Hill 2009b:3-3 through 3-6 and Appendix B, included in Appendix CMS of this EIR).

4.6.2.1 Federal Plans, Policies, Regulations, and Laws

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) established a regulatory system to track hazardous wastes from the time of generation to final disposal, also known as "cradle to grave." The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous wastes. RCRA's provisions give state regulatory agencies authority to regulate solid and hazardous wastes. In California, the DTSC is authorized to implement the RCRA in lieu of the U.S Environmental Protection Agency (EPA).

Hazardous waste management equipment used and hazardous waste generated during operation of the proposed project would be required to comply with all applicable hazardous waste laws and regulations, including RCRA, a federal statute passed in 1976. The goal of RCRA is to protect human health and the environment, reduce waste, conserve energy and natural resources, and eliminate generation of hazardous waste as expeditiously as possible. The Hazardous and Solid Waste Amendments (HSWA) of 1984 significantly expanded the scope of RCRA by adding new corrective action requirements, land disposal restrictions, and technical requirements. HSWA also provided for more oversight by EPA, related to the investigation and corrective action within certain facilities where hazardous materials may have been discharged. The corresponding regulations in Title 40 of the Code of Federal Regulations (CFR), Parts 260 through 279, provide the general framework for managing hazardous waste including requirements for entities that generate, store, transport, treat, and dispose of hazardous waste.

Wastes generated both during facility operations and during assessment activities and remedial actions must be classified as either nonhazardous or hazardous waste, based on specific criteria, and must then be transported and disposed of in accordance with the classification. Transportation requirements for hazardous wastes include packaging for transport, generating a manifest, and displaying the placard required by the hazardous materials transportation regulations in 49 CFR Part 172, Subpart F.

Comprehensive Environmental Response, Compensation, and Liability Act

The CERCLA authorizes EPA to respond directly to releases of hazardous substances that could endanger public health or the environment. CERCLA directs the EPA to list national priorities among the known "releases or threatened releases" of hazardous substances. CERCLA requires that remedial alternatives attain ARARs unless they are waived. ARARs consist of regulations, standards, criteria, or limitations promulgated under federal or more stringent state laws. ARARs are classified as chemical-specific, location-specific, or action-specific.

Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a remediation goal. Location-specific ARARs are restrictions on the concentrations of hazardous substances or the conduct of activities because of the characteristics of the site or its immediate environment. Action-specific ARARs specify how a remedial alternative must be achieved. They are generally technology- or activity-based requirements or limitations, and apply to specific remedial approaches rather than to a site.

CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. During a 5-year period, $1.6 billion was collected and sent to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party could be identified. Fund-financed cleanup actions can only be conducted at sites listed on EPA's National Priorities List. The National Priorities List provides information about the existence of known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The list is intended primarily to guide EPA in determining which sites warrant further investigation.

U.S. Department of Transportation Hazardous Materials Regulations (Title 49 CFR Parts 100–185)

The U.S. Department of Transportation (DOT) Hazardous Materials Regulations cover all aspects of hazardous materials packaging, handling, and transportation. Parts 173 ("Packaging Requirements"), 177 ("Highway Transportation"), 178 ("Packaging Specifications"), and 180 ("Packaging Maintenance") would apply to the proposed project activities. Additional potentially applicable parts include Part 171 ("General Information, Regulations and Definitions") and Part 172 ("Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans").

Under DOT regulations, a hazardous material is "a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under section 5103 of Federal hazardous materials transportation law (49 U.S. Code 5103)." The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, and materials designated as hazardous in the Hazardous Materials Table (49 CFR 172.101). DOT classifies hazardous materials into nine primary classes: explosives, gases, flammable liquids, other flammable substances, oxidizing substances and organic peroxides, toxic (poisonous) and infectious substances, radioactive materials, corrosives, and miscellaneous dangerous goods. Some have subclasses. For example, compressed gases are divided into subclasses for flammable, nonflammable, and poison gases. The Hazardous Materials Transportation Act requires that carriers report accidental releases of hazardous materials to the DOT at the earliest practical moment.

Emergency Planning and Community Right-to-Know Act (42 U.S. Code 11001 et seq.)

Also known as Title III of the Superfund Amendments and Reauthorization Act, the Emergency Planning and Community Right-to-Know Act (EPCRA) was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety, and the environment from chemical hazards. To implement EPCRA, Congress required each state to appoint a State Emergency Response Commission (SERC). SERCs are required to divide their states into Emergency Planning Districts and to name a Local Emergency Planning Committee for each district. EPCRA provides requirements for emergency release notification, chemical inventory reporting, and toxic release inventories for facilities that handle chemicals.

4.6.2.2 State Plans, Policies, Regulations, and Laws

Hazardous Waste Control Law (California Health and Safety Code, Division 20, Chapter 6.5)

This statute is the basic hazardous waste law for California. The Hazardous Waste Control Law implements the federal RCRA “cradle-to-grave” waste management system in California, although this program regulates more materials as hazardous wastes than the federal program. California hazardous waste regulations can be found in the CCR Title 22, Division 4.5, “Environmental Health Standards for the Management of Hazardous Wastes.” The program is administered by DTSC.

Hazardous Material Release Response Plans and Inventory Law (California Health and Safety Code, Division 20, Chapter 6.95)

This state law requires businesses to disclose the hazardous materials used in their businesses and to develop a Hazardous Material Management Plan or a “business plan” for hazardous materials emergencies if they handle at any one time more than 500 pounds, 55 gallons, or 200 cubic feet of hazardous materials. The business plan includes an inventory of all hazardous materials stored or handled at the facility above these thresholds. This law is designed to reduce the occurrence and severity of hazardous material releases and to promote emergency response preparedness by local agencies. The Hazardous Materials Management Plan must be submitted to the Certified Unified Program Agency (CUPA), which for the project vicinity is the San Bernardino County Fire Department, Hazardous Materials Division. The state has integrated the federal EPCRA reporting requirements into this law; once a facility is in compliance with the local administering agency requirements, submittals to other agencies are not required. The Hazardous Material Management Plan also defines response procedures and equipment for spills or releases of hazardous materials.

Cortese List (California Government Code, Section 65962.5)

The Hazardous Waste and Substances Sites List (Cortese List) is a planning document used by the state, local agencies, and developers to comply with requirements in providing information about the location of hazardous materials release sites. Government Code Section 65962.5 requires the California Environmental Protection Agency to develop at least annually an updated Cortese List. DTSC is responsible for a portion of the information contained in the Cortese List, as are other state and local government agencies. The Cortese list documents active and inactive landfills, underground pipelines, federal and state hazardous waste sites, LUST sites, and solid waste disposal facilities with known migration of hazardous waste.

California Emergency Services Act

The California Emergency Services Act provides the basic authority for conducting emergency operations following a proclamation of emergency by the governor and/or appropriate local authorities. Local government and district emergency plans are considered to be extensions of the California Emergency Plan, established in accordance with the Emergency Services Act.

4.6.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

San Bernardino County Fire Department, Hazardous Materials Division

The purpose of the Hazardous Materials Division (HMD) is to protect the health and safety of the public and the environment of San Bernardino County by assuring that hazardous materials are properly handled and stored. HMD accomplishes this through inspection, emergency response, site remediation, and hazardous waste management services. An overview of these services is provided below.

- Inspections: HMD inspects hazardous material handlers and hazardous waste generators to ensure full compliance with laws and regulations. HMD also implements CUPA programs for the development of accident prevention and emergency plans, proper installation, monitoring, and closure of underground tanks and for the handling, storage, transportation, and disposal of hazardous wastes.

- Emergency Response: HMD provides 24-hour response to emergency incidents involving hazardous materials or wastes to protect the public and the environment from accidental releases and illegal activities.

- Investigation/Remediation Oversight: HMD oversees the investigation and remediation of environmental contamination caused by releases from underground storage tanks, hazardous waste containers, chemical processes, or the transportation of hazardous materials. However in cases where a site such as the PG&E Topock Compressor Station was previously subject to DTSC oversight due to hazardous waste treatment, disposal, or other activities, DTSC usually continues to oversee the cleanup and remediation activities.

- Enforcement Actions: HMD conducts investigations and takes enforcement action as necessary against anyone who disposes of hazardous waste illegally or otherwise manages hazardous materials or wastes in violation of federal, state, or local laws and regulations.

San Bernardino County Hazardous Waste Management Plan

California Assembly Bill 2948 authorized counties to prepare hazardous waste management plans, designed to serve as the primary planning document for the management of hazardous waste within the counties. The *San Bernardino County Hazardous Waste Management Plan* identifies the types and amounts of wastes generated in the county; establishes programs for managing these wastes; identifies an application process for the siting of specified hazardous waste facilities; identifies mechanisms for reducing the amount of waste generated in the county; and identifies goals, policies, and actions for achieving effective hazardous waste management.

4.6.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.6.3.1 ANALYSIS METHODOLOGY

The potential hazards to the public or the environment from routine exposures to hazardous materials or reasonably foreseeable upset and accident conditions as a result of the proposed project are evaluated by addressing the potential for exposure to hazardous materials with respect to federal, state, and/or San Bernardino County requirements. Additionally, impacts and mitigation measures are evaluated according to general terms and conditions pertaining to implementation of remediation strategies established by PG&E in its agreements with surrounding landowners.

4.6.3.2 THRESHOLDS OF SIGNIFICANCE

Based on the CEQA Guidelines and the Safety Element of the County General Plan, the proposed project would have a significant impact related to hazardous materials if it would:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;

- create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

- be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code 65962.5, and as a result, would create a significant hazard to the public;

- emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing school;

- for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport, public use airport, or private airstrip, would the project result in a safety hazard for people residing or working in the project area;
- impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

The purpose of the proposed project is to evaluate and implement a remedial alternative that would, over time, remediate groundwater contamination at the project site. In accordance with the Appendix G of the CEQA Guidelines, one of the considerations in an environmental evaluation is whether a project is located on a site that is included in a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and whether, as a result, it would create a significant hazard to the public or the environment. As indicated in Section 4.6.1, the compressor station is listed on a Cortese list. However, completion of the proposed project would result in the removal of the site from the Cortese database and the elimination of the significant hazard to the public or environment associated with the previous contamination remediated by the proposed project. Therefore, this significance threshold is not further discussed in this section.

The project area is not located within one-quarter mile of an existing or planned school and the proposed project would not result in hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or planned school. Therefore, no impact would occur related to hazards near existing or planned schools and this threshold is not considered further in this analysis.

A review of the County of San Bernardino Airports Web site (San Bernardino County Department of Airports 2007) and a recent aerial photograph of the project area revealed that the proposed project is not located within 2 miles of a public airport or public use airport. The nearest airport is the Needles Municipal Airport located approximately 8 miles southeast. The nearest private airport, Eagle Airpark, near Mojave City, Arizona is approximately 13 miles southeast. The criteria regarding airport safety that has been adopted in the comprehensive land use plan (CLUP) for the Needles Municipal Airport was reviewed to assess potential safety concerns pertaining to both the Needles Municipal Airport and the Eagle Airpark. The CLUP defines limitations to development within specified "Referral Areas" based on distance from the Needles Municipal Airport. The project area is not located within any specified Referral Areas of restricted development defined in the CLUP for either airport (San Bernardino County 1991). Because the project area is at least 8 miles from an airport, the project would not result in any increased safety hazards for people working in the project area and, therefore, no impact would occur.

Emergency response programs in the project area are sponsored by the local fire departments and the Mohave County Municipal Community Emergency Response Team (CERT). In addition to the basic Federal Emergency Management Agency CERT Training, Mohave County CERT members receive background training in emergency sheltering, mass decontamination, Emergency Operation Center support, and damage assessment activities. With regard to emergency response programs associated with the compressor station, several corporate programs have been developed and are used at PG&E facilities around the western United States to address issues associated with natural gas and storage of hazardous materials and wastes, such as petroleum products, that are common among all PG&E facilities (Russell, pers. comm., 2009). PG&E also has prepared a document titled *Hazardous Materials Business Plan for the Topock Compressor Station, Interstate 40 and Park Moabi Road, Needles, California*, dated March 2008 (PG&E 2008). This document discusses a variety of emergency response procedures to be followed that are specific to the compressor station, including those related to fire hazards, spills, flash floods, earthquakes, natural gas releases, respiratory hazards, and underground storage tank releases. The Hazardous Materials Business Plan contains an evacuation plan and procedures, including maps showing the locations of emergency exits, fire extinguishers, spill control equipment, and other areas of potential significance from an emergency response standpoint. Emergency coordinators have been assigned to ensure that the required activities described in the Hazardous Materials Business Plan [HMBP] (PG&E 2010) would be properly followed during an emergency at the compressor station. The HMBP includes emergency notification procedures, evacuation procedures, and emergency response procedures (PG&E, 2010: 4 though 8 and Attachments 1 and 4).

The proposed project would not adversely affect Interstate 40 and U.S. 95 other than adding a relatively small amount of additional vehicles related to project construction activities that would not degrade level of service on roadways or result in congestion at intersections, as described in Section 4.10 “Transportation and Traffic”, and would therefore not interfere with the designated evacuation routes defined in the *County of San Bernardino 2007 General Plan*. Therefore, impacts related to emergency response would not occur and are not considered further in this EIR.

The combination of several physical factors along the foothills of the San Bernardino Mountains exposes development and natural resources to potential disaster from wildland fires. The physical factors include topography, climate, vegetation, pathogen infestation, and human use and occupancy. Because the proposed project is not located in the foothills of the San Bernardino Mountains or in an area in which dense vegetation exists adjacent to developed areas, the proposed project site is not at risk from wildland fires. The proposed project is not located in or near an identified very high fire hazard severity zones (San Bernardino County 2005). Furthermore, the Colorado River forms a fire barrier to the nearest community of Golden Shores, Arizona. Therefore, no impact would occur related to the exposure of people or structures significant risk of loss, injury or death involving wildfires, and this threshold is not considered further in this analysis.

4.6.3.3 IMPACT ANALYSIS

IMPACT HAZ-1	Spills or Releases of Contaminants during Construction, Operation and Maintenance, and Decommissioning Activities from Routine Transport, Use, and Disposal of Hazardous Materials. *Operation and maintenance of the proposed project could result in the potential release of chemicals during use or delivery of chemicals as a result of component failure (e.g., valve, flange, or pipe), tank failure, or human error (e.g., tank overfilling). This would be a* **potentially significant** *impact.*

Construction, operation and maintenance, and decommissioning activities associated with the proposed project would result in generation of waste materials that may be determined to be hazardous waste, nonhazardous/designated waste, nonhazardous/inert, or other classification with specific management or disposal requirements. Wastes would be generated during well drilling, installation, and removal; and cleaning of contaminated equipment. Wastes generated at the site could include consumables such as filters, and equipment cleaning fluids.

Operation and maintenance activities associated with the proposed project would include the use of up to 240,000 gallons per year of a chemical (reducing agent) to remove Cr(VI) from the water. Chemicals at fixed treatment facilities would be stored and used inside secondary containment structures designed to minimize the likelihood of a release to the environment. In addition, chemical usage would be refined throughout the operations and maintenance phase as cleanup progresses. Specific details about the types and quantities of chemicals needed for the proposed project are not known with certainty at this time, and would be determined during the detailed design phase. Specific chemical types and usage rates may vary depending on the types and amount of infrastructure, lengths of operations and maintenance periods, and actual flow rates. Various other chemicals may be used in smaller volumes for the treatment system and for maintenance of the monitoring, injection and extraction wells, and treatment system and support equipment. These other chemicals could include cleaners, adhesives, paints or coatings, acids, caustics, gases, precipitants/coagulants, polymers, dispersants, inhibitors/ antiscaling chemicals, specialty chemicals, fuels, cement/bentonite grout materials, and additives. These chemicals could be released during use or delivery of the chemicals as a result of component failure (e.g., valve, flange, or pipe), tank failure, or human error (e.g., tank overfilling) (Doss, pers. comm., 2010b). Chemicals that may be used in the well maintenance program include descaling agents that are typically used in small quantities of gallons per well which are then purged and contained at the conclusion of the maintenance task.

Hazardous materials likely to be handled in the largest volumes would be reductant for the in situ systems (up to 240,000 gallons per year), chemicals for injection well maintenance, chemicals for treatment of freshwater and extracted groundwater containing Cr(VI). Hazardous wastes generated would potentially include soil cuttings and mud rotary well installation waste (drilling mud); and decommissioning rinse water. Investigation-derived waste materials that would likely be generated include groundwater, drill cuttings, and incidental trash. Wastewater generated during drilling, development, and testing activities could potentially be contaminated and would be stored in "roll off" bins (i.e., bins that can be transported off-site) or portable storage tanks up to 20,000 gallons in capacity with up to four such large storage tanks needed for each well. The number and size of staging areas and number of tanks and roll off bins would vary depending on how many wells are installed, the diameters and depths of the wells, the drilling method used, and how quickly construction would be required to proceed. Up to four 20,000 gallon tanks and four to six roll off bins could be required for large-diameter, deep wells.

Decommissioning activities would occur for the existing IM-3 Facility, as well as all other associated remediation facilities. It would include removal of the structure, treatment equipment, and associated tanks and facilities from the project area. The concrete foundation beneath the treatment plant would likely be removed. Imported fill or other appropriate materials would be spread over the area to establish final grade. Decommissioning of the existing IM-3 Facility as well as all other remediation facilities would require activities in several locations throughout the project area. Aboveground piping from the treatment plant to the injection well field would be removed and either reused or disposed of off-site as scrap material.

Eventual decommissioning of the proposed project would include removal of the exterior structure, decontamination and removal of interior treatment equipment, and removal of associated tanks and other facilities from the site. Treatment facility structures and equipment, such as storage tanks, pumps, process piping, conduit, reactors, instrumentation, electrical power supply, security, fencing, lights, electrical trays, concrete, and road surfacing, are assumed to be removed and either reused, sold for salvage value, and/or transported off-site to an appropriately permitted disposal facility. Equipment such as process pipes and tanks would be decontaminated as appropriate, by power washing or other appropriate means.

The specific hazards resulting from release or spill would depend on the material, its volume, and its location relative to site workers, the Colorado River, or stormwater systems. Some chemicals, such as acids and caustics, could present safety hazards as a result of direct contact with workers or the environment, either during normal use or resulting from a spill or release, (The use of acids or caustics would be limited to fixed treatment facilities where the chemicals would be stored and used inside secondary containment structures, minimizing the likelihood of a release to the environment) which could result in a **potentially significant** impact. **(Impact HAZ-1a)**

During construction and decommissioning of the proposed project, vehicles such as drilling rigs, and support vehicles would be used and refueled on-site. During refueling, spills or releases might occur. In addition, smaller oil spills might occur during maintenance of field equipment. The specific hazards resulting from such spills would depend on the volume and location of the spill or release in relation to site workers, the Colorado River, stormwater, or native soils. Nonetheless, spills and other types of release would present a **potentially significant** impact. **(Impact HAZ-1b)**

Waste management is governed by ARARs that have been identified for this project, as described in the Final CMS/FS (CH2M Hill 2009b, included in Appendix CMS of this EIR). These include federal hazardous waste regulations, California hazardous waste regulations and laws implemented by DTSC, and nonhazardous waste disposal restrictions from the California State Water Resources Control Board and Colorado River Basin RWQCB and the California Integrated Waste Management Board. The proposed project would comply with all ARARs related to the generation, handling, and disposal of wastes resulting from construction, operations and maintenance, and decommissioning activities. However, additional mitigation would be required to reduce these impacts. SOPs for handling the investigation derived wastes, the site-specific health and safety plan, and the HMBP will include procedures for waste generation, handling, and disposal consistent with the ARARs.

Mitigation Measure HAZ-1a: Spills or Releases of Contaminants during Operation and Maintenance Activities.

a. PG&E shall store, handle, and transport hazardous material in compliance with applicable local, state, and federal laws.

b. All chemical storage and loading areas shall be equipped with proper containment and spill response equipment. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response.

c. A project-specific HMBP, chemical standard operating procedure (SOP) protocols and contingency plans shall be developed to ensure that proper response procedures would be implemented in the event of spills or releases. Specifically, the HMBP and SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required personal protective equipment, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response. The field manager in charge of operations and maintenance activities shall be responsible for ensuring that these procedures are followed at all times.

Timing:	During operation and maintenance activities.
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	With mitigation, this impact would be reduced to a **less-than-significant** level because measures and plans would be in place to prevent spills of hazardous materials from occurring and to appropriately handle spills in the event that they occur on-site.

Mitigation Measure HAZ-1b: Spill or Release of Contaminants during Construction and Decommissioning Activities.

a. Fueling areas and maintenance areas would be supplied with proper secondary containment and spill response equipment.

b. PG&E shall develop fueling SOP protocols and a contingency plan that would be implemented at all fueling areas on-site. The SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required PPE, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. Potential measures include but are not limited to, fuel storage in bermed areas, performing vehicle maintenance in paved and bermed areas, and availability of spill kits for containment and cleanup of petroleum releases. The field manager in charge of construction and decommissioning activities shall be responsible for ensuring that these procedures are followed at all times.

c. PG&E shall comply with local, state, and federal regulations related to the bulk storage and management of fuels.

Timing:	During construction and decommissioning activities.
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.

Significance after Mitigation:	With mitigation, this impact would be reduced to a **less-than-significant** level because measures and plans would be in place to prevent spills or releases of hazardous materials from occurring and to appropriately handle spills in the event they occur on-site.

IMPACT HAZ-2 **Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil.** *Construction, operation and maintenance, and decommissioning activities associated with the proposed project could result in the generation of dust and the exposure of construction workers to airborne contaminants. Although the effects of contaminated dust are expected to be highly localized and remain on-site, the project could potentially expose construction workers to contaminated dust in areas where dust-disturbing activities would occur on contaminated soils. This would be a* ***potentially significant*** *impact.*

Construction, operation and maintenance, and decommissioning activities associated with the proposed project could result in the generation of dust and the exposure of construction workers to airborne contaminants determined to be in the soil of the project site or that further investigation may determine to be in the soil. Routes of exposure could include inhalation, ingestion, or dermal contact. Activities that could result in dust generation include drilling, grading and trenching activities; transfer of soil cuttings to containers; hauling of materials off-site; and vehicle traffic on unpaved roads. The dust generated from component activities would be expected to remain on-site because studies have shown that airborne soil reduces in concentration by about 90% within 100 meters downwind (Veranth 2004). Therefore, hazard impacts associated with contaminated airborne soils would be expected to be highly localized. Nonetheless, if construction workers are present in areas where contaminated soils become airborne, this would present a **potentially significant** impact. **(Impact HAZ-2)**

Mitigation Measure HAZ-2: Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil.

Before initiating ground-disturbing operations, a health and safety plan shall be developed and implemented by qualified environmental professionals to ensure health and safety precautions are being met. It is not possible to prepare the health and safety plan at this stage of the planning process because final construction plans and other design documents have not been finalized in sufficient detail. However, at a minimum, the health and safety plan shall include procedures to mitigate potential hazards, and such procedures shall include the use of PPE, measures that provide protection from physical hazards, measures that provide protection from chemical hazards that may be present at the site, decontamination procedures, and worker and health and safety monitoring criteria to be implemented during construction. The worker health and safety plan shall include protective measures and PPE that are specific to the conditions of concern and meet the requirements of the U.S. Occupational Safety and Health Administration's (OSHA's) construction safety requirements and Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). In accordance with OSHA requirements, appropriate training and recordkeeping shall also be a part of the health and safety program. The worker health and safety plan shall be certified by a Certified Industrial Hygienist in accordance with OSHA regulations. The worker health and safety plan shall be explained to the construction workers and all workers shall be required to sign the plan, which will be kept on the construction site at all times.

Worker safety training shall occur prior to initiation of ground disturbing activities. Training shall include the review of all health and safety measures and procedures. All workers and engineering inspectors at the site shall provide written acknowledgement that the soils management plan (discussed below), worker health and safety plan, and community health and safety plan were reviewed and training was received prior to commencement of construction activities.

The following are specific elements and directives that shall be included in the health and safety plan and implemented by PG&E during construction, operation and maintenance, and decommissioning of this project:

a. Vehicles traveling on unpaved roadways or surfaces would be directed to avoid traveling in areas where contaminated soils are known to be present; vehicle speeds shall be controlled (e.g., limited to 15 mph or slower) to limit generation of dust; measures, such as wetting of surfaces, will be employed to prevent dust generation by vehicular traffic or other dust-generating work activities.

b. Pre-mobilization planning shall occur during which the likelihood of encountering contaminated soils shall be reviewed along with the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place prior to implementing the field operations.

c. Should evidence of contaminated soil be identified during ground disturbing activities (e.g., noxious odors, discolored soil), work in this area will immediately cease until soil samples can be collected and analyzed for the presence of contaminants by the site supervisor or the site safety officer. Contaminated soil shall be managed and disposed of in accordance with a project-specific health and safety plan and soil management plan. The health and safety plan and soil management plan shall be approved by DTSC before beginning any ground disturbing activities. While the project is exempt from the requirements of the San Bernardino County Division of Environmental Health, the health and safety plan and soil management plan shall be prepared in general accordance with the substantive requirements of this agency.

d. In the event that drilling sites must be located within areas of suspected soil contamination, the appropriate PPE shall be worn by all personnel working in these areas and methods specified in the health and safety plan used to control the generation of dust. When working in these areas, personnel shall be required to follow all guidance presented in the site-specific health and safety plan and soil management plan. The site-specific health and safety plan shall include provisions for site control such as, but not limited to, delineation of the exclusion, contaminant reduction and support zones for each work area, decontamination procedures, and procedures for the handling of contaminated soils and other investigation derived wastes. Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils.

e. Personnel working at the site shall be trained in Hazardous Waste Operations.

f. All soil excavated and placed in roll-off bins or trucks for transportation off-site shall be covered with a tarp or rigid closure before transporting, and personnel working in the area shall be positioned upwind of the loading location.

Timing:	The health and safety plan and soil management plan shall be approved by DTSC prior to commencement of any ground disturbing activities. The health and safety plan and soil management plan shall be implemented during construction, operation and maintenance, and decommissioning activities that could have potential to disturb the ground surface.
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	Exposure to chemicals from excavated or disturbed soil would be **less than significant** after mitigation as the result of limiting generation of contaminated dust during work activities, reducing worker exposures to such soils through best management practices, and use of personal protective equipment.

4.7 HYDROLOGY AND WATER QUALITY

This section describes existing conditions contributing to the hydrology and water quality at the project site and surrounding area; describes relevant federal, state, regional, and local laws and regulations; and addresses the potential hydrology and water quality impacts of the proposed project. This section also discusses the beneficial uses of groundwater and the surface water (notably the Colorado River) at the project site and the surrounding area. The site soil erosivity (i.e., potential for soil erosion) is discussed in Section 4.5, “Geology and Soils,” including a limited discussion of potential impacts on water quality. Other impacts from groundwater remediation are discussed elsewhere (e.g., Section 4.6, “Hazards and Hazardous Materials”). Section 4.12, “Water Supply,” provides a full discussion of potential impacts related to groundwater and potential impacts on water supply.

This section also describes interim measures that have been implemented, along with potential future remedial activities to address the contaminated groundwater and protect the water quality of both groundwater and the Colorado River. Key inputs on site characteristics for this section were derived primarily from data and information presented in the following documents:

- *Final Report, RCRA Facility Investigation/Remedial Investigation Report: PG&E Topock Compressor Station, Needles, California, Volume 1 – Site Background and History* (CH2M Hill 2007);

- *RCRA Facility Investigation/Remedial Investigation Report: PG&E Topock Compressor Station, Needles, California, Volume 2 – Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigation* (CH2M Hill 2009a);

- *RCRA Facility Investigation/Remedial Investigation Report: PG&E Topock Compressor Station, Needles, California, Volume 2 Addendum – Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigation* (CH2M Hill 2009b); and

- *Human Health and Ecological Risk Assessment Work Plan: Topock Compressor Station, Needles, California* (ARCADIS 2008).

- *Human Health and Ecological Risk Assessment of Groundwater Impacted by Activities at Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1 and SWMU 2, Topock Compressor Station, Needles, California* (Arcadis 2009).

4.7.1 EXISTING SETTING

This section describes the physical characteristics and settings with regard to the water resources (including water quality) of the project area.

4.7.1.1 CLIMATE

The climate in the site vicinity is typical of low desert areas along the Colorado River, with hot summers and mild winter seasons. The nearest weather station, located approximately 6.3 miles upriver from the compressor station in the Havasu National Wildlife Refuge (HNWR), is operated by the U.S. Department of Interior, Bureau of Land Management (BLM). The closest National Weather Service station is at Needles Airport, approximately 7.5 miles northwest of the compressor station.

The average daily maximum temperature ranges from 63.8 °F in January to 108.6°F in July. The average daily maximum temperature exceeds 100°F during June, July, August, and September, and the temperature rarely drops below freezing. Based on the 30-year period of 1961–1990, average precipitation was 4.67 inches per year in Needles. Between 1950 and 1990, the maximum annual rainfall was 9.6 inches. In a typical year, rain primarily occurs during summer thunderstorms from July through early September or during winter from January to March. May and June are typically the driest months (CH2M Hill 2007:2-2).

The predominant wind direction in the site vicinity is south-southwest, with an average speed of 8.8 miles per hour. The second most predominant wind direction is north-northwest, with an average speed of 10.7 miles per hour. Wind direction and speed are more variable in the project area (Topock Compressor Station) and surrounding areas and are largely controlled by the local topography. PG&E personnel at the compressor station report the winds are predominantly to the southeast (CH2M Hill 2007:2-2).

4.7.1.2 SURFACE WATER

Local Surface Water Features

The project area is located in the California Regional Water Quality Control Board (RWQCB) Colorado River Basin, Region 7 in the East Colorado River Basin Planning Area. The East Colorado River Basin Planning Area is 200 miles long with a maximum width of 40 miles. It encompasses the eastern portion of San Bernardino, Riverside, and Imperial Counties and is bounded on the north by Nevada, on the east by the Colorado River, which generally forms the Arizona-California state line, on the south by Mexico, and on the west by the drainage division of the California streams and washes directly into a tributary to the Colorado River. The area is characterized by desert valleys and low mountains that are generally less than 4,000 feet above sea level. There are four hydrology units within the planning area.

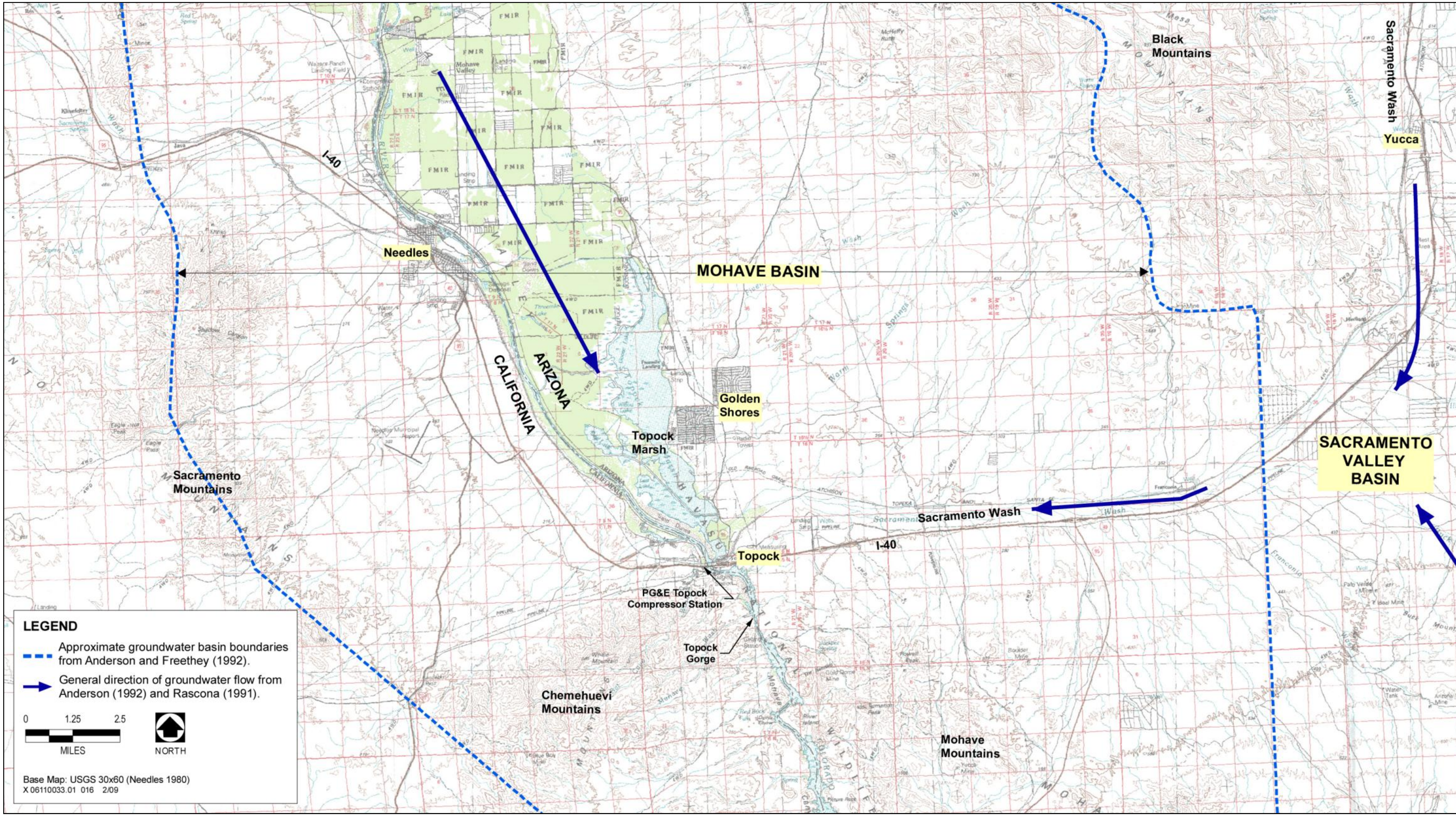
The primary surface water features in the project area are the Colorado River and its adjacent wetlands and marshes. Exhibit 4.7-1 shows the groundwater basins in the project area and geomorphic setting of the Colorado River and major drainages and surface water features in the region. The river system upstream from the project area is characterized by the wide Mohave Valley floodplain, marsh, and alluvial valley. Downstream from Topock, the river traverses the exposed bedrock of the Chemehuevi Mountains of California and the northern portion of the Mohave Mountains in Arizona. The river channel narrows in the area of the Topock Gorge, located approximately one-quarter of a mile south of the Interstate 40 (I-40) bridge.

The Colorado River channel ranges from approximately 600 to 700 feet wide in the area upstream from the I-40 bridge crossing at Topock and between approximately 300 and 500 feet wide in the Topock Gorge. According to the U.S. Bureau of Reclamation, when the river was profiled near the project site in 1994, the river channel was typically less than 9 feet deep with a maximum depth of 21 feet. The last major dredging in this area occurred in 1960 (Metzger and Loeltz 1973, cited in CH2M Hill 2009c:3-12 and CH2M Hill 2007:2-6).

In the project area as well as upstream in the Mohave Valley, a floodplain borders both sides of the Colorado River, although, because of upstream dams and flow regulation, the river no longer floods. Topography on the floodplain is subtle, with elevations typically less than 40 feet above the river elevation. The width of the floodplain adjacent to the project site averages 500 feet and narrows south of the site as the river enters the Topock Gorge, where the shoreline becomes consolidated Miocene- and pre-Tertiary-aged bedrock. Near the project site, the floodplains on both sides of the river are covered with sand dunes, which have been attributed to historical dredging activities.

There are two major surface drainages in the project area: the Sacramento Wash, an east-west dry wash, located on the Arizona side of the Colorado River, and Bat Cave Wash, a north-south dry wash (ephemeral stream) with its upper reaches located immediately adjacent to the compressor station on the west. Bat Cave Wash flows only briefly, following intense rainfall events, and drains northward to the Colorado River.

The 4,000-acre Topock Marsh, located across the Colorado River northeast of the project area and part of the Havasu National Wildlife Refuge, was created from a historical river meander in 1966 when the South Dike outlet structure was constructed. The marsh represents more than 40% of the remaining backwaters of the Colorado River. The aquatic and terrestrial habitats in the project area support fish, amphibians, reptiles, birds, and



Source: CH2M Hill 2009b:Figure 3-1, adapted by AECOM in 2009

Regional Surface Features **Exhibit 4.7-1**

mammals, including several threatened or endangered species (CH2M Hill 2007:ES-3). Water levels in the marsh are manipulated by closing and opening the gates at the South Dike outlet structure. Levels are increased during early spring to benefit nesting southwestern willow flycatcher and are slowly drawn down during fall to maximize the availability of submerged aquatic vegetation for water birds. Exhibit 4.7-2 shows more detailed surface water features in the project area, including the Park Moabi inlet/slough, dry wash drainages, and floodplain shoreline features.

Surface Water Flow Conditions

The flow of the Colorado River is dynamic, fluctuating seasonally and daily largely because of upstream flow regulations. The flow of the river in the project area is controlled primarily by water releases at Davis Dam on Lake Mohave, approximately 41 miles upstream. River levels in the area fluctuate by 2–3 feet per day and by approximately 5 feet seasonally, with the higher water levels occurring in late spring to early summer. Daily average flows vary from 4,000 to 25,000 cubic feet per second, according to the dam releases.

The seasonal and daily fluctuations of the river level result in both losing stream conditions (surface water moves to a groundwater aquifer) and gaining stream conditions (groundwater moves to surface water). In general, the Colorado River is considered a losing stream throughout the northern and central Mohave Valley groundwater basin. In the southern portion of the basin, near the project area, the Colorado River is considered a gaining stream. Water levels in Topock Marsh are maintained slightly higher than the river at Topock by diverting river water at an upstream location near Needles and by controlling release from a downstream dike surrounding the marsh.

Surface Water Quality

Consistent with the objective of maintaining the beneficial uses of the Colorado River, sampling has been performed to assess potential PGE&E impacts to the quality of the Colorado River. Water quality samples were routinely collected between July 1997 and October 2007 from 18 surface water monitoring locations along the Colorado River during the RCRA facility investigation/remedial investigation (RFI/RI) characterization activities (Exhibit 4.7-3). Colorado River sampling activities are ongoing. Frequency and timing of surface water sampling varied over the duration of the RFI/RI (CH2M Hill 2009a: 4-8 and Table 4-5). Table 4.7-1 summarizes the sampling results for Colorado River Stations R-28 (downstream of Bat Cave Wash and adjacent to the groundwater plume) and I-3 (downstream from the project site). Water quality sampling results (including stable isotope data) from groundwater wells close to the Colorado River indicate that a mixing zone exists between the Alluvial Aquifer (i.e., the groundwater bearing zone in the project area) and the river.

As a component of the RFI/RI characterization activities and routine monitoring events from July 1997 through October 2007, more than 700 surface water samples were collected from 43 locations along the shoreline and in-channel of the Colorado River (see Exhibit 4.7-3 for locations) (CH2M Hill 2009a:10-4). These samples were analyzed for chromium, but the data set also includes trace metals, general chemistry parameters, and perchlorate analyses. Tables 1 through 3 in Appendix WQ of this document summarize the sampling results for surface water and pore water through August 2008, and Table 4 in Appendix WQ of this document presents the chemical specific applicable or relevant and appropriate requirements (ARARs) for surface water.

The primary chemicals of potential concern (COPCs) for surface water quality related to PG&E activities are total chromium [Cr(T)] and Cr(VI). As shown in Table 1 of Appendix WQ, Cr(T) has been detected at eight sampling locations along the shoreline, with average concentrations ranging from 0.627 to 3.49 micrograms per liter (µg/l). Cr(VI) has only been confirmed once in the over 700 samples that have been taken. It was detected on September 18, 2008 at a concentration of 0.23 µg/l at location SW-1/R-23, a small, placid, pondlike inlet connected to the Colorado River. In September 2007, a surface water sample from location C-R22, an in-channel sampling location, had a Cr(VI) concentration of 0.4 µg/l. PG&E indicates that this detection was qualified with a J-flag as subsequent investigation of the field and laboratory practices for the sample revealed a strong possibility that a low level contamination of the buffer solution used for lab and field preservation was responsible for the low level Cr(VI) detected. Anomalous 2002 Cr(VI) detections are flagged in the database as false positives because of an

Table 4.7-1 Colorado River Surface Water Quality Results							
		River Sampling Station R-28			River Sampling Station I-3		
Analyte	Units	Number of Samples	Average Detected Concentration[1, 2]	Range of Detected Values	Number of Samples	Average Detected Concentration[1, 2]	Range of Detected Values
Field Measurements							
Dissolved oxygen	mg/l	48	10.0	3.60–13.0	49	10.2	5.87–14.3
Oxidation reduction potential	mV	48	110	-130–287	46	129	-30–258
pH	pH units	51	8.21	5.90–9.86	49	8.07	5.67–9.59
Salinity	%	48	0.0794	0.00–0.54	48	0.0823	0.00–0.55
Specific conductance	µS/cm	49	1,092	587–3020	50	1,100	591–2160
Temperature	°C	52	18.0	8.00–24.8	51	18.2	7.72–36.9
Turbidity	NTU	50	14.4	0.00–207	47	23.9	0.00–420
Anions							
Bromide	mg/l	15	NA	ND (0.50)	0	--	--
Chloride	mg/l	16	91.4	80.2–106	5	79.6	74.0–84.0
Fluoride	mg/l	3	0.380	0.38	5	0.324	0.30–0.34
Nitrate	mg/l	0	--	--	1	0.78	0.78
Nitrite	mg/l	0	--	--	1	0.01	0.01
Sulfate	mg/l	16	256	223–296	5	232	221–242
General Chemistry							
Alkalinity hydroxide	mg/l	3	NA	ND (5.00)	1	NA	ND (5.00)
Alkalinity, as carbonate	mg/l	15	NA	ND (5.00)	5	NA	ND (5.00)
Alkalinity, bicarb as $CaCO_3$	mg/l	15	136	122–167	5	143	130–167
Alkalinity, total as $CaCO_3$	mg/l	16	134	122–146	2	139	137–140
Ammonia	mg/l	0	--	--	3	0.20	0.10–0.30
Ammonia as nitrogen	mg/l	5	NA	ND (0.50)	2	NA	ND (0.50)
Bicarbonate	mg/l	1	149	149	0	--	--
Carbonate	mg/l	1	NA	ND (5.00)	0	--	--
Deuterium	0/00	15	-95.9	-102– -83	1	-98	-98
Orthophosphate	mg/l	2	NA	ND (0.50)	2	NA	ND (0.50)
Oxidation reduction potential	mV	0	--	--	3	250	194–306
Oxygen 18	0/00	15	-12.1	-13– -11.1	1	-12.1	-12.1
Perchlorate	µg/l	0	--	--	1	NA	ND (4.00)
pH	pH units	31	8.20	7.09–8.51	35	8.18	7.71–8.48
Phosphate	mg/l	0	--	--	3	0.0433	0.02–0.06
Soluble silica	mg/l	1	8.93	8.93	0	--	--
Specific conductance	µS/cm	32	1,018	740–2200	37	951	594–1190
Sulfide	mg/l	1	NA	ND (0.40)	4	1.30	1.30

Table 4.7-1 - Continued
Colorado River Surface Water Quality Results

		River Sampling Station R-28			River Sampling Station I-3		
Analyte	Units	Number of Samples	Average Detected Concentration[1, 2]	Range of Detected Values	Number of Samples	Average Detected Concentration[1, 2]	Range of Detected Values
Total dissolved solids	mg/l	16	656	580–710	5	595	532–648
Total organic carbon	mg/l	3	7.70	3.90–14.2	5	3.90	3.20–4.90
Metals							
Barium, dissolved	µg/l	1	NA	ND (500)	5	125	110–170
Chromium	µg/l	1	13.3	13.3	1	13.4	13.4
Chromium, dissolved	µg/l	63	12.4	3.50–31.0	66	5.46	1.60–13.5
Copper, dissolved	µg/l	22	4.53	2.60–6.10	26	5.08	3.50–11.0
Hexavalent chromium	µg/l	62	N/A	ND (0.2 to 10)	65	N/A	ND (0.2 to 10)
Lead, dissolved	µg/l	0	--	--	3	NA	ND (5.00)
Molybdenum, dissolved	µg/l	1	5.40	5.40	3	4.73	4.20–5.00
Nickel, dissolved	µg/l	22	6.33	0.98–30.0	26	2.46	1.00–4.90
Vanadium, dissolved	µg/l	1	253	253	3	2.30	2.20–2.40
Zinc, dissolved	µg/l	22	116	4.40–1060	26	48.4	3.90–158
Boron, dissolved	mg/l	15	NA	ND (200)	0	--	--
Calcium, dissolved	mg/l	16	81.5	72.0–88.1	5	76.3	66.0–98.8
Iron	mg/l	0	--	--	2	0.03	0.03
Iron (+2)	mg/l	0	--	--	3	0.26	0.26
Iron, dissolved	mg/l	3	NA	ND (500)	2	NA	ND (500)
Magnesium, dissolved	mg/l	16	29.9	26.0–32.1	5	26.6	25.2–28.0
Manganese, dissolved	mg/l	3	NA	ND (500)	5	0.00533	0.004–0.007
Potassium, dissolved	mg/l	16	5.30	4.04–6.36	5	4.73	4.08–5.89
Sodium, dissolved	mg/l	16	95.1	76.8–108	5	93.5	80.5–114

Notes: °C = degrees Celsius.
mg/l = milligrams per liter.
mV = millivolt.
NA = not applicable.
ND = parameter not detected at maximum reporting limit listed.
NTU = nephelometric turbidity unit.
0/00 = parts per thousand.
µg/l = micrograms per liter.
µS/cm = microSiemens per centimeter.
-- = not analyzed.

1 Number of samples includes only the primary lab or field sample. Field duplicates are not included. Rejected data not included.
2 Average concentration of detected concentrations only.
3 Hexavalent chromium detects of 19.2 and 24.6 are flagged in the database with the following qualifier: "According to the data quality review for the June 2002 monitoring, and unidentified interference for this sample caused the result to be a false positive. No action should be taken or project decisions made based on the result." This flag was assigned by PG&E as many of the data from this sampling round had unusual and anomalous (not repeatable) Cr(VI) data.

Source: Results from Pacific Gas and Electric Company groundwater monitoring program, sampling events from July 1997 through October 2007 (CH2M Hill, 2007b: Appendix H-4) unidentified interference. None of the detected concentrations exceeded the chemical-specific ARAR for Cr(T) (50 μg/l), or Cr(VI) (11 μg/l) for surface water. For surface water samples collected through August 2007, no surface water analyte concentrations were detected above their respective ARARs (CH2M Hill 2009a:Table 7-2).

Potential Sources of Surface Water Impact

The primary surface water feature in the project area is the Colorado River and its adjacent wetlands and marshes. The Colorado River watershed drains an area of 632,000 square kilometers (244,000 square miles), including parts of seven western U.S. states (Wyoming, Colorado, Utah, New Mexico, Nevada, Arizona, California). This drainage basin comprises about one-twelfth of the area of the continental United States. The Topock Marsh is also a source of water recharge along with smaller sources including precipitation in bordering mountains, irrigation return flow, storm overland flow, and underflow from adjacent groundwater basins. Due to this hydrogeologic regime, activities (e.g., industry) within any of the water recharge sources could be potential sources of contamination to surface water within the geographical limits of the project area (Anderson 2002:1).

Surface water quality of the Colorado River is affected by commercial and industrial facilities located along the length of the river and by storm water run-off from non-point source areas such as roadways. A significant regional impact to the river is the perchlorate emanating from the Las Vegas area. Perchlorate is detected in water samples collected from the river and from Lake Havasu, located downstream from the compressor station (CH2M Hill 2009a:6-13).

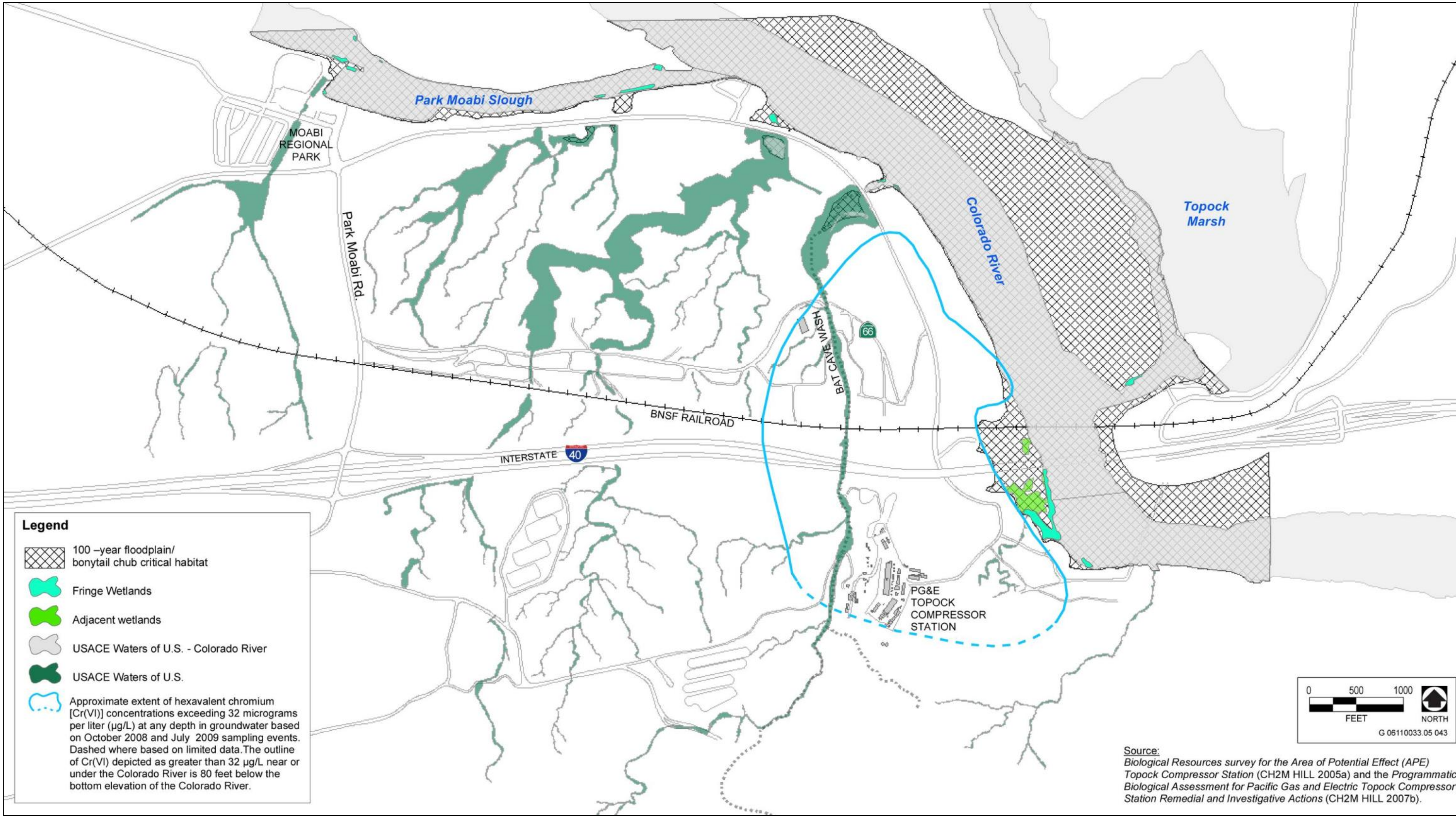
There are two main mechanisms by which surface water could be impacted from PG&E's activities in the project area: the movement of contaminated groundwater into the Colorado River and stormwater runoff from the various identified solid waste management units (SWMUs) and areas of concern (AOCs) that could carry contaminated sediment to the river.

As discussed above, the level of the Colorado River fluctuates daily and seasonally, resulting in both gaining and losing conditions. Groundwater movement into the river occurs generally between October and January, when the river is at its lowest levels (CH2M Hill 2009a:3-12). The extraction wells associated with IM-3 (TW-2D, TW-3D, TW-2S, and PE-1) pump a sufficient amount of groundwater from the MW-20 bench area and nearby floodplain to maintain an average landward groundwater gradient away from the river in the vicinity of the contaminant plume (CH2M Hill 2009a:3-12). Thus, the river remains a net losing stream in the area within the radius of influence of the IM-3 extraction wells. During the first quarter 2009, IM-3 operated at 135 gpm and extracted groundwater from wells TW-3D and PE-1 (CH2M Hill 2009c:3-1).

Based on groundwater samples from beneath the river, surface water samples collected as part of the RFI/RI investigations and other monitoring events, and the observed influence of IM-3 groundwater pumping, Cr(VI) has only rarely been detected in the Colorado River [see Cr (VI) discussion above]. The second potential source of surface water impact is stormwater runoff from SWMUs and AOCs with contaminated soils. Although stormwater runoff samples have not been collected by PG&E, DTSC did conduct stormwater sampling in January 2010 after a rain event to evaluate the potential for contaminants in soils to affect groundwater and surface water. The January 2010 results of stormwater sampling are summarized in Table 4.7-2. PG&E will complete investigations to characterize potential contamination residing in soils for the individual SWMUs and AOCs identified to date and will publish the results of these investigations in *RCRA Facility Investigation/Remedial Investigation Report: PG&E Topock Compressor Station, Needles, California*, *Volume 3*. This report is currently scheduled to be completed and submitted by late 2012.

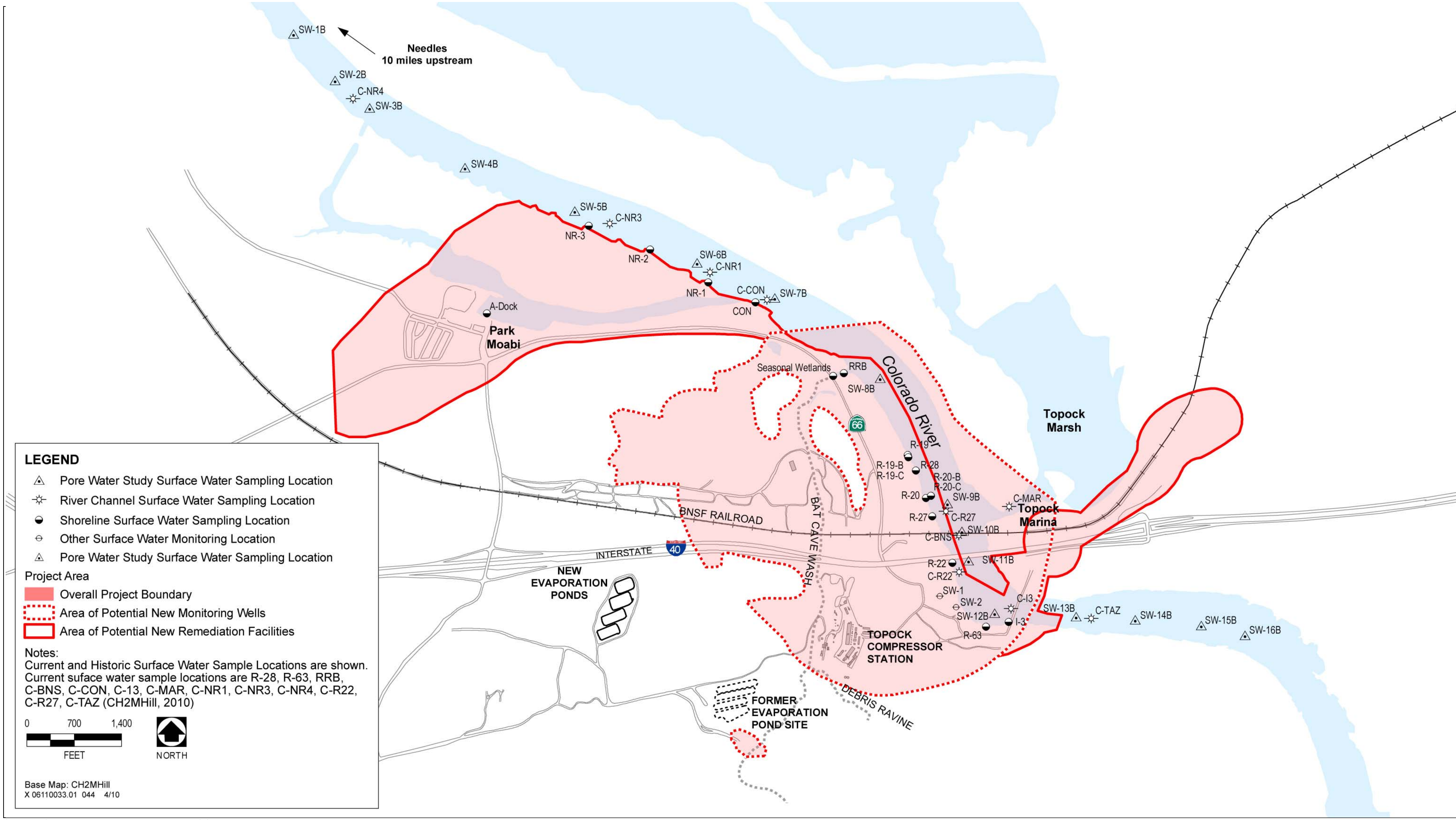
Potential Surface Water Receptors

Receptors are humans, animals, and plants that use or contact soil, groundwater, and/or surface water within the project area, or from the project area. Beneficial uses of the Colorado River and other surface waters located in the project area, including Bat Cave Wash, Gene Wash Reservoir, Copper Basin Creek, and Piute Creek, are



Source: CH2M Hill 2009a:Figure 2-5, adapted by AECOM in 2009

U.S. Army Corps of Engineers Jurisdictional Waters and Wetlands **Exhibit 4.7-2**



Source: CH2M Hill 2009b, adapted by AECOM in 2009

Surface Water Monitoring Location **Exhibit 4.7-3**

Table 4.7-2 Unfiltered Surface Water Sample Results, January 27, 2010			
Sample Location	Chromium (Total)[1]	Molybdenum	Selenium
SW-1	0.58 µg/l	5.6 µg/l	3.4 µg/l
SW-2	<0.5 µg/l	3.5 µg/l	1.7 µg/l
AOC-10c	12 µg/l	5.5 µg/l	3.2 µg/l
AOC-10d	3.1 µg/l	1.0 µg/l	<0.5 µg/l
AOC-11	4.2 µg/l	4.5 µg/l	2.8 µg/l

Notes: µg/l = micrograms per liter

[1] Chromium was detected in the laboratory method blank at a concentrations of 0.29 µg/l.

Source: Results from surface water sampling conducted by DTSC on January 27, 2010 (DTSC March 9, 2010)

specified in the water quality control plan (basin plan) for the Colorado River Basin (Colorado River Basin RWQCB 2006:Tables 2-3 and 2-5) and are presented in Table 4.7-3. The risk assessment evaluated the groundwater to surface water transport pathway by comparing floodplain groundwater exposure point concentrations to surface water criteria, comparing surface water quality downstream of the compressor station to surface water quality criteria, and by comparing downstream surface water quality data to upstream surface water quality data. The results indicate that the floodplain groundwater COPCs are not being transported to the Colorado River at concentrations that exceed screening-level surface water criteria and no further surface water risk assessment was recommended (Arcadis 2009:ES-10).

Table 4.7-3 Beneficial Uses of Nearby Surface Waters					
Beneficial Use	Surface Water				
	Colorado River	Bat Cave Wash	Gene Wash Reservoir	Copper Basin Creek	Piute Creek
Municipal and domestic water supply	✓		✓	✓	✓
Agricultural supply	✓		✓		✓
Aquaculture	✓		✓		
Industrial service supply	✓		✓		
Groundwater recharge	✓	✓	✓	✓	✓
Water contact recreation	✓		✓	✓	✓
Noncontact water recreation	✓	✓	✓	✓	✓
Warm freshwater habitat	✓		✓	✓	✓
Cold freshwater habitats	✓		✓		
Wildlife habitat	✓	✓	✓	✓	✓
Hydropower generation	✓		✓		
Preservation of rare, threatened, or endangered species	✓		✓	✓	✓

Source: Colorado River Basin RWQCB 2006:Table 2-2

4.7.1.3 GROUNDWATER

The following paragraphs discuss regional and local hydrogeology and groundwater conditions, including groundwater quality, groundwater flow conditions, sources of groundwater contamination in the site vicinity, contaminant distribution in groundwater, and potential groundwater receptors.

Regional and Project Area Hydrogeology and Groundwater Conditions

The project area lies at the southern end of the Mohave Valley groundwater basin and within in the Needles Subbasin (DWR 2003:202), which is bisected by the Colorado River (Exhibit 4-7.1), The Sacramento Valley groundwater basin lies to the east, in Arizona. The Sacramento Wash is the principle surface drainage in the Sacramento Valley basin. Groundwater in the Mohave Valley basin occurs in the alluvial basin deposits. Bedrock water-bearing zones occur locally, where the bedrock formations are weathered or fractured. No areas or locations have been identified in the Mohave Valley groundwater basin where saturated bedrock formations are capable of significant storage or sustained yield (Wilson and Owen-Joyce 1994, cited in CH2M Hill 2009c:3-5).

The groundwater system in the project area has been described as a "river aquifer" (Wilson and Owen-Joyce 1994, cited in CH2M Hill 2009c:3-5; Guay, Eastoe, and Bassett 2006, cited in CH2M Hill 2009c:3-5). The river aquifer consists of permeable and partly saturated sediments and sedimentary rocks that are hydraulically connected to the Colorado River, allowing water to move between the river and the aquifer in response to withdrawal of water from the aquifer or differences in water-level elevations between the river and the aquifer (Wilson and Owen-Joyce 1994, cited in CH2M Hill 2009c:3-5). The boundaries of the river aquifer are the low permeability bedrock that forms the bottom and sides of the basins that underlie the valley.

Hydrogeologic Setting of the Alluvial Aquifer

Groundwater occurs under both unconfined and semiconfined conditions in the alluvial fan and fluvial sediments, which make up the Alluvial Aquifer, under the project area. Groundwater in the Alluvial Aquifer occurs at depths ranging from as shallow as 5 feet below ground surface (bgs) on the floodplain adjacent to the river to 170 feet bgs in the upland alluvial terrace areas (CH2M Hill 2009a:3-9). Exhibit 4.5-3 presents a regional hydrogeologic cross-section that illustrates the relationship between the Alluvial Aquifer, groundwater, and bedrock (see "Hydrogeologic Setting of the Bedrock Aquifer," below). Additional hydrogeological sections were presented in Volume 2 of the final RFI/RI (CH2M Hill 2009a:Figures 5-2 though 5-8). The saturated thickness of the aquifer ranges from approximately 20 feet to the south (MW-21 location) to 260 feet in the IM-3 injection area to more than 350 feet in the northern floodplain (MW-49 location) (CH2M Hill 2009a:3-9). The Alluvial Aquifer pinches out along the bedrock outcrops south of the project site. The water table has a very gently sloping gradient (0.0003 to 0.0005 vertical feet per horizontal foot [CH2M Hill 2009d: 2-6, included in Appendix CMS of this EIR]) throughout the project area and typically equilibrates within 2–3 feet of the river level.

Hydrogeologic Setting of the Bedrock Aquifer

Groundwater is also encountered in secondary fractures in the Miocene Conglomerate and pre-Tertiary metamorphic and igneous rock underlying the Alluvial Aquifer (CH2M Hill 2009d:2-6, included in Appendix CMS of this EIR). The groundwater occurs under semiconfined to confined conditions caused by varied interconnectedness of the fracture systems, with upward hydraulic gradients from the bedrock to the alluvial aquifer (CH2M Hill 2006a:3-5).

Water Budget

In the project area, the Colorado River is a net gaining stream, receiving input from surface water and groundwater (CH2M Hill 2005:2-7), although the IM-3 Facility ensures that the river is maintained as a losing stream in the vicinity of the plume. The recharge sources within the modeled area include groundwater underflow from the north, modeled at 700 acre feet per year (af/yr) (Arizona portion of the Mohave Basin), groundwater underflow from the Sacramento Wash, modeled at 100 af/yr (Arizona portion of the Mohave Basin), precipitation recharge from the Chemehuevi Mountains, modeled at 200 af/yr (California), and 10 af/yr of groundwater underflow modeled for the central-western and northeastern boundaries (CH2M Hill 2005:2-7). Topock Marsh is modeled at recharging groundwater at 3,500 af/yr with most of the water eventually discharging to the Colorado River (CH2M Hill 2006b:2-12).

The water budget discharge incorporated into the model includes evapotranspiration in the floodplain, localized pumping, flux (discharge) to the Colorado River, and underflow beneath the riverbed through the Topock Gorge (CH2M Hill 2005:2-8). Evapotranspiration was modeled at 140 af/yr, discharge to the river was modeled at 600 af/yr, and underflow to the Topock Gorge was estimated at 10 af/yr (CH2M Hill 2005:2-8 and 2-9). Groundwater extraction, excluding IM-3 accounts for approximately 640 af/yr (CH2M Hill 2006b:2-13) and occurs within the model domain at two various private wells located at Golden Shores, Arizona and Topock pumping wells located approximately 1 mile northeast of the compressor station at 80 af/yr (CH2MHill 2005:2-9 and CH2MHill 2006: 2-13) and Park Moabi (CH2M Hill 2006b:2-13).

Additional pumping areas located outside of the model domain are the Serrano Well at approximately 70 af/yr and two El Paso Natural Gas wells with combined extraction of approximately 30 af/yr (CH2M Hill 2006b:2-13).

Groundwater Quality

The total dissolved solids (TDS) in the groundwater are of sodium-chloride nature and range from relatively low TDS (<500 milligrams per liter [mg/l]) to high TDS (>10,000 mg/l). The lower TDS groundwater is generally found in shallow wells near the Colorado River and in shallow alluvial wells in the western parts of the project area (CH2M Hill 2009a:5-15). The TDS level in groundwater generally increases with depth within the project area. Groundwater in the bedrock and the Miocene conglomerate are sodium-chloride dominated, with TDS ranging from approximately 8,000 to 13,000 mg/l (CH2M Hill 2009a:5-16). Table 5 (Appendix WQ) presents a summary of the TDS observed in the monitoring wells throughout the project area (July 2007 to October 2007). The groundwater temperature ranges from 70 to 89ºF. The coldest groundwater temperatures are found nearest the Colorado River, with alluvial groundwater temperatures increasing as the horizontal distance from the river increases (CH2M Hill 2009a:5-18). Groundwater near the river has geochemical and physical properties that are similar to those of the river water. This finding reflects the natural movement of river water to groundwater near the edge of the river and the effect of IM-3 groundwater extraction within the floodplain.

A significant finding of the RFI/RI has been the identification of a groundwater reductive zone under the floodplain within the Alluvial Aquifer. The reductive zone occurs in the organic rich fluvial sediments of the Alluvial Aquifer (CH2M Hill, 2009d: 2-7). The reductive zone is characterized by oxidation-reduction potential measurements between -220 and -90 millivolt in shallow fluvial wells at the floodplain, compared to oxidation-reduction potential readings between 0 and 300 millivolts (aerobic conditions) in the alluvial wells (CH2M Hill 2009a:5-19). In the reductive zone associated with the fluvial wells in the floodplain, the soluble form of chromium, Cr(VI), is reduced (converted) to Cr(III). Chromium as Cr(III) is essentially immobile at a neutral pH and precipitates out of groundwater. In this context, ‘reduction’ refers to the transformation of Cr(VI) to Cr(III) and the ‘reductive zone’ refers to the portion of the aquifer where the geochemical conditions facilitate this transformation of Cr(VI) to Cr(III). Thus, the reductive zone present in the fluvial groundwater in the floodplain can remove chromium from the groundwater. The reduction capacity, [degree to which the aquifer can transform the Cr(VI) to Cr(III)] and aquifer matrix concentration of the reducing material (organic-rich sediment) is variable, so quantification of the amount of Cr(VI) that may be reduced is currently an estimate, based on laboratory testing of a limited number of core samples from localized boreholes. Additionally while these naturally occurring reducing conditions are present within shallow and mid-depth fluvial wells and in pore water and slant wells beneath the river bottom (CH2M Hill 2009d:6-31, included in Appendix CMS of this EIR), uncertainties remain regarding the overall continuity and extent to which the naturally occurring reducing conditions in fluvial deposits provide a pervasive and permanent barrier to Cr(VI) contaminant migration to the river.

Groundwater Flow Conditions

Groundwater flow in the project area is mainly in the Alluvial Aquifer, with groundwater movement influenced by the level of the Colorado River and IM-3 pumping. Exhibits 4.7-4 through 4.7-9 present the groundwater elevation maps for the Alluvial Aquifer in June and December 2006.

The average hydraulic conductivity for the fluvial and upper alluvial sediments is approximately 30 feet per day assuming an average effective porosity of 12% because of the very gently sloping horizontal groundwater gradient in the shallow Alluvial Aquifer in areas not affected by the pumping for IM-3. The average groundwater velocity has been calculated to be about 45 feet per year (CH2M Hill 2009a:5-12). This is a rough estimate, but serves to illustrate that the groundwater movement in the project area is not fast.

Groundwater movement in the medium and deep zones of the Alluvial Aquifer within the floodplain generally shows movement toward the pumping center for IM-3 (CH2M Hill 2009a:5-12). Landward gradients (river water recharging groundwater) were observed in the middle zone in June and December 2006, with the higher gradients observed in June. The deep zone groundwater shows similar landward gradients, but seasonal differences are less noticeable.

Throughout the project area, vertical groundwater gradient (movement) in the Alluvial Aquifer is primarily upward, which is attributable to the seepage of water from the bedrock to the Alluvial Aquifer. The exception to the upward gradient is observed in the vicinity of the pumping wells for IM-3. These pumping wells have deeper screen intervals and the extraction results in a downward movement of groundwater in the area surrounding the IM-3 pumping wells (CH2M Hill 2009a:5-12).

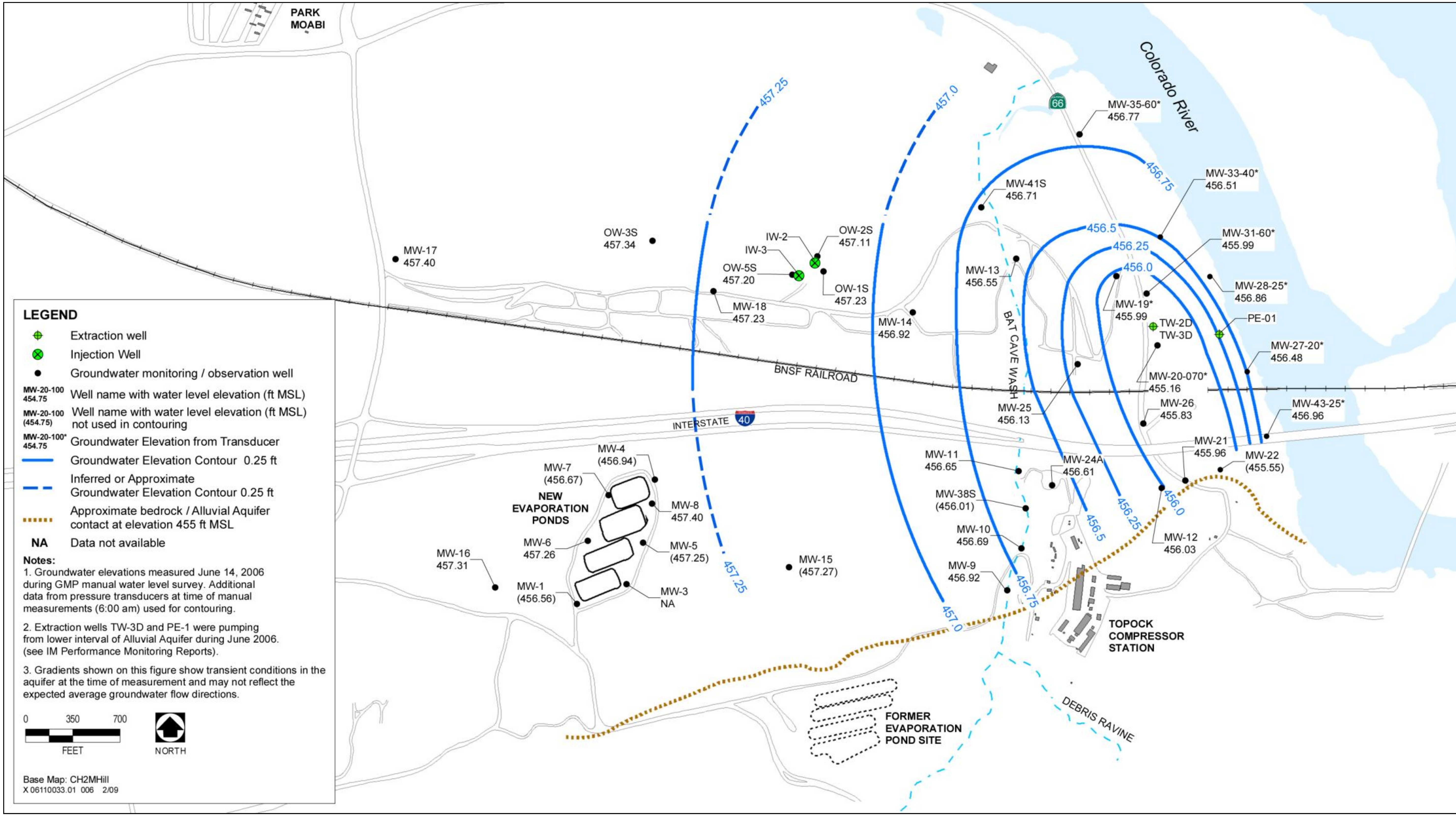
The fluctuations in the level of the Colorado River are reflected in the groundwater across the project area. The fluctuations have been observed in groundwater monitoring wells 2,000 feet from the river. The amplitude of the fluctuations diminishes with distance from the river and with depth, except for the wells in the floodplain area immediately adjacent to the river, where shallow wells show less fluctuation than deep wells relative to river level changes (CH2M Hill 2009a:5-14).

Potential Sources of Groundwater Impacts

The investigations to date have identified one SWMU (CH2M Hill 2009a:2-1) and two AOCs as potential sources of groundwater contaminants. The potential sources are SWMU 1 (Former Percolation Bed), and AOC 1 (Area Around Former Percolation Bed), and AOC 10 (East Ravine) (Exhibit 4.5-6 in this document, "Solid Waste Management Units, Areas of Concern, and Other Undesignated Areas"). The areal extent of AOC 1 has not been specifically defined, but is considered, at a minimum, to be the floor of Bat Cave Wash, extending from the former percolation bed (SWMU 1) to the Burlington Northern & Santa Fe Railway railroad tracks. The Phase A soil investigation, which began in 2008, is being conducted for PG&E by CH2M Hill and will further characterize and delineate the extent of contamination including the SWMU 1 and AOC 1/10 areas.

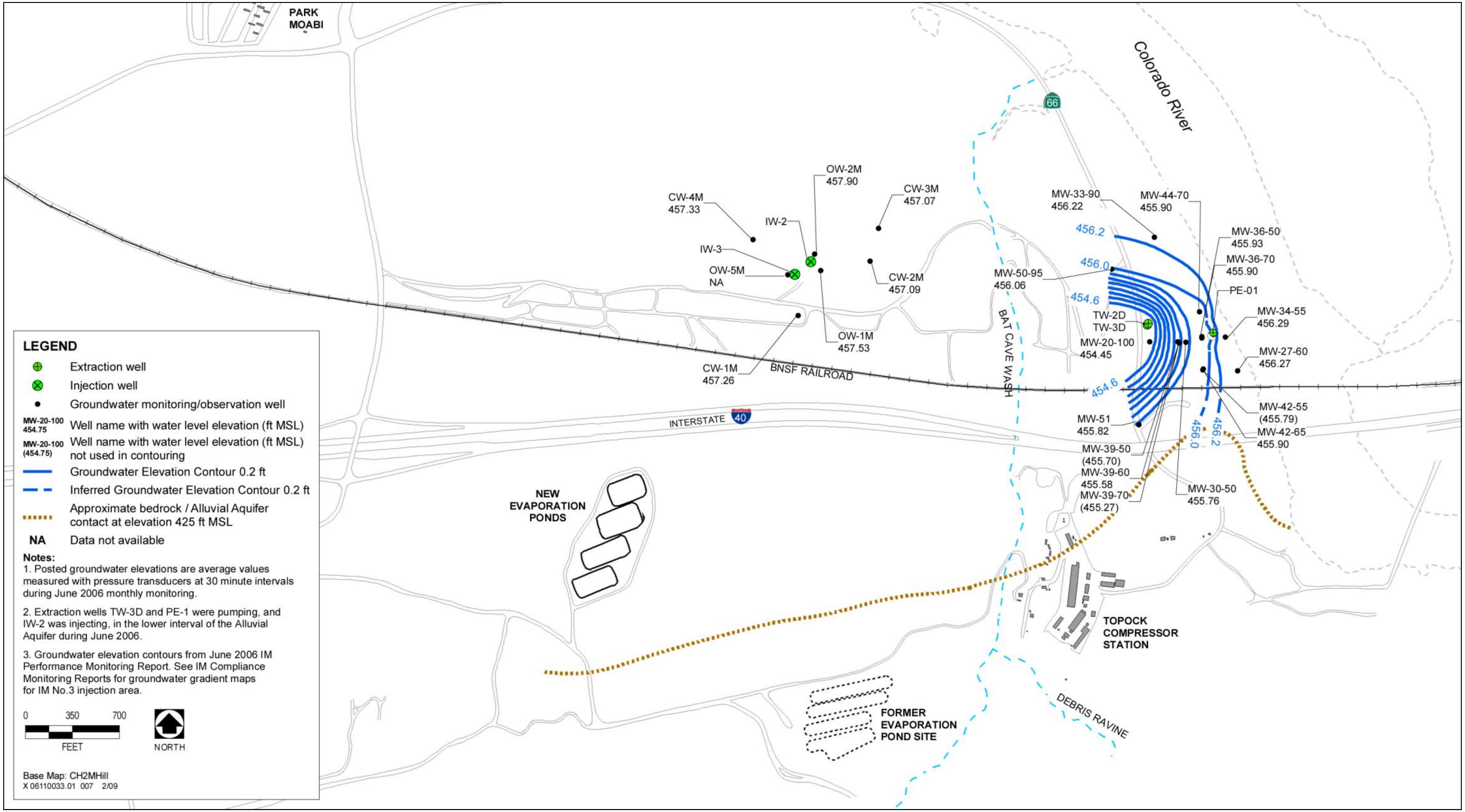
Based on the results of well installations in the Alluvial Aquifer on the California and Arizona shores of the Colorado River, the chromium plume has not been detected in Arizona or under the Colorado River just south of Interstate 40 (CH2M Hill 2008b:3-2; CH2MHill 2009d; Figure 2-12). The extent of the bedrock plume near the Colorado River is less certain. Cr(VI) concentrations range from less than 0.2 µg/l to 15,700 µg/l within the plume boundaries, with the highest concentrations observed in the area of the MW-20 and MW-24 benches (CH2M Hill 2008b:Table 2-4).

During the course of the RFI/RI activities, anomalously high concentrations of Cr(VI) were detected sporadically in groundwater samples from bedrock monitoring well MW-23 (i.e. 1,020 µg/l in March 2007 which is two orders of magnitude greater than other detected concentrations in 2006 and 2007 [CH2M Hill, 2009b:Table 6-4]), located north of the mouth of the East Ravine wash. The East Ravine had been identified as an area of concern (AOC 10) for soil impacts (see Section 4.5.1.5), and the California Department of Toxic Substances Control



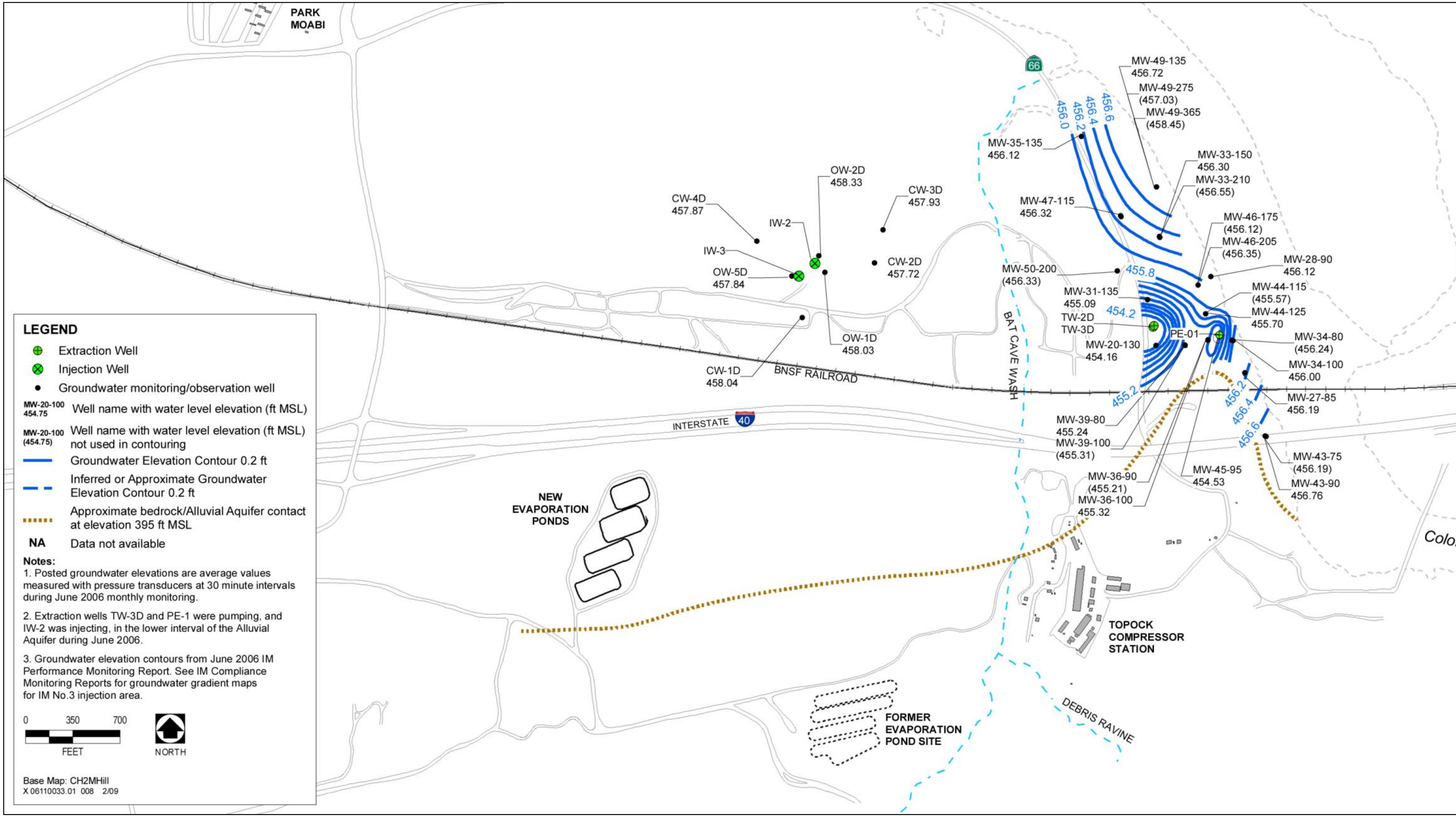
Source: CH2M Hill 2009b:Figure 5-11a adapted by AECOM in 2009

Groundwater Elevation Map Shallow Zone of Alluvial Aquifer (Water Table), June 2006 **Exhibit 4.7-4**



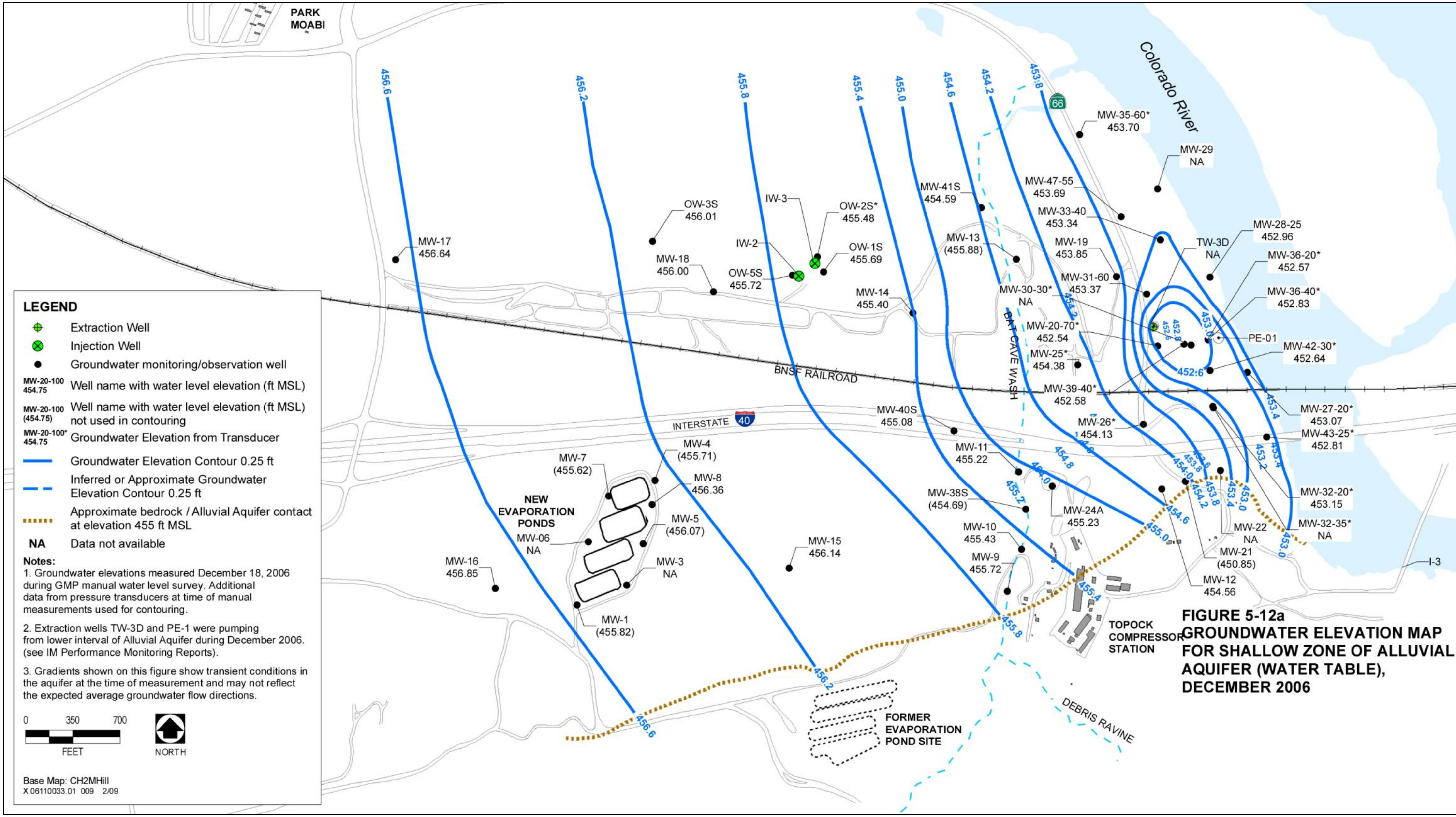
Source: CH2M Hill 2009b:Figure 5-11b, adapted by AECOM in 2009

Groundwater Elevation Map Mid-Depth Zone of Alluvial Aquifer, June 2006 **Exhibit 4.7-5**



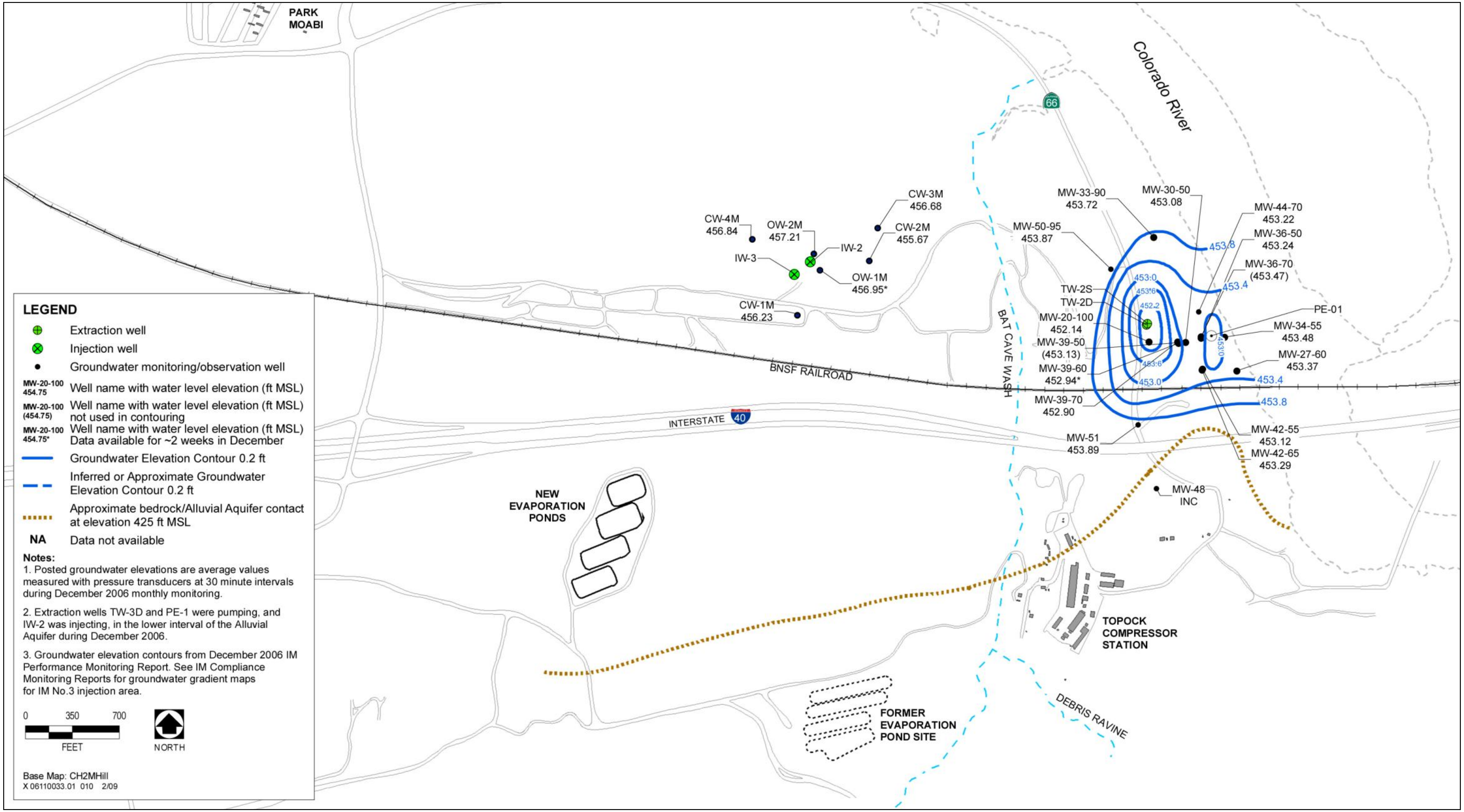
Source: CH2M Hill 2009b:Figure 5-11c, adapted by AECOM in 2009

Groundwater Elevation Map, Deep Zone of Alluvial Aquifer, June 2006 **Exhibit 4.7-6**



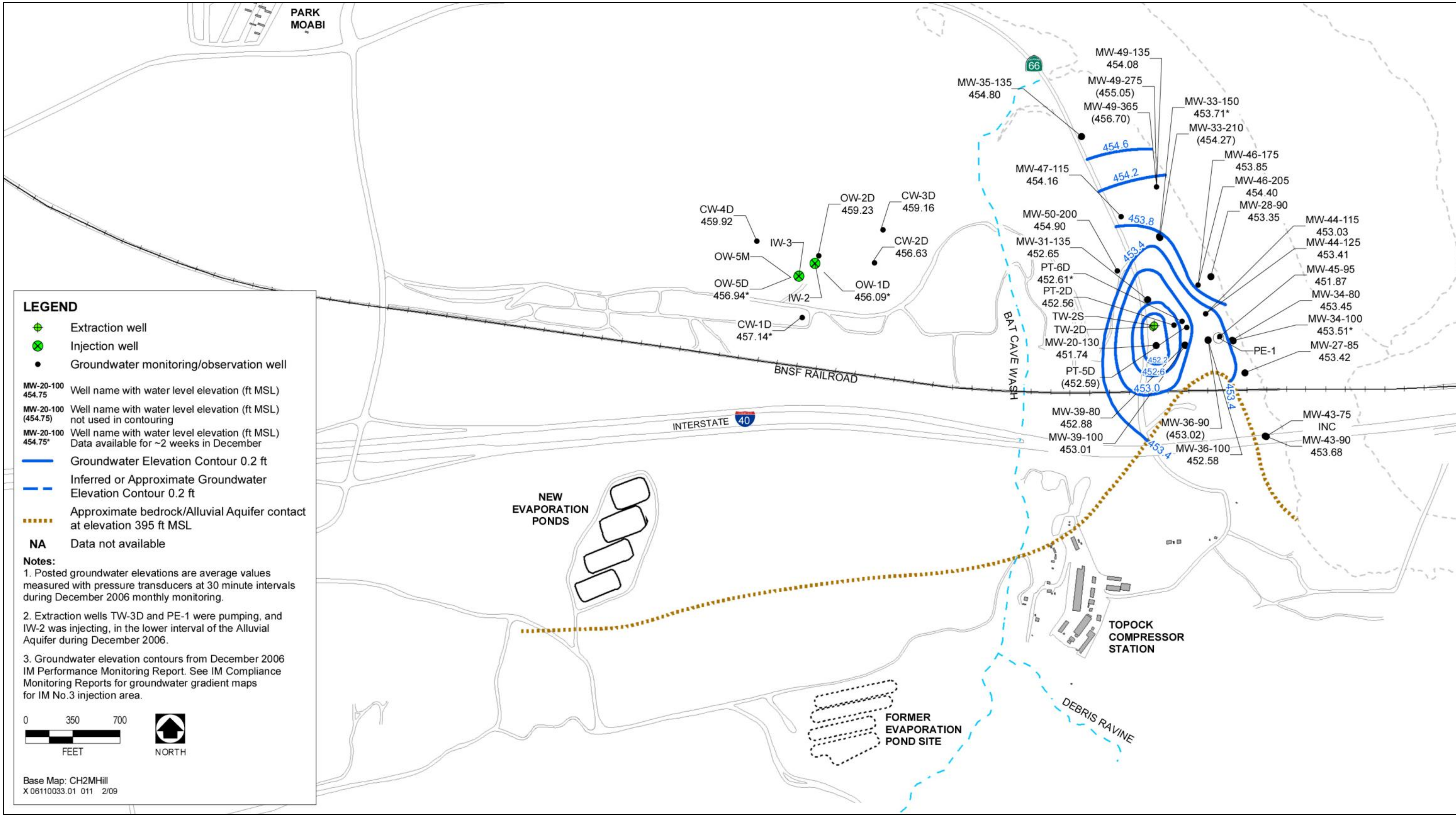
Source: CH2M Hill 2009b:Figure 5-12a, adapted by AECOM in 2009

Groundwater Elevation Map, Shallow Zone of Alluvial Aquifer (Water Table), December 2006 **Exhibit 4.7-7**



Source: CH2M Hill 2009b:Figure 5-12b, adapted by AECOM in 2009

Groundwater Elevation Map, Mid-Depth Zone for Alluvial Aquifer, December 2006 **Exhibit 4.7-8**



Source: CH2M Hill 2009b:Figure 5-12c, adapted by AECOM in 2009

Groundwater Elevation Map, Deep Zone of Alluvial Aquifer, December 2006 **Exhibit 4.7-9**

(DTSC) has approved additional investigations (DTSC 2008) that include both soil and groundwater characterization because of the detection of highly elevated chromium in AOC 10 soil and groundwater (MW-23). The scope of the groundwater investigation was presented in *Revised Work Plan for East Ravine Groundwater Investigation: PG&E Topock Compressor Station, Needles California* (CH2M Hill 2008a). The findings of the East Ravine investigation are provided as Appendix A in the Final CMS/FS (CH2M Hill 2009a). Results of the East Ravine investigation have detected significant hexavalent chromium (e.g., 660 µg/l) in shallow bedrock groundwater wells (CH2M Hill, 2009d:A3-5).

SWMU 1 and AOC 1 (Percolation Bed and Bat Cave Wash)

Wastewater was discharged to Bat Cave Wash between 1951 and 1970. This wastewater consisted primarily of cooling tower blowdown (approximately 95%) and a minor volume of effluent from an oil/water separator (OWS) and other facility maintenance operations (approximately 5%) (CH2M Hill 2007:4-3). Chemicals present within this wastewater discharge include chromium [Cr(III) and Cr(VI)]; the COPCs are summarized below. The earliest available information from 1968 indicates an average of approximately 48,500 gallons per day (gpd) of cooling tower blowdown was discharged to Bat Cave Wash, with a high of approximately 64,300 gpd in July and a low of approximately 25,600 gpd in February (PG&E 1968, referenced in CH2MHill 2007: 4-3).

From 1951 until 1964, untreated cooling tower blowdown containing hexavalent chromium was released to the Bat Cave Wash. From 1964 to 1969, the cooling tower blowdown was treated at the project site with a one-step system to reduce Cr(VI) in the wastewater to Cr(III) before discharge to the percolation bed (SWMU 1), which was installed in the wash in approximately 1964 (CH2M Hill 2007:3-18). Although the process converted Cr(VI) to Cr(III), the concentration of total chromium [Cr(T)] was not affected. Beginning in late 1969, cooling tower blowdown was treated at the project site with a two-step system to reduce Cr(VI) to Cr(III) and then to remove Cr(III) from the wastewater before discharge to Bat Cave Wash (CH2M Hill 2007:4-3). The continuous discharge of wastewater to Bat Cave Wash ceased in May 1970 when injection well PGE-08 (SWMU 2) was brought online and the treated wastewater was injected into groundwater. PGE-08 had a very deep screen interval of 405–554 feet bgs.

SWMU 1 and AOC 1 have been identified as sources of groundwater contamination. Soil sampling data to be collected during RFI/RI activities for the Bat Cave Wash area are still pending. COPCs for soil and groundwater associated with SWMU 1 and AOC 1 consist of the following: Cr(T), Cr(VI), copper, lead, nickel, zinc, electrical conductivity, pH, Title 22 metals, volatile organic compounds, polycyclic aromatic hydrocarbons, semivolatile organic compounds, and total petroleum hydrocarbons. Dioxins and furans may be added to this list due to recent detections in soil at AOC 4 (Debris Ravine) which discharges to Bat Cave Wash above SWMU 1 and AOC 1.

AOC 10 (East Ravine)

East Ravine is a small ravine located on the southeast side of the compressor station. The ravine is approximately 1,600 feet long and runs eastward into the Colorado River. Portions of the East Ravine are on PG&E property outside the compressor station's fence line, and other portions of the ravine are located on property owned by HNWR. The East Ravine was designated as an AOC in a 2001 letter report from DTSC (2001).

The East Ravine contains two human-made impoundments of unknown origin and construction date. The largest impoundment is formed by a constructed earthen dam. A smaller impoundment is formed by a dirt road embankment that was built across the drainage channel in the lower portion of the East Ravine. Because of the impoundments, surface water flowing from most of the length of this ravine (west of the lower dirt road) currently does not appear to reach the Colorado River. The drainage for this ravine includes runoff from the compressor station's access road, runoff from the mountains to the south, and runoff from the compressor station itself.

Three subareas (Subareas 10b, 10c, and 10d) where water and soil collect, either within low-gradient areas along the ravine course or behind impoundments, have been identified within the East Ravine. Subarea 10b, a natural drainage depression, is located in a flat area in the upper portion of the ravine. The middle drainage depression

(10c) is the largest and is located behind a dam that was built across the ravine. The third subarea, Subarea 10d, is the easternmost impoundment, formed by the construction of an access road.

The road embankment that forms the easternmost drainage depression has no visible culvert, and there is no evidence of erosion that would suggest that water has flowed over the top of the road from one side to the other. During a site visit in May 2006, a storm drain was noted leading from the southeastern portion of the Station and discharging into the East Ravine upstream of the previously identified subareas. Although discharge from the steam-cleaning area has always been directed to the oily-water treatment system, this storm drain may have captured some runoff from the steam-cleaning area before the steam-cleaning area was fully contained by berms (Russell, pers. comm., 2006, cited in CH2M Hill 2007:4-3, 4-20 through 4-22, 4-25 through 4-27, 4-29 through 4-32, and 4-35).

During the 2009 East Ravine Groundwater Investigation, Cr(VI) was also found within the Miocene conglomerate and pre-tertiary metadiorite bedrock formations east and southeast of the Topock compressor station. Detected Cr(VI) concentrations in wells screened within the conglomerate ranged from 1.4 μg/l (MW-57 at 185 ft bgs) to 340 μg/l (MW-57 at 70 feet bgs) and in wells screened within the metadiorite the results ranged from <1.0 μg/l (MW-64 at 150 feet bgs and at 260 feet bgs) to 780 μg/l (MW-60 at 175 feet bgs) (CH2M Hill 2009:Appenidix A, Figure A-5 and Figure A-6) Groundwater in the shallow bedrock of the East Ravine area is notably less reducing, presumably due to the stronger hydraulic communication with alluvial groundwater and/or surface runoff. The average permeability of the bedrock is estimated to be less than 1 foot/per day, much lower than the Alluvial Aquifer. Water-conducting fractures were found to be relatively sparsely distributed in East Ravine bedrock.

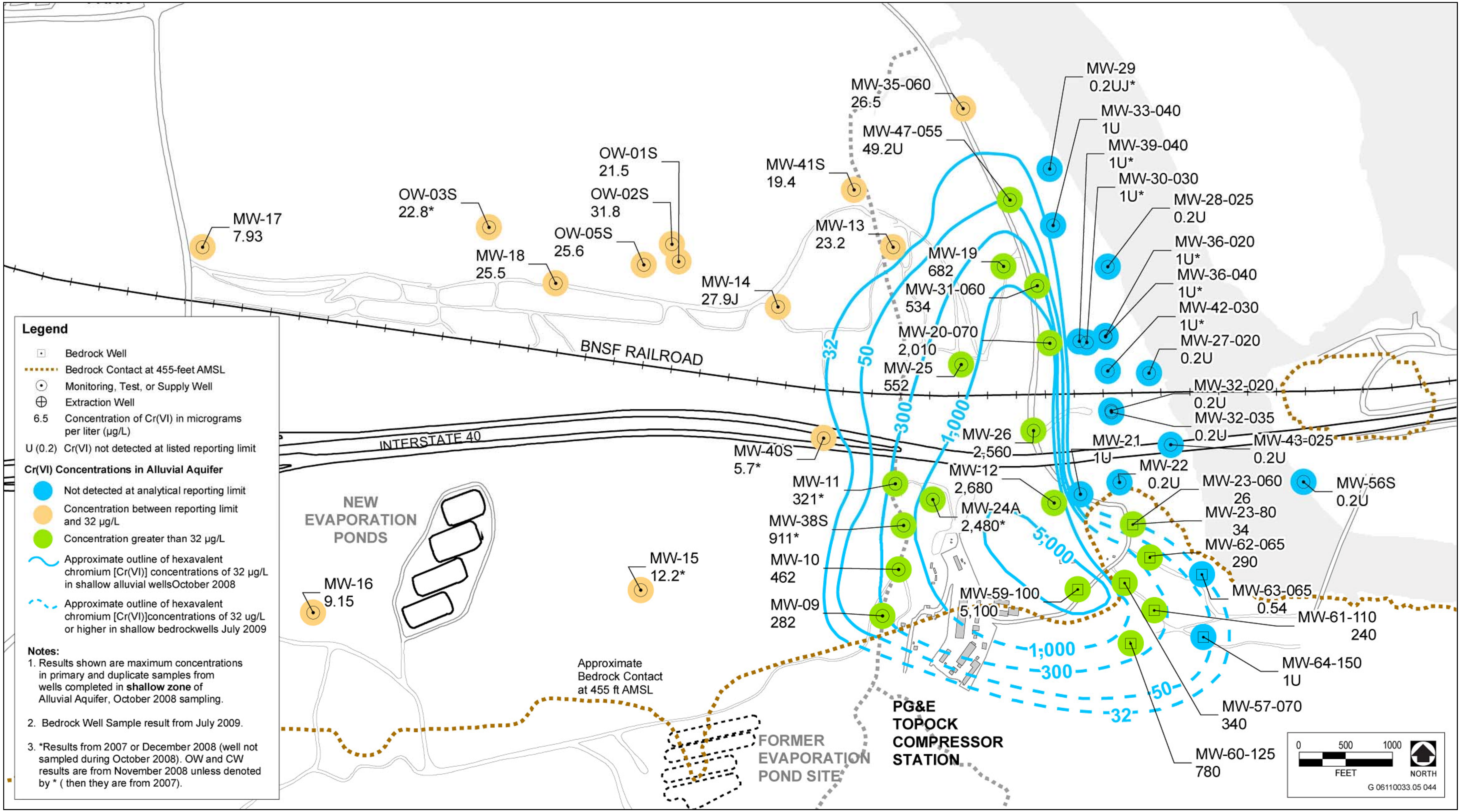
Cr(VI) concentrations in bedrock groundwater appear to be limited in extent to shallow and to a much lesser extent, middepth intervals (using the same elevation intervals for the Alluvial Aquifer). However, additional characterization activities are currently planned for the East Ravine area. Cr(VI) greater than or equal to 32 μg/l in the shallow and mid-depth wells extends approximately 1,500-feet east southeast of the Compressor Station. However, the mass of Cr(VI) in bedrock likely represents less than 1% of the total plume mass, due to the low porosity of these bedrock formations (CH2M Hill 2009a:2-11).

The natural runoff from the eastern portion of the facility eventually flows to the East Ravine. The runoff may have contained dissolved and suspended materials released at the facility. Based on limited historic information, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, Cr(VI), Title 22 metals, volatile organic compounds, semivolatile organic compounds, and pH have been identified as COPCs for this unit (DTSC 2006).

Contaminant Distribution in Groundwater

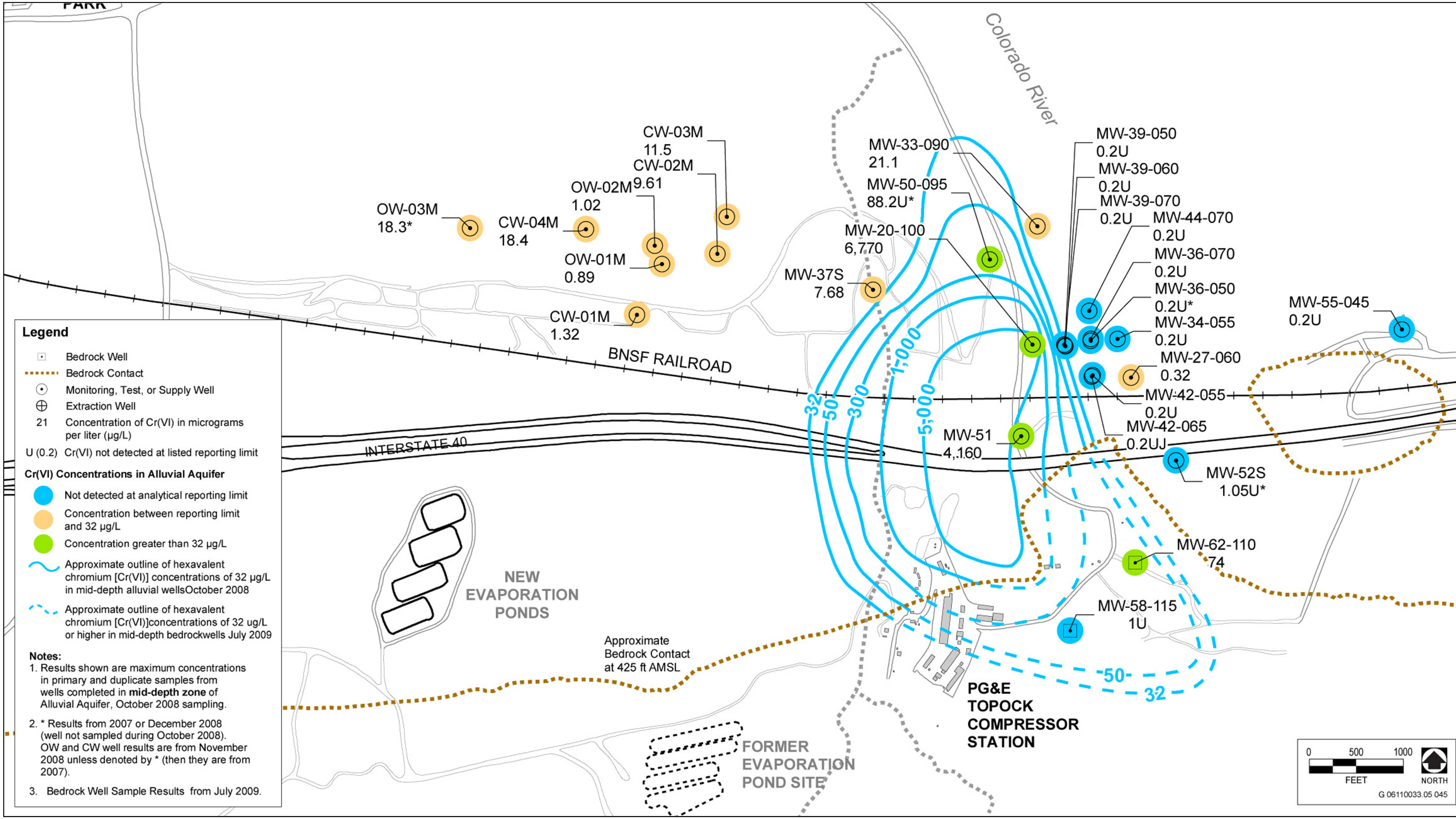
The primary chemicals of concern (COCs) in groundwater at the project site are Cr(VI) and Cr(T). The extent of contaminated groundwater in the Alluvial Aquifer encompasses an area of approximately 175 acres that includes groundwater under Bat Cave Wash, the Upper Bench area, and the floodplain (CH2M Hill 2009a:ES-18). This groundwater plume has been defined as groundwater that exceeds a Cr(VI) concentration of 31.8 (rounded to 32) μg/l, which has been established as the alluvial background concentration for the project (CH2M Hill 2009a:ES-10). However, background chromium concentrations in fluvial dominated waters in certain floodplain wells are expected to be low to below detection limits (e.g., <0.2 μg/l). Exhibits 4.7-10 through 4.7-12 show the Cr(VI) distribution at the project site in October 2008 and July 2009. Table 5 (Appendix WQ) presents a summary of the sampling results for the period from May to July 2007.

Based on the results of well installations on the California and Arizona shores of the Colorado River, the chromium plume is inferred to not have moved into Arizona (CH2M Hill 2008b:3-2). Cr(VI) concentrations range from less than 0.2 μg/l to 15,700 μg/l within the plume boundaries, with the highest concentrations observed in the area of the MW-20 and MW-24 benches (CH2M Hill 2008b:Table 2-4).



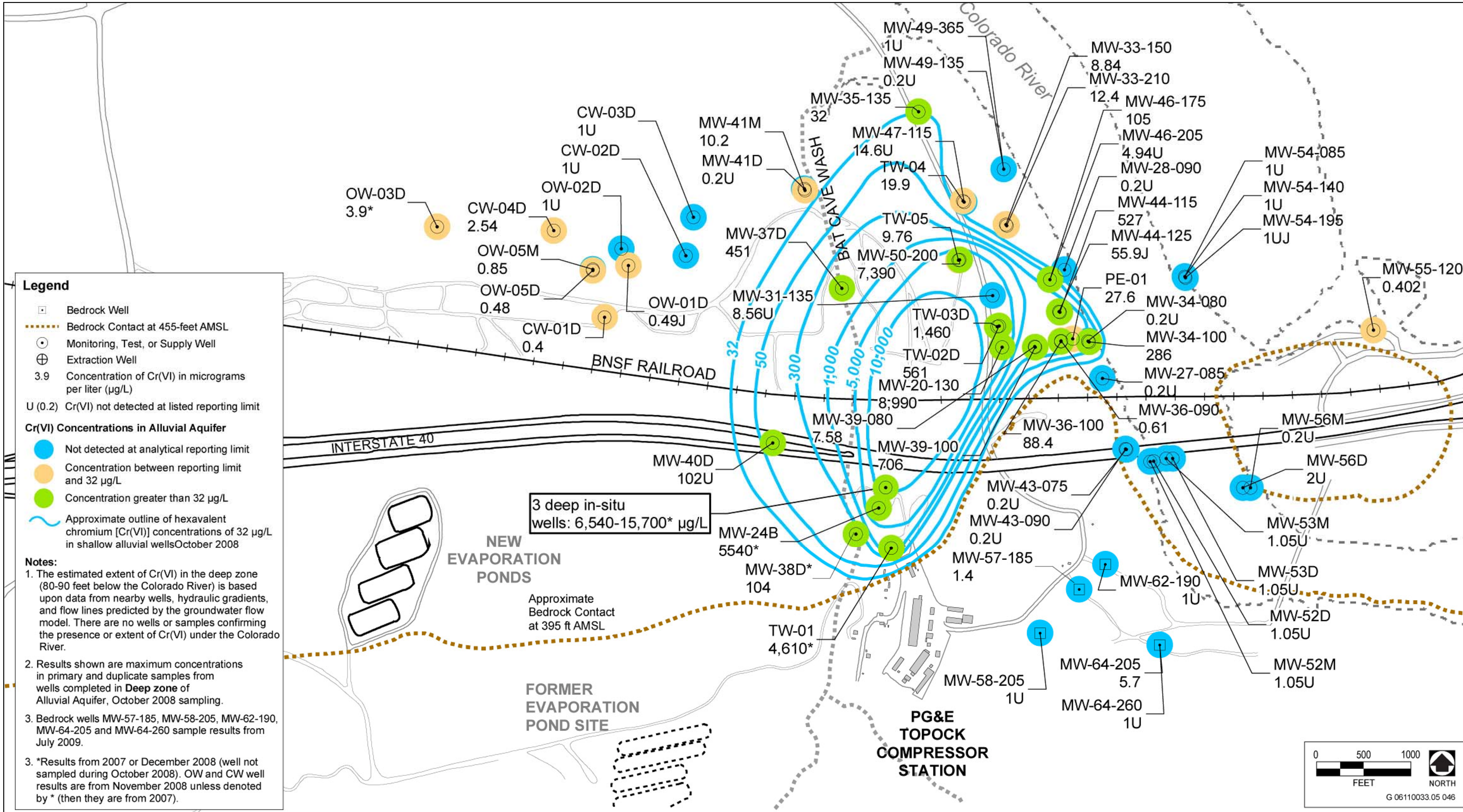
Source: CH2M Hill 2009d:Figure 2-10, included in Appendix CMS of this EIR; adapted by AECOM in 2009

Groundwater Hexavalent Chromium Results, Shallow Wells October 2008 and July 2009 **Exhibit 4.7-10**



Source: CH2M Hill 2009d Figure 2-11, included in Appendix CMS of this EIR ;adapted by AECOM in 2009

Groundwater Hexavalent Chromium Results, Mid-Depth Wells October 2008 and July 2009 **Exhibit 4.7-11**



Source: CH2M Hill 2009d:Figure 2-12, included in Appendix CMS of this EIR; adapted by AECOM in 2009

Groundwater Hexavalent Chromium Results, Deep Wells October 2008 and July 2009 **Exhibit 4.7-12**

Based on the operational history of the project site, TDS (as specific conductance) was identified as a COPC in the RFI/RI Volume 1 Report (CH2M Hill 2007:1-4). Historic operations, which concentrated TDS (as salts) in the blowdown water may have contributed to a higher TDS concentration within the Cr(VI) plume boundary (CH2M Hill 2009c). It appears that the TDS of alluvial plume wells tends to be greater than that of non-plume alluvial wells. However, further assessment of the data indicates that higher TDS in the plume well data set is influenced by the proximity of the well screen interval to the bedrock surface (TDS increases with depth within the aquifer as bedrock is approached [CH2M Hill 2009:6-26). The RFI/RI Volume 2 Report (CH2M Hill 2009a:10-2) did not identify TDS as a COPC.

Arsenic, molybdenum, selenium, and nitrate have been found in groundwater samples from the project area at concentrations exceeding regional background concentrations or maximum contaminant levels (MCLs). Highest concentrations are 157 μg/l for arsenic, 301 μg/l for molybdenum, 155 μg/l for selenium, and 32 μg/l for nitrate (CH2M Hill:Table 6-8). Arsenic concentrations significantly exceeding the regional background concentration of 24.3 μg/l (CH2M Hill 2009a:6-7) are found in one monitoring well (MW-12) with an average concentration of 97.3 μg/l. The source of the arsenic has not been determined, but is not believed to be related to SWMU 1/AOC 1 or AOC 10 activities (CH2M Hill 2009a:6-8). Molybdenum concentrations exceeding the background upper tolerance limit were observed at 25 well locations. The wells with elevated levels of molybdenum are located within and outside the chromium plume area (17 in the plume area, eight outside the plume area). The very high molybdenum detected in the Bat Cave Wash discharge area, the known use of molybdenum by the facility, coupled with its detection in facility wastewater analyses, suggest it is associated with releases from SWMU 1/AOC 1 (CH2M Hill 2009a:6-16). Selenium concentrations exceeding the regional background level of 10.3 μg/l were found in nine monitoring wells (six in the chrome plume area, three outside the chrome plume area). The wells with elevated selenium coincide with the axis of the core of the chromium plume. However, selenium use at the facility has not been documented by PG&E. Areas of elevated nitrate concentrations in groundwater occur in the New Ponds area and Upper Bat Cave Wash (CH2M Hill 2009a:5-19). Sources of the elevated nitrates potentially include blowdown water and naturally occurring sources such as leaching from disturbed areas of desert pavement, mountain front recharge along alluvial fans for excess nitrates not utilized by vegetation (CH2M Hill 2009a:5-19). Nitrate is absent in wells along the Colorado River where the natural reducing conditions have transformed nitrate to ammonia (CH2M Hill 2009a:5-19 and 5-20).

The compounds assessed and determined not to be groundwater COCs in the project area with respect to SWMU 1 and AOC 1 include but are not limited to: pH; copper, nickel, zinc, lead; arsenic, vanadium, antimony, beryllium, fluoride, total petroleum hydrocarbons; and organic compounds; (CH2M Hill 2009a:ES-17). Arsenic detected within well MW-10, located in Bat Cave Wash, appears to have been related to site activities, but the most recent analyses no longer detect arsenic at this well.

Potential Groundwater Receptors

Groundwater at the project site is not currently being used for industrial or potable use; therefore, no complete pathway for ingestion or dermal contact from these direct uses of groundwater currently exists. The nearest wells used for potable supply are located at Park Moabi, located approximately 1 mile northwest of the project area, wells at Topock less than one half mile directly across the Colorado River (Sanders well), and wells at Golden Shores Arizona, located approximately 2.5 miles north-northeast of the project area (CH2MHill 2006:Figure 2-1). The Park Moabi Wells 3 and 4 were sampled in 2007 with Well 3 non-detect (<1.0 μg/l) and Well 4 with Cr(VI) detected at 21.4 μg/l which is below the regional background level of 32 μg/l (CH2M Hill 2009a:Figure 6-12b). Due to the distances of the Park Moabi wells from the chromium plume, the detections in Well 4 are likely not associated with the plume. The risk assessment concludes that there are currently no pathways for human exposure to contaminated groundwater, since there are currently no operating drinking water wells within the immediate area of the contaminant plume, although there is a possibility for "future hypothetical residential groundwater users" to be exposed. Plant uptake pathways and receptors were evaluated in the risk assessment, and the pathways were found to be potentially complete but the risks to ecological receptors were considered not to be significant (ARCADIS 2009:ES-11).

4.7.2 Regulatory Background

The proposed project would be subject to the requirements of all applicable federal, state, and regional water quality control board requirements for the protection of surface and groundwater resources found within the project area.

Specifically, the onsite portions of remedial actions taken under CERCLA authority must meet the substantive provisions of promulgated requirements that are ARARs, as discussed in Section 2.3. Criteria, guidance, advisories, and proposed standards that are not legally binding are not ARARs, but may be considered and used as appropriate to ensure the protectiveness of the remedy. These are referred to as "To Be Considered" criteria (TBCs). DOI, as the lead agency for remedial actions taken under CERCLA authority, has established a list of ARARs and TBCs for the site, which is presented in the Final CMS/FS (CH2M Hill 2009d:3-3 through 3-6 and Appendix B, included in Appendix CMS of this EIR).

4.7.2.1 Federal Plans, Policies, Regulations, and Laws

Regulations applicable to the proposed project are designed to protect the water quality and identified beneficial uses of groundwater and surface water. Because of identified contamination in groundwater from previous activities at the project site, regulations also encompass activities associated with managing the remediation of groundwater. These regulations also are designed to protect human health and the environment during the implementation of the remedial activities.

Resource Conservation and Recovery Act

The RCRA establishes requirements for the treatment, storage, and disposal of hazardous wastes. These requirements include seismic and floodplain protection standards that must be followed by treatment, storage, and/or disposal facilities constructed, operated, or maintained for hazardous wastes that are located within certain distances of fault lines and floodplains. Portions of the Topock project area are located on or near the 100-year floodplain of the Colorado River. See Section 4.6, "Hazards and Hazardous Materials," for more details.

Executive Order 11988

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. It generally requires federal agencies constructing, permitting, or funding a project in a floodplain to:

- avoid incompatible floodplain development,
- be consistent with the standards and criteria of the National Flood Insurance Program, and
- restore and preserve natural and beneficial floodplain values.

Executive Order 11990

Executive Order 11990 (Protection of Wetlands) requires federal agencies to follow avoidance, mitigation, and preservation procedures, with public input, before proposing new construction in wetlands. It generally requires:

- avoidance of wetlands,

- minimization of activities in wetlands, and

- coordination with the U.S. Army Corps of Engineers (USACE) and Section 404 of the Clean Water Act (CWA) regarding wetlands mitigation.

Federal Land Policy and Management Act

BLM is responsible for implementing the Federal Land Policy and Management Act. The act directs BLM to take any action necessary to prevent unnecessary or undue degradation of public lands they oversee.

Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS), in cooperation with other federal and state agencies, enforces the federal Endangered Species Act by evaluating the potential for impacts on candidate, threatened, and endangered fish and wildlife resources.

Fish and Wildlife Coordination Act

At the project site, USFWS is also responsible for overseeing the implementation of the National Wildlife Refuge System Administration Act, as amended, for work taking place at the Havasu National Wildlife Refuge. The act requires USFWS to evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with both the mission of the overall refuge system and the specific purposes for which the Havasu Refuge was established. The Fish and Wildlife Coordination Act requires that any federally funded or authorized modification of a stream or other water body must provide adequate provisions for conservation, maintenance, and management of wildlife resources and their habitat.

Section 10 of the Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army, acting through USACE, for the construction of any structure in or over any navigable water of the United States or for work outside the limits defined for navigable waters of the United States if the structure or work affects the course, location, or condition of the navigable water body. The law applies to any dredging or disposing of dredged materials, excavating, filling, rechanneling, or any other modifying of a navigable water of the United States. It applies to all structures, including any infrastructure, permanent or semipermanent obstacle, or obstruction, including but not limited to wharfs, weirs, jetties, bank protection (e.g., riprap, revetment, bulkheads), mooring structures (e.g., pilings), navigation aids (e.g., buoys, dolphins), aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessels, tunnels, artificial canals, and boat ramps.

Activities regulated under Section 10 of the Rivers and Harbors Act generally are similar to those under Section 404 of the CWA, but the geographic extent of jurisdiction is more restricted, limited to identified navigable waters of the United States.

Federal Antidegradation Policy

The federal antidegradation policy has been in existence since 1968. The policy protects existing uses and water quality and national water resources. It directs states to adopt a statewide policy that includes the following primary provisions:

- Existing instream uses and the water quality necessary to protect those uses shall be maintained and protected.

- Where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the state finds that allowing lower water quality is necessary for important local economic or social development.

- Where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Federal Clean Water Act

The U.S. Environmental Protection Agency (EPA) is the lead federal agency responsible for water quality management under the CWA. The Clean Water Act of 1972 (also known as the Federal Water Pollution Control Act) is the primary federal law that governs and authorizes water quality control activities by EPA and the states. Various elements of the CWA address water quality. These are discussed below. Wetland protection elements administered by USACE under Section 404 of the CWA include issuance of permits to dredge or fill wetlands.

Section 401 Water Quality Certification

Section 401 of the CWA states that any person applying for a federal permit or license that may result in the discharge of pollutants into waters of the United States must obtain a state certification that the activity complies with all applicable water quality standards, limitations, and restrictions. This certification is administered in California by the State Water Resources Control Board (SWRCB) via the RWQCBs. No license or permit may be granted by a federal agency until certification required by Section 401 has been granted. Further, no license or permit may be issued if certification has been denied. An entity seeking a Section 401 water quality certification typically must obtain a CWA Section 404 permit from USACE.

Section 404 of the Clean Water Act

Section 404 of the CWA requires that any person conducting any activity that involves any discharge of dredged or fill material into waters of the United States, including wetlands, obtain a permit. USACE is responsible for issuing permits for the placement of fill or discharge of material into waters of the United States required under CWA Sections 401 and 404. Water supply projects that involve instream construction, such as dams or other types of diversion structures, trigger the need for these permits and related environmental reviews by USACE. USACE also is responsible for flood control planning and assisting state and local agencies with the design and funding of local flood control projects.

Water Quality Criteria and Standards

Under federal law, EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: identified designated beneficial uses of the water body in question and criteria that protect the designated uses. Section 304(a) requires EPA to publish advisory water quality criteria on the kind and extent of all effects on health and welfare caused by pollutants in water. The criteria must accurately reflect the latest scientific knowledge. Where multiple uses of a water body exist, water quality standards must protect the most sensitive use. In California, EPA has granted SWRCB and its nine RWQCBs the authority to identify beneficial uses and adopt applicable water quality objectives.

National Pollutant Discharge Elimination System Permit Program

The National Pollutant Discharge Elimination System (NPDES) permit program was established in the CWA to regulate municipal and industrial discharges to surface waters of the United States. In California, EPA delegates much of the implementation of the CWA to SWRCB. Although SWRCB has issued a few NPDES permits, the vast majority of NPDES permits are issued by the various RWQCBs. The discharge of wastewater to surface waters is prohibited unless an NPDES permit issued by the applicable RWQCB allows that discharge. NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint-source stormwater runoff. NPDES permits generally identify effluent and receiving water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge; prohibitions on discharges not specifically allowed under the permit; and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities. Typically, NPDES permits are issued for a 5-year term.

In November 1990, EPA published regulations establishing NPDES permit requirements for municipal and industrial stormwater discharges. Phase 1 of the permitting program applies to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase 1 also applies to stormwater discharges from a large variety of industrial activities, including general construction activity if the project would disturb more than 5 acres. Phase 2 of the NPDES stormwater permit regulations, which became effective in March 2003, require that NPDES permits be issued for construction activity for projects that disturb between 1 and 5 acres. Phase 2 of the municipal permit system, known as the NPDES General Permit for Small Municipal Separate Storm Sewer System, requires small municipal areas with fewer than 100,000 persons to develop stormwater management programs. The RWQCBs in California are responsible for implementing the NPDES permit system (see “NPDES Permit System,” below).

Section 303(d) Impaired Waters List

Under Section 303(d) of the CWA, states must develop lists of water bodies that would not attain water quality objectives for specific pollutants after implementation of required levels of treatment by point-source dischargers (municipalities and industries). Section 303(d) requires that the state develop a total maximum daily load (TMDL) for each of the listed pollutants. The TMDL is the amount of loading that the water body can receive and still be in compliance with water quality objectives. It can also act as a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality objectives. The TMDL prepared by the state must include an allocation of allowable loadings to point and nonpoint sources, with consideration of background loadings and a margin of safety. The TMDL must also include an analysis that shows the linkage between loading reductions and the attainment of water quality objectives. EPA must either approve a TMDL prepared by the state or, if it disapproves the state’s TMDL, issue its own. NPDES permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of the TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated. The section of the Colorado River adjacent to the project site is not listed on the impaired waters list (EPA 2007).

National Toxics Rule and California Toxics Rule

The National Toxics Rule (NTR) was issued by EPA on December 22, 1992, and amended on May 4, 1995, and November 9, 1999, to establish numeric criteria for priority toxic pollutants necessary to bring all states, including California, into compliance with the requirements of section 303(c)(2)(B) of the CWA. The NTR established water quality criteria for 42 pollutants that were not covered under California’s statewide water quality regulations. As a result of a court-ordered revocation of California’s statewide water quality control plan (basin plan) for priority pollutants in September 1994, EPA initiated efforts to issue additional numeric water quality criteria for California. On May 18, 2000, EPA issued the California Toxics Rule (CTR), which established numeric criteria for priority pollutants not included in the NTR; the CTR was amended on February 13, 2001. The CTR documentation (65 *Federal Register* 31682) carried forward the previously established criteria of the NTR, thereby providing a single document listing California’s fully adopted and applicable water quality criteria for priority pollutants.

Safe Drinking Water Act

The Safe Drinking Water Act was passed in 1974 to regulate the nation’s drinking-water supply. The law, which was amended in 1986 and 1996, requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and groundwater. The Safe Drinking Water Act authorizes EPA to set national health-based standards for drinking water to protect against both naturally occurring and human-made contaminants that may be found in drinking water. EPA sets national standards for drinking water to protect against health risks, considering available technology and costs. These national recommended water quality criteria set enforceable MCLs for particular contaminants in drinking water or required ways to treat water to remove contaminants.

4.7.2.2 State Plans, Policies, Regulations, and Laws

Dickey Water Pollution Act

The Dickey Act created the State Water Pollution Control Board along with nine regional water pollution control boards located in each of the major California watersheds. In 1967 the California Legislature merged the functions of the State Water Quality Board and the State Water Pollution Control Board into the SWRCB to administer state water rights and water quality functions. SWRCB and its nine RWQCBs administer water rights and enforce pollution control standards throughout the state. In addition to granting the water right permits needed to operate new water supply projects, SWRCB also issues certifications related to water quality to developers of projects that affect federal or state waters under Section 401 of the federal CWA. That portion of San Bernardino County in which the project site is located is under the jurisdiction of the Colorado River Basin RWQCB (Region 7). Several plans, policies, and regulations implemented wholly or in part by the SWRCB and/or the RWQCBs are identified in the discussion below.

SWRCB Resolution No. 68-16—State Nondegradation Policy

In 1968, as required under the federal antidegradation policy described previously, SWRCB adopted a nondegradation policy aimed at maintaining high quality for waters in California through the issuance of Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining High Quality Waters in California"). The nondegradation policy states that the disposal of wastes into state waters shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the state and to promote the peace, health, safety, and welfare of the people of the state. The goal of SWRCB Resolution No. 68-16 is to maintain high-quality waters where they exist in the state. In part, SWRCB Resolution No. 68-16 states:

- Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies.

- Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters must meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

SWRCB has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy, which is applicable if a discharge that began after November 28, 1975, will lower existing surface water quality.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (1969) is California's statutory authority for the protection of water quality. Under this act, California must adopt water quality policies, plans, and objectives that ensure that beneficial uses of water in the state are reasonably protected. The act requires the nine RWQCBs to adopt basin plans and establish water quality objectives. The act authorizes SWRCB and the RWQCBs to issue and enforce waste discharge requirements (WDRs) that contain terms and conditions to regulate the discharge of waste to surface waters and land.

Title 22 of the California Code of Regulations

California Code of Regulations Title 22, Division 4 establishes both MCLs and secondary MCLs that shall not be exceeded in water supplied to the public. This section is equivalent to the federal Safe Drinking Water Act. Division 4.5 establishes standards for treatment, storage, and disposal facilities (TSDF) constructed, operated, or maintained within certain distances of fault lines, floodplains, or the maximum high tide and standards for establishing groundwater and vadose zone protection.

Water Quality Control Plan for the Colorado River Basin

The Colorado River Basin RWQCB, under the authority of the state Porter-Cologne Water Quality Control Act and pursuant to the CWA, is responsible for authorizing activities that may discharge wastes to surface water or groundwater resources. The basin plan for the Colorado River Basin, originally adopted by the Colorado River Basin RWQCB in 1993 and last amended in June 2006, identifies the beneficial uses of water bodies and provides water quality objectives and standards for waters of the Colorado River Basin. State and federal laws mandate the protection of designated beneficial uses of water bodies. State law defines beneficial uses as “domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves” (Water Code Section 13050[f]).

The Colorado River Basin plan identifies specific narrative and numeric water quality objectives for a number of physical properties (e.g., temperature, turbidity, and suspended solids); biological constituents; and chemicals of concern, including inorganic parameters, trace metals, and organic compounds. Water quality objectives for toxic priority pollutants (i.e., select trace metals and synthetic organic compounds) are also identified in the basin plan.

NPDES Permit System

SWRCB and the Colorado River Basin RWQCB have adopted specific NPDES permits and/or WDRs for a variety of activities that may involve the discharge of wastes to waters of the state or to land. SWRCB’s statewide stormwater permit for general construction activity (Order 99-08-DWQ, as amended) is applicable to all land-disturbing construction activities that would disturb 1 acre or more. Construction activities such as clearing, grading, stockpiling, and excavation are subject to the statewide general construction activity NPDES permit. Because the proposed project would disturb one acre or more of soil, the remedial activities would have to comply with the substantive requirements of Order 99-08-DWQ, and as of July 1, 2010, the new SWRCB Order 2009-0009-DWQ, discussed below.

NPDES permits are also issued to point-source discharges of pollutants to surface waters and are issued pursuant to Water Code Chapter 5.5, which implements the federal CWA. Examples include public wastewater treatment facilities, industrial facilities, power plants, and groundwater cleanups discharging to surface waters. In California, adopted WDRs for discharges to surface water that are issued by the relevant RWQCB also serve as the NPDES permits for these dischargers. The project site is within the jurisdiction of the Colorado River Basin RWQCB.

The Colorado River Basin RWQCB may also issue site-specific WDRs, or waivers to WDRs, for certain waste discharges to land or waters of the state occurring within its jurisdiction. In particular, Colorado River Basin RWQCB Resolution R7-2003-0008 identifies activities subject to waivers of reports of waste discharge and/or WDRs for a variety of activities, including minor dredging activities and construction dewatering activities that discharge to land. The WDRs also include findings, discharge prohibitions, effluent limitations, provisions, and self-monitoring requirements. The findings of the NPDES permit process provide information about design and operations, beneficial uses to be protected, and applicable standards.

SWRCB Order 2009-0009 DWQ

Order 2009-0009 DWQ, effective July 1, 2010, is a General Construction Permit regulating construction related storm water discharges to surface water and will replace Order 99-08-DWQ described above on July 1, 2010. The permit incorporate numeric limits on constituents contained in storm water runoff pollution from construction sites. The permit is based on the approach that minimal requirements are needed for low-risk projects and become progressively more stringent for projects with a higher threat to water quality. The permit also identifies appropriate control requirements based on the risk of sediment. Best management practices (BMP) for erosion control, sediment control, and runoff control are key components of compliance with the permit requirements (SWRCB 2009:30–31).

WDRs for Topock Interim Measure

The Colorado River Basin RWQCB also issues WDRs for discharges associated with industrial activities within its jurisdiction that define discharge limitations and waste stream management requirements for a specific project. WDRs were issued to PG&E in 2004 for discharging treated groundwater from the Interim Measure by three different methods: discharge to the Colorado River (R7-2004-0100), discharge to land by subsurface injection (R7-2004-0103), and discharge to Class II surface impoundments (R7-2004-0080). The only method used for the discharge of treated wastewater has been through subsurface injection. Orders R7-2004-0100 and R7-2004-0103 expired in January 2007, and the provisions in Order R7-2004-0080 for discharge of treated groundwater from the Interim Measure expired in January 2007. Discharge of treated groundwater from the Interim Measure is currently authorized under RWQCB Order R7-2006-0060.

The Colorado River Basin RWQCB may develop a new set of WDRs for purposes of covering the injection process, including amendments to the injection water and operation of the IRZ. Monitoring of the treatment process appurtenances shall be employed to facilitate compliance with the waste discharge requirements defined in the WDR Order . Noncompliance with the WDR Order, which defines specific management actions intended to protect water quality, shall be grounds for enforcement actions.

SWRCB Order No. 97-03-DWQ is a General Permit regulating discharges to storm water from specified industrial activities. This permit requires facility operators to eliminate unauthorized non-storm water discharges; develop and implement a storm water pollution prevention plan; and perform monitoring of storm water discharges and authorized non-storm water discharges. The storm water pollution prevention plan (SWPPP) has two major objectives: (1) to help identify the sources of pollution that affect the quality of industrial storm water discharges and authorized non-storm water discharges, and (2) to describe and ensure the implementation of BMPs to reduce or prevent pollutants in industrial storm water discharges and authorized non-storm water discharges. This General Permit requires development and implementation of an SWPPP emphasizing BMPs. This approach provides the flexibility necessary to establish appropriate BMPs for different types of industrial activities and pollutant sources.

PG&E is currently implementing a SWPPP for the Topock Interim Measure (*Industrial Storm Water Pollution Prevention Plan Topock Compressor Station Groundwater Treatment System Interim Measure No. 3*; CH2M Hill 2005) to identify sources of pollutants that may affect discharges from the Interim Measure activities and to implement BMPs to reduce pollutants in discharges that may impact receiving water quality. The BMPs identified are aimed at implementing measures to control the release of potential chemical contaminants. Examples of BMPs identified in the SWPPP include storing materials and equipment to ensure that spills or leaks cannot enter the storm drain system or surface water, developing and implementing a spill prevention and cleanup plan, and designing tank systems with sufficient strength to avoid collapse or rupture. In conformance with the substantive requirements of Order No. 97-03-DWQ, PG&E would prepare a revised SWPPP for the project.

California Water Code

Section 13801(c), California Well Standards, Bulletin 74-90 (Supplement to Bulletin 74-81) sets forth minimum standards for the construction of water supply, cathodic, and monitoring wells. These standards would be applicable for all wells installed at the project site.

4.7.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

San Bernardino Department of Public Health

The Safe Drinking Water Permit Section, Environmental Health Services (EHS) of the San Bernardino Department of Public Health is responsible for issuing permits for the installation of soil borings (if groundwater is encountered) and groundwater wells in San Bernardino County. EHS personnel are responsible for inspecting boring and well installations for conformance with state and local well standards.

4.7.3 Environmental Impacts and Mitigation Measures

4.7.3.1 Analysis Methodology

The purpose of the proposed project is to implement a final remedy that would, over time, clean up groundwater contaminated with chemicals of concern. In particular, Cr(VI) as the main chemical of concern to the background levels of 32 µg/l. The feasibility and ability of the proposed project to meet objectives is considered in detail in the Final CMS/FS (CH2M Hill 2009a). The purpose of this analysis is to evaluate the potential hydrologic and water quality impacts resulting from implementation of the proposed groundwater remediation project. Impacts to hydrology and water quality were evaluated qualitatively by assessing proposed construction, operation and maintenance, and decommissioning activities for the project.

4.7.3.2 Thresholds of Significance

Based on the CEQA Guidelines and Water Quality Element of the *San Bernardino County General Plan*, the proposed project would have a significant impact related to hydrology and water quality if it would:

- violate any water quality standards or waste discharge requirements;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- place housing within a a100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map;
- place within a 100-year flood hazard area structures which would impede or redirect flows;
- expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-or off-site; or

- require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Construction and decommissioning activities for the proposed project would not increase flows that would result in flooding on-site or off-site. Operation and maintenance activities associated with the proposed project may include the long-term presence of new impervious surfaces that would increase runoff from the project site; however, these surfaces would be discontinuous and would continue to flow predominantly as sheet flow directly to the Colorado River. Increased flows would be minimal in comparison to total flows to the receiving water and are not expected to result in flooding on-site or off-site. No impacts related to on- or off-site flooding are anticipated and therefore this threshold is not considered further in this analysis.

All phases of the proposed project would use localized runoff management measures, if needed, to handle on-site flows, and would not require construction of new stormwater drainage facilities or expansion of existing facilities. No impacts related to new stormwater drainage facilities are anticipated and therefore this threshold is not considered further in this analysis.

In the project area, as well as upstream in the Mohave Valley, a floodplain borders both sides of the Colorado River. Portions of the project area are located on or near the 100-year floodplain of the Colorado River. However, because of upstream dams and flow regulation, the river no longer floods. The proposed project involves the installation and operation of wells, pipelines, and other remedial facilities and does not include sensitive land uses, such as residential or commercial structures, in a floodplain area. No structures or new infrastructure is planned for the floodplain area that would impede or redirect flood flows in any of the project components. Therefore, no impact would occur related to the existing floodplain.

The closest dam to the project area is Parker Dam, located 42 miles downstream. Davis Dam and Hoover Dam are located approximately 55 and 108 miles upstream of the project site, respectively. The Hazards Overlay Map of the County General Plan indicates that the project area is not in an area that would be subject to inundation from failure of either dam. Therefore, no impact would occur related to inundation caused by dam failure.

The project site is not located near a coastline that a tsunami could reasonably be expected to inundate. The local geology, as described in Section 4.5, "Geology and Soils," and the minimal amount of rain received at the site are not favorable to the generation of a mudflow that could significantly affect the project. Seiches can be generated by wind, differential barometric pressure between two locations, landslides, or earthquakes. Wind-generated seiches require large areas of open water, and seiches generated by differential barometric pressure require meteorological conditions not generally observed in the project area. The most likely source that would generate a seiche would be an earthquake. The mechanisms for generating the seiche include direct earth movement in the form of landslides or movement along a fault and from seismic waves moving through the earth. However, the size of the seiche generated would likely be minimal, given that no active faults have been identified within approximately 95 miles of the project area. Therefore, generation of the seiche from direct ground movement along a fault is not likely. The potential for seismic waves to generate a seiche is minimal, owing to the limited occurrence of sedimentary rocks that could transmit the seismic energy into the water of the Colorado River. Therefore, no impacts would occur related to inundation by seiche, tsunami, or mudflow.

Refer to Section 4.12, "Water Supply," for the analysis related to the potential depletion of groundwater supplies or interference with groundwater recharge such that it would result in a net deficit in aquifer volume or the lowering of the local groundwater table.

4.7.3.3 Impact Analysis

The proposed project consists of installing, operating and maintaining, and decommissioning groundwater injection, extraction, and monitoring wells, conveyance piping and utilities, and other associated facilities. Injection and extraction wells would require connection to power supplies, pipelines, and control systems.

These wells would likely have treatment facilities (equipment vaults or small equipment sheds located near the wellhead). New or improved existing roadways would also be constructed and maintained to provide access to the various elements (wells, conveyance piping, and treatment facilities). A water conveyance system would transfer freshwater, treated and untreated water, and reductant-amended water throughout the treatment area. Pipelines could be installed aboveground or belowground. Roads, pipelines, pumps, electrical and communication wiring and equipment, and instruments would require periodic inspection and repair.

Some chemicals would be stored on site to facilitate treatment of the contaminant plume. Specific details about the types and quantities of chemicals needed for the proposed project are not known with certainty at this time and would not be finalized until the detailed design phase for the component is completed. However, it is anticipated that the reductant would be the single largest category of chemical use and storage, and maximum amount of reductant stored (based on ethanol use) would be 240,000 gallons per year. Specific chemical types and usage rates might vary depending on the types and amount of infrastructure, lengths of operations and maintenance periods, and actual flow rates. Materials likely to be handled in the largest volumes would be reductant for the in situ systems, chemicals for injection well maintenance, chemicals for treatment of freshwater, and extracted groundwater containing Cr(VI). Various other chemicals may be used in smaller volumes for the treatment system and for maintenance of the monitoring, injection and extraction wells, and support equipment. These other chemicals could include cleaners, adhesives, paints or coatings, acids, caustics, gases, precipitants/coagulants, polymers, dispersants, inhibitors/antiscaling chemicals, specialty chemicals, fuels, and additives.

Eventual decommissioning of proposed project facilities, as well as the IM-3 Facility would include removal of the exterior structure, decontamination and removal of interior treatment equipment, and removal of associated tanks and other facilities from the site. Additionally, the IM-3 Facility includes extraction wells, injection wells, monitoring wells, pipelines, an aboveground treatment plant, brine storage, and loading facilities. Decommissioning of the existing IM-3 Facility would require activities in several locations throughout the project area. Decommissioning of the existing IM-3 Facility is assumed to include removal of the structure, treatment equipment, and associated tanks and facilities from the site. Treatment facility structures and equipment, such as storage tanks, pumps, process piping, conduit, reactors, instrumentation, electrical power supply, security, fencing, lights, electrical trays, concrete, and road surfacing, are assumed to be removed and either reused, sold for salvage value, and/or transported off-site to an appropriately permitted disposal facility. Equipment, such as process pipes and tanks, would be decontaminated as appropriate, such as by power washing. Injection, extraction, and monitoring wells would include decommissioning activities, such as over-drilling the well with a drill rig, and sealing the well/borehole with cement grout.

The proposed project could potentially cause hydrology and water quality impacts from construction activities associated with construction and decommissioning of the treatment facilities and from potential increased runoff and exposure of runoff to significant materials during construction, operation and maintenance, and decommissioning.

IMPACT HYDRO-1	Exceedance of Water Quality Standards. *Construction, operation and maintenance, and decommissioning activities associated with the proposed project could result in (i) the exceedance of water quality standards as a result of increased runoff from impervious surfaces and (ii) exceedance of water quality standards due to potential exposure of runoff to significant materials stored, handled, and transported at the site. This would be a* potentially significant *impact.*

Construction, operation and maintenance, and decommissioning activities associated with the proposed project could result in the exceedance of water quality standards and objectives o if pollutants (e.g., sediment, partially treated or untreated contaminated groundwater, materials stored and handled on-site) are released and have the potential to become exposed to stormwater runoff. Earth-disturbing construction activities such as grading, drilling, and excavation and the construction of infrastructure, could lead to temporary impacts associated with water quality runoff. Construction activities involving soil disturbance, excavation, cutting/filling, stockpiling, and grading could potentially degrade receiving water quality, primarily the Colorado River and receiving drainages. During a storm event, the potential for sediment load of surface runoff flowing over disturbed soils increases, resulting in additional erosion of the site surface and impacts on water quality of the receiving waters. Construction materials such as asphalt, concrete, and equipment fluids could also be exposed to rainfall, which would result in contaminated surface runoff and adverse impacts on receiving water quality.

In addition, operation and maintenance activities could potentially cause a violation of water quality standards (nondegredation rule); if the pipeline conveying extracted water and/or carbon amended water from extraction and injection wells or at IRZ wells leaks or ruptures, in which case the untreated water could enter the Colorado River or nearby washes or infiltrate into the soil.

Loading and unloading activities, including unloading treatment chemicals and containers and loading treatment system solids and empty chemical containers for disposal, could also result in a release of pollutants, which could violate water quality standards. Additional pollutant sources include trucks used for loading/unloading and forklifts used to move containers. A release of pollutants could potentially occur if containers are dropped or punctured during loading/unloading causing a leak, or from incidental oil and fluid leaks from trucks and forklifts. Water quality impacts on receiving waters would be **potentially significant**. **(Impact HYDRO-1)**

In Situ Treatment Byproducts

The IRZ portion of the proposed project would result in temporary, localized reducing conditions within the aquifer. The reducing conditions created within the IRZ would transform the soluble Cr(VI) to Cr(III) with low solubility. A result of the reducing conditions is the creation of metal byproducts, which include soluble forms of arsenic, iron, and manganese as byproducts of the reduction process.

IRZ pilot testing conducted within the floodplain and upland areas have determined that iron, manganese, and arsenic byproduct concentrations from the IRZ operation would be within the range observed in natural reducing zones at the site: approximately 0 to 30,000 µg/l for iron, 0 to 10,000 µg/l for manganese, and 0 to 50 µg/l for arsenic. Higher concentrations of these metals were temporarily observed in a few upland pilot test monitoring wells at locations close to injection wells where the reducing conditions are strongest. However, a short time after the injection of carbon amendments ceased, these locally elevated metals concentrations decreased (CH2M Hill 2009d:34, included in Appendix CMS of this EIR). Pilot tests indicate that with further distance from the injection wells, substantially attenuated (decreased) concentrations of these constituents would be observed, which in time would return to baseline naturally occurring conditions (CH2M Hill 2009d:32, included in Appendix CMS of this EIR).

During IRZ operation, the concentrations of metal byproducts would decrease through combinations of natural processes including sorption to soils or organic material, diffusion with migration, and precipitation as solid forms (CH2M Hill 2009d:37, included in Appendix CMS of this EIR). The iron and manganese would be liberated during the reduction process and typically coprecipitate with arsenic, thus removing dissolved arsenic from the groundwater. These reactions typically occur within or along the IRZ margins (CH2M Hill 2009d:35, included in Appendix CMS of this EIR). The presence of iron, manganese, and arsenic byproducts is considered temporary. When the organic carbon injected to form the IRZ is consumed, the concentrations of iron, manganese, and arsenic begin to return toward baseline concentrations.

Regular monitoring that is a part of the proposed project would reveal concentrations of these byproduct metals. If monitoring indicates that byproducts remain temporarily elevated above baseline and background for an extended period of time, operational modifications with respect to cycle duration and strength organic carbon dose may be made. In the event that the modifications with respect to cycle duration and dose strength are ineffective in controlling the byproduct generation and migration, additional measures that may include short-term oxidant or oxygen injection may be implemented for purposes of controlling reductive byproducts.

With these measures in place, hydrologic and water quality impacts related to these operational byproducts is **less than significant**.

Mitigation Measure HYDRO-1: Exceedance of Water Quality Standards.

The project shall implement BMPs to meet the substantive criteria of all applicable federal, state, and local permit and regulatory requirements, even if a permit is not required pursuant to CERCLA, for purposes of ensuring the protection of receiving water quality. As such, a BMP plan shall be prepared and implemented for the project prior to construction and decommissioning phase activities.

Impacts on water quality from pollutants, including soils from erosion, shall be controlled through use of the following types of BMPs, which shall be incorporated into the appropriate project-specific BMP plan. BMP designations are based on those used by the *California Department of Transportation Storm Water Quality Handbooks, Construction Site BMPs Manual* (Caltrans 2000) and the *California Stormwater Quality Association Construction BMP Handbook* (California Stormwater Quality Association 2004):

- Scheduling (SS-1): Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes.

- Preservation of Existing Vegetation (SS-2): Preserving existing vegetation to the maximum extent practicable facilitates protection of surfaces from erosion and can also help to control sediments. Sensitive areas should also be clearly identified and protected.

- Hydraulic Mulch (SS-3), Straw Mulch (SS-6), and Wood Mulching (SS-8): Using various mulches is a method for temporarily stabilizing soil and can be used on surfaces with little or no slope.

- Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (SS-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles.

- Stabilized Construction Entrance/Exit (TC-1): A graveled area or pad located at points where vehicles enter and leave a construction site can be built. This BMP provides a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust.

- Runoff Control Measures (SS-9, SS-10, and SC-10): These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and stormwater conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Diversions can be either temporary or permanent. Temporary diversions include excavation of a channel along with placement of the spoil in a dike on the downgradient side of the channel, and placement of gravel in a ridge below an excavated swale. Permanent diversions are used to divide a site into specific drainage areas, should be sized to capture and carry a specific magnitude of storm event, and should be constructed of more permanent materials. A water bar is a specific kind of runoff diversion that is constructed diagonally at intervals across a linear sloping surface such as a road or right-of-way that is subject to erosion. Water bars are meant to interrupt accumulation of erosive volumes of water through their periodic placement down the slope, and divert the resulting segments of flow into adjacent undisturbed areas for dissipation.

- Silt Fence (SC-1): A temporary sediment barrier consisting of fabric is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows.

- Gravel Bag Berm (SC-6) and Sand/Gravel Bag Barrier (SC-8): A temporary sediment barrier consisting of gravel-filled fabric bags is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows.

- Desilting Basin (SC-2) and Sediment Trap (SC-3): Constructing temporary detention structures facilitates the removal of sediment from waters. The devices provide time for sediment particles to settle out of the water before runoff is discharged.

Secondary concerns include potential pollutants from inappropriate material storage and handling procedures and nonstormwater discharges. These will be addressed through the following types of BMPs, which shall be incorporated into the stormwater BMP plan:

- Material Delivery and Storage (WM-1): Provide covered storage for materials, especially toxic or hazardous materials, to prevent exposure to stormwater. Store and transfer toxic or hazardous materials on impervious surfaces that will provide secondary containment for spills. Park vehicles and equipment used for material delivery and storage, as well as contractor vehicles, in designated areas.

- Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an overpack drum, is provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous.

- Solid Waste Management (WM-5): Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter.

- Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes.

- Concrete Waste Management (WM-8): Dispose of excess concrete in specific concrete washout facilities.

- Sanitary/Septic Waste Management (WM-9): Locate sanitary and septic waste facilities away from drainage courses and traffic areas. Maintain the facilities regularly.

- Vehicle and Equipment Cleaning (NS-8): Clean vehicles and equipment that regularly enter and leave the construction site.

- Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off-site whenever possible. If off-site fueling is not practical, establish a designated on-site fueling area with proper containment and spill cleanup materials.

- Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be protected from stormwater runoff and on-site flooding.

In addition to BMPs implemented to avoid or reduce impacts from the construction and decommissioning phases, BMPs shall also be implemented to avoid or reduce impacts from the operations and maintenance phases. To address potential violation of water quality standards caused by insufficient treatment, system failure at concentrations in excess of water quality standards, proper design shall include contingency measures such as safeguards to shut down the extraction wells in case of pipeline failure or malfunction. In addition, operation of the proposed project will be governed by and follow an operations and maintenance plan.

PG&E will comply with all applicable water quality standards and any SWRCB or RWQCB resolutions identified as ARAR, as well as a corrective action monitoring program. Under the corrective action monitoring program, data will be collected to measure performance of the remedy, compliance with standards, and progress of the remedial action as a part of the project description. In addition, the project will be operated to continually assess performance issues and to modify the type, method, and configuration of the treatment delivery systems to enhance performance of the remedy to attain the cleanup goals and to respond to site conditions and performance issues as described in the project description.

A SWPPP will also be prepared for the proposed project, which will contain BMPs related to industrial activities (industrial SWPPP). The BMPs are designed to reduce pollutants in discharges that may affect receiving water quality during operations and maintenance of the proposed project. As noted above, BMP designations are based on those used by the *California Stormwater Quality Association Construction BMP Handbook* (California Stormwater Quality Association 2004). The SWPPP will incorporate BMPs such as the following:

- Good Housekeeping: Maintain facility in a clean manner and train facility personnel to contribute to a safe, clean, and orderly environment by properly disposing of trash in designated containers, storing materials in appropriate locations, and keeping equipment clean and in good working condition.
- Preventative Maintenance: Prevent or minimize release of pollutants. Develop Standard Operating Procedures for operation and maintenance of facility components and train employees to follow the procedures.
- Non-Stormwater Discharges (SC-10): Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Conduct regular inspections of high priority areas.
- Spill Prevention, Control, and Cleanup (SC-11): Store materials properly to prevent spills from entering the storm drain system or surface waters. Ensure that spill cleanup materials are located on-site and are easily accessible. Clean up leaks and spills immediately using proper absorbent materials. Absorbents used to clean up hazardous materials must be disposed of as hazardous waste. Educate employees about spill prevention and cleanup.
- Vehicle and Equipment Fueling (SC-20): Maintain clean fuel-dispensing areas using dry cleanup methods, such as sweeping or using rags and absorbents for leaks and spills. Cover the fueling area to prevent contact with stormwater. Train personnel in pollution prevention, focusing on containment of spills and leaks.
- Outdoor Loading/Unloading (SC-30): Load and unload chemicals during dry weather, if possible, and load and unload in designated areas. Check equipment regularly for leaks.
- Outdoor Liquid Container Storage (SC-31): Cover the storage area with a roof and provide secondary containment. Inspect storage areas regularly for leaks or spills.
- Outdoor Equipment Operations (SC-32): Perform activities during dry weather, cover the work area with a roof, and use secondary containment. Train employees in proper techniques for spill containment and cleanup.
- Waste Handling and Disposal (SC-34): Cover storage containers with leak-proof lids, check for leaks weekly, and clean storage areas regularly. Ensure that wastes are disposed of properly.
- Tank Design System: Ensure that tank systems have sufficient strength to avoid collapse, rupture, or failure and that they are protected against physical damage and excessive stress. Provide adequate secondary containment.

In conformance with the substantive requirements of General Industrial Permit (Order No. 97-03-DWQ), a monitoring and reporting program will be implemented to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary, to continue to reduce pollutants and impacts on receiving waters. The monitoring program shall include the following minimum elements:

- sampling and analysis of the first stormwater event of the wet season (October 1 through May 30),

- sampling and analysis of a second stormwater event during the wet season,
- quarterly visual observations,
- monthly visual observations of storm-event discharges during the wet season, and
- annual evaluation for site compliance.

Results of this monitoring shall be reported annually to DTSC. The annual report shall also report noncompliance, if applicable, with either the SWPPP or substantive general permit requirements and shall include a plan to prevent recurrence of the noncompliance.

The implementation of stormwater plans shall include an education component to train workers on water quality concerns and proper BMP implementation, maintenance, and repair, in addition to stormwater management program training on the construction BMP plan and industrial SWPPP.

Timing:	BMPs to minimize impacts to less than significant shall be implemented before and during activities in the project area.
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC shall be responsible for ensuring compliance.
Significance after Mitigation:	Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling runoff and by ensuring that the quality of stormwater flows meets the relevant requirements. Consequently, any impacts resulting from alterations of drainage and hydrology and water quality during construction, operation and maintenance, and decommissioning would be mitigated to a level of **less than significant**.

IMPACT HYDRO-2	Drainage Pattern Alterations. *The proposed project would require the construction of impervious surfaces that could result in increased flows from individual project sites within the project area that could result in an increase of erosion and siltation on the project site and off-site. This would be a* ***potentially significant*** *impact.*

All phases of the proposed project would have the potential for localized alteration of drainage patterns. These alterations may result in temporarily increasing runoff during operation and maintenance caused by increased impervious areas. The impervious areas include features such as well heads and vaults, remediation equipment compounds, and chemical storage areas. Installation of these features would redirect surface water flows around the features. Temporary ponding and/or flooding could also result from such activities, from temporary alterations of the drainage patterns, or from the temporary creation of a sump condition from grading. However, flows from the project area are predominantly sheet flow to the Colorado River and are not anticipated to be significantly altered. Alterations may temporarily result in erosion and siltation if flows are substantially increased or routed to concentrated flow paths that would not have the capacity to carry the flow. The increased impervious area; however, is expected to be predominantly noncontiguous, therefore minimizing the impact of concentrated flow paths, increased flow rates, and associated erosion and siltation. Nonetheless, increased runoff has the potential to result in increased erosion and siltation that would present a **potentially significant** impact.

Decommissioning of the proposed project would result in removal of impervious surfaces and would result in project flows similar to preproject conditions. This phase could result in temporary increases in erosion and siltation during decommissioning activities; however, it would not result in significant impacts on erosion and siltation after the project area is stabilized. Post-project restoration would result in a **less-than-significant** impact.

Mitigation Measure HYDRO-2: Exceedance of Water Quality Standards and/or Waste Discharge Requirements.

Implement Mitigation Measure HYDRO-1. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling erosion and siltation. Consequently, any impacts associated with erosion and siltation resulting from alterations of drainage and hydrology and water quality during construction, operation and maintenance, and decommissioning would be mitigated to a **less-than-significant** level.

IMPACT HYDRO-3 Polluted Stormwater Runoff. *The proposed project does not include discharge to an existing or planned stormwater drainage system. The project does have the potential to contribute substantial additional sources of polluted runoff if materials and operations are not properly handled. This would be a* ***potentially significant*** *impact.*

The proposed project would not contribute runoff water to existing stormwater drainage systems and no new systems are proposed; therefore, no significant impact from this activity would occur. However, as discussed under Impact HYDRO-1, construction, operation and maintenance, and decommissioning activities associated with the proposed project could result in substantial additional sources of polluted runoff if pollutants (e.g., sediment, partially treated or untreated contaminated groundwater, materials stored and handled on-site) are released and if pollutants have the potential to become exposed to stormwater runoff. This impact would be **potentially significant**. **(Impact HYDRO-3)**

Mitigation Measure HYDRO-3: Exceedance of Water Quality Standards and/or Waste Discharge Requirements.

Implement Mitigation Measure HYDRO-1. Mitigation Measure HYDRO-1 shall be implemented. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling potential pollutants, including sediment, and runoff discharges from the project area. Consequently, any impacts associated with pollutants resulting from alterations of drainage and water quality during construction, operation and maintenance, and decommissioning would be mitigated to a **less-than-significant** level.

This page is left intentionally blank.

4.8 LAND USE AND PLANNING

This section describes the existing onsite and surrounding land uses and analyzes the changes or impacts to land uses that would occur with implementation of the proposed project. This analysis also addresses the project's effects on land use compatibility.

4.8.1 EXISTING SETTING

The project area is located approximately 12 miles southeast of the city of Needles, California, and 1 mile southeast of the Moabi Regional Park in California. The project site is also located 0.5 mile west of the community of Topock, Arizona, which is situated directly across the Colorado River. The project compressor station occupies approximately 66.8-acre parcel of land owned by PG&E. However, the area where corrective action activities may occur (the "project area") includes 40.3 acres of the 66.8-acre PG&E-owned parcel as well the immediate surrounding area that could be affected by construction, operation, and/or decommissioning activities associated with the proposed project (see Exhibit 3-2). The total project area is 779.21 acres, which covers additional surrounding lands managed by other agencies and private property owners (see Exhibit 3-3).The lands adjoining the PG&E parcel are owned and/or managed by a number of government agencies and private entities, including land in San Bernardino County (County) in California, which is managed by the U.S. Department of Interior (DOI) Bureau of Land Management (BLM); the Metropolitan Water District of Southern California (MWD); the Havasu National Wildlife Refuge (HNWR), which is managed by the United States Fish and Wildlife Service (USFWS); lands owned by the U.S. Bureau of Reclamation (Reclamation) and managed by the BLM; the Burlington Northern Santa Fe (BNSF) Railway; lands leased by the California Department of Transportation (Caltrans) along Interstate 40 (I-40); lands owned by the Fort Mojave Indian Tribe; and privately owned lands (see Exhibit 3-3 in Chapter 3, "Project Description"). The lands owned by the Fort Mojave Indian Tribe are owned in fee, but are subject to an exclusive easement in favor of PG&E for remediation related purposes. The land in Mohave County in Arizona includes the HNWR and privately owned land in the community of Topock.

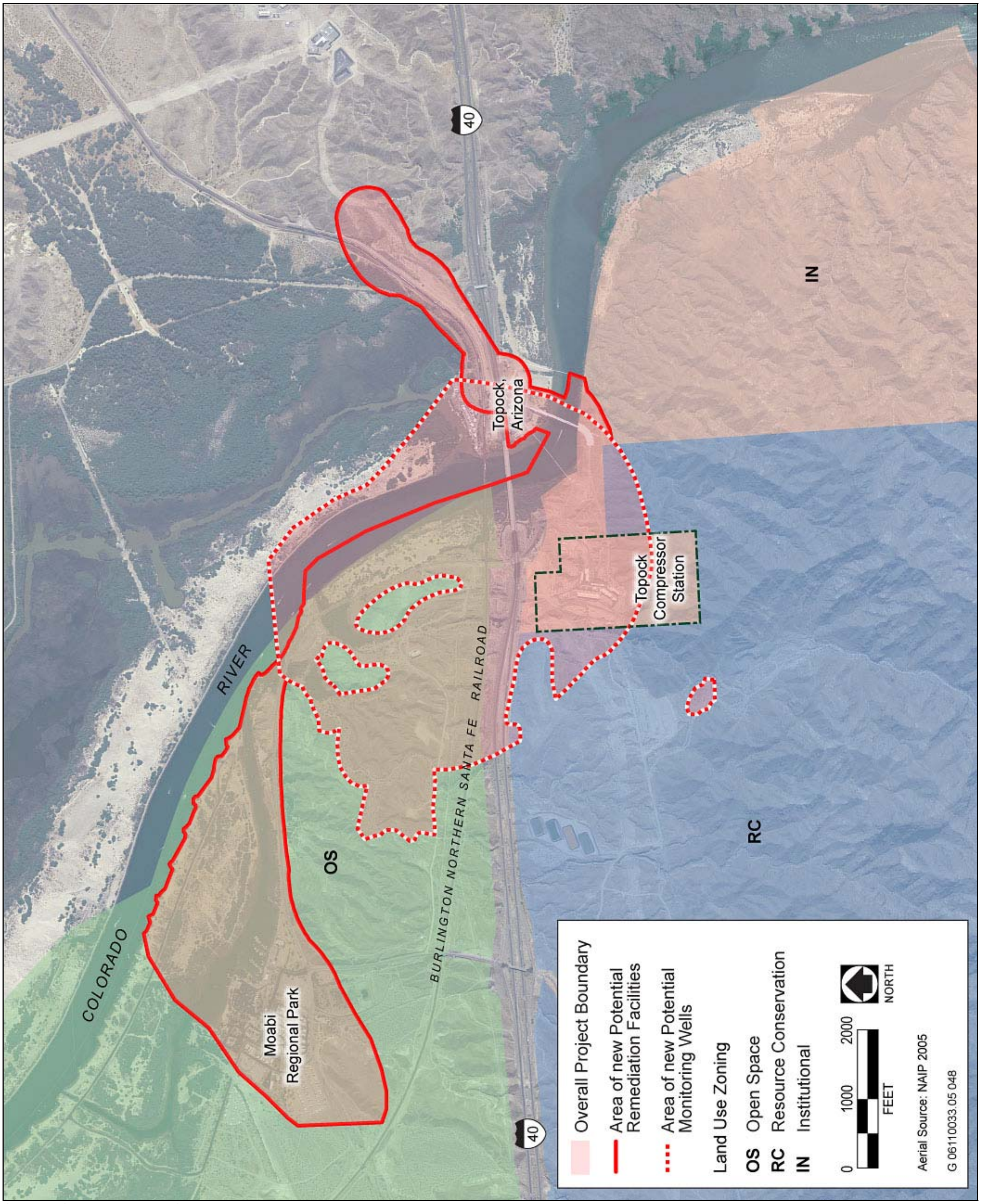
The Colorado River is the main economic driver in the area, attracting visitors and residents for recreational opportunities. All urban communities in the region are located adjacent to the Colorado River and include Laughlin, Nevada; Needles, California; and Lake Havasu City, Arizona.

4.8.1.1 EXISTING LAND USES

Existing land uses in the project area consist of the compressor station, Moabi Regional Park, the community of Topock, Arizona, open space owned and/or managed by BLM, USFWS, Reclamation, the County, MWD, the Fort Mojave Indian Tribe, the BNSF railroad right-of-way, and I-40. These lands are under multiple jurisdictions, including the County, Mohave County, Arizona, BLM, and agencies under the DOI. Lands under federal ownership are not subject to State or County policies or jurisdictional authority. As shown in Exhibit 4.8-1, the project area and adjacent lands are zoned by the County for institutional (IN), open space (OS), and resource conservation (RC) land uses (San Bernardino County 2007:CD map). These existing land uses are described below.

Topock Compressor Station

PG&E currently operates the compressor station adjacent to the Colorado River and south of I-40, which began operating in 1951. The primary facilities associated with the compressor station are located on 66.8 acres of PG&E-owned land. The compressor station is used to compress natural gas for transport through PG&E pipelines to customers in central and northern California. From 1951 to 1965, PG&E leased the property from the state and, in 1965, purchased the property from the state.



Source: San Bernardino County 2007

San Bernardino County Zoning **Exhibit 4.8-1**

The main structures used at the compressor station for compressing natural gas include the compressor building, Cooling Towers A and B, and the generator building. In addition, adjacent to the main buildings are various structures used for auxiliary purposes, including an office, a warehouse, a vehicle garage, maintenance buildings, equipment and chemical storage buildings, and a water softening building. There are also aboveground storage tanks at the facility that are used for storage of water, water treatment chemicals, new and used compressor oil, gasoline and diesel, and wastewater. All of these facilities are located on the PG&E-owned parcel. Other ongoing activities at the compressor station, including operation of IM-3, monitoring wells, and evaporation ponds, are located outside of PG&E's owned parcel and occur on lands managed by the BLM and USFWS (HNWR), or in the case of the IM-3 Facility, land owned by the Fort Mojave Indian Tribe for which PG&E holds an exclusive easement for remediation related purposes.

Moabi Regional Park

Moabi Regional Park, also referred to as Park Moabi, is owned and operated by the San Bernardino County Regional Parks Department, and is located along the banks of the Colorado River, approximately 12 miles southeast of the city of Needles. Recreational activities available in the park include lodging, camping, fishing, boating (launching and rental), off-highway vehicle trails, swimming, and water skiing. Moabi Regional Park also offers 35 full hookup recreational vehicle sites, unlimited tent sites, 24 group campsites, and approximately 100 mobile home sites. The mobile home sites can be occupied for up to 5 months during a year. Development at Moabi Regional Park is guided by a County-developed master plan. In May 2009, Pirate Cove Resort was developed as a vacation resort that features waterfront cabins, a bar and grill, a 300-slip marina, and recreational vehicle sites. The Pirate Cove Resort also has camping sites and offers water activities including boating, jet and water skiing, kayaking, canoeing, and swimming.

U.S. Fish and Wildlife Service Havasu National Wildlife Refuge

Established in 1941, the HNWR protects 30 river miles (300 miles of shoreline) of the Colorado River from Needles, California to Lake Havasu City, Arizona. The refuge consists of 37,515 acres, of which 17,606 acres have been designated wilderness. Providing suitable habitat for wintering migratory birds is the primary goal of the HNWR. PG&E's parcel of land is located within the boundaries of the HNWR, but is privately owned and operated. The HNWR also surrounds the project area to the south in California and to the north and east in Arizona, across the Colorado River. Existing recreational uses that occur on the Colorado River within the National Wildlife Refuge include boating, wildlife observation and photography, education and interpretation, hunting, and fishing.

Topock, Arizona

Topock is a small unincorporated community in Mohave County, Arizona. This community is located off I-40 between Bullhead City and Lake Havasu City in Arizona and southeast of Needles, California and the Park Moabi. The Topock Marina is located off I-40 on the Colorado River between Needles and Lake Havasu City. This marina is a refueling point for boaters traveling between these two cities on the Colorado River. The Topock Marina also includes a mobile home park. The Old Trails Arch Bridge, which is located in Topock, was constructed across the Colorado River as a highway bridge in 1916; the bridge was later converted to a natural gas pipeline bridge.

Golden Shores, Arizona

Golden Shores is a small unincorporated community in Mohave County, Arizona. This town of less than 3,000 residents is located north of I-40 and Topock Bay. Golden Shores is half way between Bullhead City and Lake Havasu City in Arizona and is located north of the project area.

Bureau of Land Management

The BLM is an agency within the DOI, which administers America's public lands, totaling approximately 253 million acres or one-eighth the landmass of the country. The BLM also manages 700 million acres of subsurface mineral estate underlying federal, state, and private lands. The BLM's stated mission is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations. The BLM offers visitors many recreational opportunities on their lands. Open space on BLM land surrounds the project area to the southwest (see Exhibit 3-3).

Bureau of Reclamation

Established in 1902, Reclamation is an agency under the DOI and oversees water resource management, specifically as it applies to the oversight and/or operation of numerous water diversion, delivery, and storage and hydroelectric power generation projects it built throughout the western United States. Reclamation has constructed more than 600 dams and reservoirs, including Hoover Dam on the Colorado River. Reclamation maintains Hoover, Davis, and Parker Dams, annually measures and accounts for the water's use, and maintains the river channel and protective levees. Reclamation is the largest wholesaler of water in the country, bringing water to more than 31 million people, and provides one out of five western farmers with irrigation water for 10 million acres of farmland. Reclamation is also the second largest producer of hydroelectric power in the western United States. As a water management agency, Reclamation has numerous programs, initiatives and activities that help the Western States, Native American Tribes and others meet new water needs and balance the multitude of competing water demands of the West while protecting the environment and the public's investment. Open space on Reclamation land surrounds the project area to the south of Park Moabi (see Exhibit 3-3). This Reclamation land is managed by the BLM and leased by the County. In addition, Reclamation owns and periodically operates a rock quarry in the southern part of the project area.

Metropolitan Water District of Southern California

The MWD, headquartered in Los Angeles, is a consortium of 26 cities and water districts that provides drinking water to 19 million people in parts of Los Angeles, Orange, San Diego, Riverside, San Bernardino and Ventura counties. It is the largest supplier of treated water in the United States. MWD currently delivers an average of 1.7 billion gallons of water per day to a 5,200 square mile service area. It was created by an act of the California Legislature in 1928, primarily to build and operate the Colorado River Aqueduct. MWD became the first and largest contractor to the State Water Project in 1960. Open space on MWD land surrounds the project area to the southeast (see Exhibit 3-3).

Burlington Northern Santa Fe Railway

The BNSF Railway is a freight railroad company headquartered in Fort Worth, Texas. It is the product of 390 different railroad lines that merged or were acquired within a period of more than 150 years. The BNSF is one of four remaining transcontinental railroads and one of the largest freight railroad networks in North America, hauling many different commodities, most notably coal, and grain, as well as intermodal freight. The BNSF system is divided into 13 divisions. The BNSF railroad right-of-way crosses through the project area.

Fort Mojave Indian Reservation

The Fort Mojave Indian Reservation is located along the Colorado River and encompasses 23,669 acres in Arizona, 12,633 acres in California, and 5,582 acres in Nevada. The southernmost boundary of the Fort Mojave Indian Reservation is located approximately 1 mile north of the PG&E compressor station. The reservation was originally established in 1870 and is now home to approximately 1,100 members of the Fort Mojave Indian Tribe. Occupancy on Fort Mojave Indian Reservation lands, unlike that of many other Indian reservations in Arizona, is less than 50% Native American. The Fort Mojave Indian Tribe leases the majority of their land to cotton, corn, and soybean farming companies.

In 2006, PG&E reached a settlement agreement with the Fort Mojave Indian Tribe in the case of *Fort Mojave Indian Tribe v. Department of Toxic Substance Control, et al.* (Superior Court of the State of California, Sacramento County [Case No. 05CS00437]). The settlement agreement calls for a transfer of a piece of land previously owned by PG&E (APN 650-151-06) to the Fort Mojave Indian Tribe. This parcel of land, where the IM-3 Facility is currently located, was transferred to the Fort Mojave Indian Tribe in October 2009. Under the terms of the settlement agreement, it is stipulated that the Fort Mojave Indian Tribe granted PG&E and its authorized representatives an exclusive easement over the property for removal of the IM-3 Facility and implementation of the proposed remediation-related purposes. Under the settlement agreement, all existing and future remediation related equipment and facilities located on the property installed by or for PG&E shall be and remain the property of PG&E. The easement will expire once PG&E has finished all remediation activities associated with the proposed project, has removed the IM-3 Facility, and restored affected portions of the IM-3 property. During the term of the easement, the Fort Mojave Indian Tribe cannot transfer title of the property into trust with the federal government.

4.8.2 Regulatory Background

According to land use maps prepared for the *County of San Bernardino 2007 General Plan* (San Bernardino County 2007:CD map), the project area includes lands owned and/or managed by Reclamation, BLM, USFWS, and San Bernardino County. Land use regulatory documents associated with these four jurisdictions are discussed below.

4.8.2.1 Federal Plans, Policies, Regulations, and Laws

Lower Colorado Water Supply Act

As discussed above, Reclamation is responsible for developing and conserving the water resources in the western United States. The Colorado River is managed and operated under numerous compacts, federal laws, court decisions and decrees contracts and regulatory guidelines collectively known as the “Law of the River.” This collection of documents apportions the water and regulates the use and management of the Colorado River among the seven basin states and Mexico. In addition to serving as the “water master” for the last 688 miles of the Colorado River within the United States on behalf of the Secretary of the Interior, under the Colorado River Compact and the Supreme Court decree in Arizona v. California, Reclamation manages the River and its reservoirs to meet water and power delivery obligations, protect endangered species and native habitat, enhance outdoor recreation opportunities, and provide flood control.

Among the many laws governing Colorado River water, the Lower Colorado Water Supply Act of 1986 authorized Reclamation to construct, operate, and maintain the Lower Colorado Water Supply Project (LCWSP), which addresses water users in California adjacent to the Lower Colorado River who either do not hold rights or whose rights are insufficient to meet their present or future needs. The LCWSP makes up to 10,000 acre-feet annually available to eligible entities for nonagricultural use along the Colorado River in California (Colorado River Board 2009a:2). The LCWSP is described in greater detail in Section 4.12, “Water Supply.”

Bureau of Land Management Approved Resource Management Plan

The BLM Lake Havasu Field Office prepared the approved *Lake Havasu Field Office Resource Management Plan* (Approved RMP) (BLM 2007) to provide comprehensive current and future management of approximately 1.3 million acres of BLM-administered public land located within the Lake Havasu Field Office planning area. The planning area comprises portions of Mohave, La Paz, Yavapai, and Maricopa Counties in Arizona and San Bernardino County in California. Recommended actions in the Approved RMP are intended to enable BLM to manage resources and uses of BLM-administered public lands located within the Lake Havasu Field Office planning area as a comprehensive unit, and must be considered by BLM before approving the proposed project.

Specifically related to land uses, the Approved RMP includes a Lands and Realty program that identifies BLM's vision for land tenure and land use authorization. The land tenure segment of the Lands and Realty program specifies that the Lake Havasu Field Office will:

- retain all public lands or interests in land that enhance multiple-use management,
- acquire lands or interests in land that complement important resource values and further management objectives, and
- dispose of lands or interests in lands that are difficult or uneconomical to manage or are no longer needed for federal purposes (BLM 2007:34,35).

The land use authorization segment of the Lands and Realty program specifies that BLM may allow the use of the public lands or interests in lands through issuance of rights-of-way (ROWs), leases, and permits. While the types of uses authorized by a ROW, issued pursuant to the Federal Land Policy and Management Act, could include access roads, power lines, telephone lines, fiber optic systems, communications facilities, and related uses, since the Department of the Interior is regulating the remediation under CERCLA, the provisions of that statute supersede any requirements under FLPMA. Specifically, CERCLA Section 121(e) provides that "no federal, state, or local permits shall be required for the portion of any removal or remedial action" conducted under CERCLA authority. As a result, no FLPMA ROWs will be required to implement the final remedy.

No exchanges of lands between BLM and PG&E are anticipated in association with the proposed project.

In addition, the Approved RMP includes administrative actions and standard operating procedures. Applicable to land use issues is the following policy:

- RR-42. No new development of any kind will be allowed in the floodplain of desert washes except for public health and safety or resource protection (BLM 2007:99).

The project area is located within a 2,395-acre Area of Critical Environmental Concern (ACEC), designated the Beale Slough Riparian and Cultural ACEC. This ACEC is designated to protect both cultural and natural resources. This large ACEC contains regionally rare riparian resources and wildlife habitat at Beale Slough to the north of the project area (BLM 2006:106, Map 28), but the project area also contains the cultural element of the ACEC. Additionally, a 1,127 acre area encompassing portions of the project area is designated as the Topock-Needles Special Cultural Resource Management Area.

Desired future conditions for the Beale Slough ACEC outlined in the Approved RMP require that, "Beale Slough Riparian and Cultural ACEC will be managed to protect and prevent irreparable damage to the relevant characteristics and important values," acknowledging that the ACEC contains "significant cultural resources [and] cultural sites within part of a regional cultural complex." The RMP also notes that, "the area's fragile and irreplaceable prehistoric sites are eligible for inclusion on the NRHP." The Final Environmental Impact Statement for the RMP addresses these designations in the context of the project, stating: "ACEC designation or SCRMA allocation is meant to protect significant cultural resources. Management decisions relating to Chromium VI remediation will take into account the special status of these lands but will not preclude necessary actions to protect the Colorado River from contamination." (BLM, FEIS at 5-117). For additional information regarding cultural resources and the project area, refer to Section 4.4, Cultural Resources.

U.S. Fish and Wildlife Service Lower Colorado River National Wildlife Refuges Comprehensive Management Plan

The project area is located within the HNWR, which encompasses 37,515 acres in California and Arizona. The HNWR is managed, along with the Bill Williams, Cibola, and Imperial national wildlife refuges, by the USFWS *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan*. The overarching goal of the

USFWS refuge system is to conserve a diversity of fish, wildlife, plants, and their habitats for the benefit of current and future generations. By fulfilling this goal, the refuge system can maintain the biological integrity, diversity, and environmental health of each refuge with a focus on native species and contribute to the conservation, and, where appropriate, restoration of representative ecosystems and ecological processes in the United States. Portions of the proposed project would construct and operate facilities (i.e., wells, pipelines) on land within the HNWR that is managed by the USFWS.

The core habitat of the HNWR is one of nine Areas of Ecological Concern identified in the *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan.* The four refuges are considered vital elements to the Areas of Ecological Concern and the ecological health of the habitats found in these Areas of Ecological Concern warrant objectives that match the refuge's objectives. A broad planning perspective for the Areas of Ecological Concern issues is contained in the *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan.* Specifically related to land use, the *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan* contains the following goals that would be applicable to the proposed project (USFWS 1994:148):

Goal #9: To improve overall refuge water quality and protect refuge waters from all contamination.

Goal #10: To ensure that only compatible and appropriate activities occur on the lower Colorado River national wildlife refuges, and to regulate, as provided by law, all activities, uses, and practices on and off the refuges that are potentially harmful to refuge resources.

The *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan* for HNWR is similar to the BLM's Lake Havasu Land Management Plan in the protection of resident wildlife and fish. The plan also delineates sensitive and important habitats, or areas of substantial biodiversity into Special Project and Protection Areas (USFWS 1994a). These areas have defined management goals and objectives assigned to them within the plan. USFWS lands in the project area are not delineated into Special Project/Protection Areas and therefore do not have more specific management goals.

Land use authorizations, including rights-of-ways for a variety of uses are permitted under National Wildlife Refugee System Administration Act of 1966 (16 USC 668dd-668ee). As discussed above with respect to BLM administered lands, no Refugee Act ROWs will be required to implement the final remedy.

4.8.2.2 State Plans, Policies, Regulations, and Laws

No state plans, policies, regulations, or laws related to land uses apply to the proposed project.

4.8.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

County of San Bernardino, California 2007 General Plan

The County General Plan includes policies to guide the planned and orderly growth of communities within the county. The following land use goals and policies are applicable to the project area. In addition, the County also maintains a master plan that guides development at the Moabi Regional Park, which is located in the northern portion of the project area, along the southern banks of the Colorado River. It is noted that the lands owned by federal entities within the project area are not governed by County land use policy. However, the County's jurisdictional directives are still an important consideration.

Land Use Element

GOAL LU 1: The County will have a compatible and harmonious arrangement of land uses by providing a type and mix of functionally well-integrated land uses that are fiscally viable and meet general social and economic needs of the residents (San Bernardino County 2007:II-32).

- **Policy LU 1.2:** The design and siting of new development will meet locational and development standards to ensure compatibility of the new development with adjacent land uses and community character (San Bernardino County 2007:II-32).

GOAL LU 7: The distribution of land uses will be consistent with the maintenance of environmental quality, conservation of natural resources, and the preservation of open spaces (San Bernardino County 2007:II-35).

GOAL D/LU 3: Ensure that commercial and industrial development within the region is compatible with the rural desert character and meets the needs of local residents (San Bernardino County 2007:II-48).

Land Use Maps

The County General Plan designates the project area and surrounding lands for resource conservation (RC), institutional (IN), and open space (OS) uses as shown in Exhibit 4.8-1 (San Bernardino County 2007:CD map). Descriptions of each of these land use designations, as described in the County General Plan, are provided below.

The purpose of the **Resource Conservation** land use designation is:

- To encourage limited rural development that maximizes preservation of open space, watershed and wildlife habitat areas.
- To identify areas where rural residences may be established on lands with limited grazing potential but which have significant open space values.
- To prevent inappropriate urban population densities in remote and/or hazardous areas of the County.
- To establish areas where open space and non-agricultural activities are the primary use of the land, but where agriculture and compatible uses may co-exist (San Bernardino County 2007:II-5).

The purpose of the **Institutional** land use designation is:

- To identify existing lands and structures committed to public facilities and public agency uses and proposed public facilities, where site selection has not occurred.
- To provide areas for development of future public facilities to meet public needs.
- To enable identification of potential facility locations that satisfy both community and regional needs relating to the population levels being served.
- To identify potential facility sites in advance of immediate need so that facility design and location may be based on the character of the area being served and can also be compatible with and supportive of the comprehensive plans of agencies within the facility service area (San Bernardino County 2007:II-20).

The purpose of the **Open Space** land use designation is to maintain open space on property legally constrained by deed restrictions on the property (San Bernardino County 2007: II-24). This land use category is applied to open spaces, recreational uses, and similar and compatible uses (San Bernardino County 2007:II-30). The Open Space Element of the County General Plan provides a reference to guide the protection and preservation of open space, recreation, and scenic areas, while accommodating future growth within the County (San Bernardino County 2007:VI-1).

County of Mohave, Arizona 2005 General Plan

The County of Mohave General Plan includes goals and policies to guide community change through the best management of the natural and built environment within the county. The following land use goal and policy is applicable to the project area on private lands in Mohave County. The project area that is located in Arizona is located in an unincorporated portion of the County of Mohave. There is no land use designation for the community of Topock, Arizona, which is referred to as an outlying community (Mohave County 2005:62 and 69).

Land Use Element

GOAL 10: To retain the beauty, the natural setting and resources, and the rural character of the County while providing opportunities for coordinated growth and development.

- **Policy 10.6**: Proposed non-residential structures adjacent to residential neighborhoods shall be designed and located to protect the privacy of residences.

4.8.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.8.3.1 ANALYSIS METHODOLOGY

The information presented in this section is based on a review of relevant literature and adopted plans, including the 2007 County General Plan, the 2005 County of Mohave General Plan, the USFWS *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan* (USFWS 1994), and *Lake Havasu Field Office Resource Management Plan* (BLM 2007). Analysis of the consistency of the project with the Lower Colorado River Multi-Species Conservation Program is addressed in Section 4.3, “Biological Resources.” A tabular format has been used to summarize the applicable land use policies and the consistency of the proposed project with these policies (Table 4.8-1).

4.8.3.2 THRESHOLDS OF SIGNIFICANCE

Based on the CEQA Guidelines, the proposed project would have a significant impact on land use if it would:

- physically divide an established community; or
- conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect, including any applicable habitat conservation plan or natural community conservation plan.

4.8.3.3 IMPACT ANALYSIS

> Potential for Division of an Existing Community. *The proposed project would not physically divide residential communities in the project area. Pipelines associated with the proposed project would be located underground or along existing pipelines. This would be a* less-than-significant *impact.*

Project facilities could be constructed on lands owned by PG&E, the U.S. Department of the Interior (owned and/or managed by Reclamation, BLM or USFWS), the Fort Mojave Indian Tribe, or land under the jurisdiction of Mohave County, Arizona. Two residential communities exist in the vicinity of the project area: the Moabi mobile home park, located in the northwestern portion of the project area in the Moabi Regional Park in San Bernardino County, California, and the residential community of Topock, located along I-40 on the eastern bank of the Colorado River in Mohave County, Arizona (refer to Exhibit 4.8-1).

Implementation of the proposed project could result in pipelines extending through or adjacent to the communities of Moabi Regional Park, which includes recreational uses, and Topock, primarily associated with the pipelines needed to deliver water from the freshwater wells that could be located in either Arizona or California. Locations of utilities and water conveyance structures would depend on the ultimate placement of the freshwater wells and treatment facilities. As discussed in Section 3.5.1.2 of the Project Description, PG&E plans to build any water supply pipeline in the vicinity of these two communities within existing utility corridors or roadways, and proposes that all pipelines in these areas be underground. A conceptual footprint of water conveyance systems and utilities is shown in Exhibit 3-4 for illustrative purposes. Main infrastructure corridors would be sited coincident with existing utility and transportation corridors; north-south main alignments are expected to use existing crossings of the freeway and railroad (e.g., at National Trails Highway, through the Bat Cave Wash culvert), and east-west main connections are expected to follow alignments of existing roads (I-40, railroad, National Trials Highway, IM-3 access road, pipeline ROW roads) to the extent feasible. Other pipelines would be constructed between the main corridors and the well locations. Final locations of pipelines would be determined in consultation with the landowners and/or other entities with rights-of-way. The pipelines would be trenched underground, and their specific locations, dimensions, and specifications will be determined during final design of the project. Pipelines placed underground would not conflict with existing land uses (such as recreation) or physically divide the residential communities. As a result, this would be a **less-than-significant** impact.

> *Conflicts with Land Use Plans, Policies, or Regulations. As summarized in Table 4.8-1, the proposed project would be consistent with relevant land use regulations and would not result in significant conflicts with land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. Although some features of the project may be perceived as conflicting with the overall purpose of the County's Open Space and Resource Conservation land use designations, the proposed project is construction of necessary facilities for purposes of remediation, and would be decommissioned following project completion. No changes to designated land uses or zoning designations are required for project approval. For these reasons, this impact would be less than significant.*

BLM's Approved RMP includes a land use policy that states that no new development of any kind will be allowed in the floodplain of desert washes except for the purposes of the protection of public health and safety or resource protection (Policy RR-42) (BLM 2007:99). There is the potential for pipelines, wells, or other associated infrastructure to be constructed across the Bat Cave Wash. However, all infrastructure associated with the proposed project for remediation of the contaminated groundwater plume is considered necessary to protect public health and safety and would be removed following project completion. The ultimate location of facilities located on BLM-administered lands would be placed in consultation with land and resource managers at BLM. For these reasons, the ultimate location of facilities required for implementation of the proposed project would not conflict with the policies of BLM's Approved RMP.

The USFWS *Lower Colorado River National Wildlife Refuges Comprehensive Management Plan* includes a goal to ensure that only compatible and appropriate activities occur on the lower Colorado River national wildlife refuges, and to regulate activities, uses, and practices on and off the refuges that are potentially harmful to refuge resources (USFWS 1994:148). Wells and pipelines would be constructed in areas designated as a USFWS National Wildlife Refuge intended to conserve a diversity of wildlife and their habitats for the benefit of current and future generations. The ultimate locations of facilities located in the HNWR would be placed in consultation with land and resource managers at USFWS. As analyzed in Section 4.3, "Biological Resources," of this DEIR, the project would not conflict with resource management goals of the USFWS.

Facilities constructed for the proposed project would only be required until cleanup goals for the contaminated groundwater plume have been achieved. Following attainment of the cleanup goals and an additional 10 years of monitoring, all facilities would be decommissioned. In addition, the final locations of facilities would be determined in consultation with the landowners and/or other entities with rights-of-way.

Facilities associated with the proposed project would be located in an area designated for either open space, resource conservation, and/or institutional under the County General Plan (San Bernardino County 2007: CD map) (Exhibit 4.8-1). The County General Plan identifies that the purpose of the land use designation of open space is to maintain open space. Some of the project facilities such as wells, pipelines, and additional roads, could detract from the character and purpose of the designated open space; however, some of these uses (such as existing monitoring wells and access) are already located within the open space areas. Therefore, the proposed project is considered consistent with these existing land uses. The environmental effects resulting from construction of these facilities are addressed in the other topical sections of this EIR (e.g., biological resources, cultural resources, and aesthetics).

The County General Plan identifies that one purpose of the institutional land use designation (covering portions of the project area) is to provide areas for development of future public facilities to meet public needs. The proposed project would be consistent with that intended land use, as these would be facilities that serve the existing operation of the compressor station, which provides the public with gas and electricity. Although the compressor station is a privately owned facility, providing the public with gas and electricity is consistent with the goal of meeting public needs by providing utility services. Lastly, the County General Plan identifies that a purpose of the resource conservation land use designation applicable to portions of the project area is to preserve open space, watershed, and wildlife habitat areas. The proposed project impacts on watersheds and wildlife habitats are analyzed in greater detail in Section 4.3, “Biological Resources,” of this DEIR. As described in Section 4.3, the proposed project would not conflict with the resource management goals of USFWS. Therefore, the proposed project would not conflict with the overall intent of the County General Plan land use designations.

Because construction and operation of the proposed project would be located on portions of land owned by the United States, under the jurisdiction of the DOI, and managed by the BLM, the Reclamation, or the USFWS, approval to proceed with the proposed project from these federal land management agencies would be required. However, because DOI has recently issued a Proposed Plan identifying the proposed project as DOI’s Preferred Alternative for selection as the DOI CERCLA remedial action for the site, the federal land management agencies are expected to approve the construction and operation of the proposed project on federal land. As demonstrated above, the proposed project would require construction and operation of remediation facilities on parcels of land managed by other agencies and entities. Final locations of facilities would be determined in consultation with the landowners and/or other entities during final design. The proposed facilities are consistent with the goals of planning policies and documents applicable to the project area. Therefore, the proposed project would not result in a conflict with existing plans, policies, or regulations that would result in significant land use impacts. This impact would be **less than significant**. No mitigation is required.

Table 4.8-1
Consistency with Land Use Plans, Policies, and Regulations

Policy or Plan Directive	Project Consistent with Policy/ Directive?	Consistency Analysis
Bureau of Land Management Approved Resource Management Plan		
RR-42. No new development of any kind will be allowed in the floodplain of desert washes except for public health and safety or resource protection (BLM 2007:99).	Yes	Although new facilities associated with the proposed project could be constructed in or across the Bat Cave Wash on property managed by the BLM, the facilities would be constructed for the purposes of protecting public health, welfare, and the environment. The BLM has concurred in a Proposed Plan issued by the DOI identifying the proposed project as DOI's Preferred Alternative for selection as the DOI CERCLA remedial action for the site. Thus the operation of the proposed project is not anticipated to conflict with BLM land use objectives or other policies of BLM.
U.S. Fish and Wildlife Service, Lower Colorado River National Wildlife Refuges Comprehensive Management Plan		
Goal #10: To ensure that only compatible and appropriate activities occur on the lower Colorado River national wildlife refuges, and to regulate, as provided by law, all activities, uses, and practices on and off the refuges that are potentially harmful to refuge resources (USFWS 1994:148).	Yes	Portions of the proposed project (i.e., wells, pipelines) would be constructed and operated within the HNWR managed by the USFWS. As analyzed in Section 4.3, "Biological Resources" of this DEIR, the project would not conflict with resource management goals of the USFWS. In particular, because the proposed project is consistent with the Preferred Alternative identified by DOI with which USFWS has concurred, the facilities and activities associated with the remediation of the Topock groundwater contamination are likely to be determined by USFWS to be compatible with the purposes for which the HNWR was established. Thus, operation of the proposed project is not anticipated to result in any conflicts with land use or management requirements of USFWS.
County of San Bernardino, California 2007 General Plan		
Goal LU 1: The County will have a compatible and harmonious arrangement of land uses by providing a type and mix of functionally well-integrated land uses that are fiscally viable and meet general social and economic needs of the residents (San Bernardino County 2007:II-32). **Policy LU 1.2**: The design and siting of new development will meet locational and development standards to ensure compatibility of the new development with adjacent land uses and community character (San Bernardino County 2007:II-32).	Yes	The proposed project would involve construction of new facilities in the vicinity of existing communities. Existing communities near the project area include a trailer park in Moabi Regional Park and mobile home residences in Topock, Arizona. The proposed project could construct and operate wells and pipelines near or adjacent to these two communities. As for the pipelines, these facilities would be primarily constructed underground and out of sight of the two communities. Any pipelines located aboveground would be constructed to blend in with the surrounding landscape and the character of the two communities. As for the wells, these would involve constructing subsurface concrete vaults equipped with instrumentation, valves, and other pipe appurtenances and may include an aboveground concrete pad or foundation along with an access point. These wells would not involve any large structures, and all components of the wells located aboveground would be painted a beige color to blend in with the surrounding landscape. Overall, the wells would blend in with the surrounding landscape and the character of the two communities. Furthermore, all project components would be decommissioned following project implementation. No changes to designated land uses or zoning designations are required for project approval.

Table 4.8-1
Consistency with Land Use Plans, Policies, and Regulations

Policy or Plan Directive	Project Consistent with Policy/ Directive?	Consistency Analysis
Goal LU 7: The distribution of land uses will be consistent with the maintenance of environmental quality, conservation of natural resources, and the preservation of open spaces(San Bernardino County 2007:II-35).	Yes	The proposed project would involve construction and operation of new remediation facilities in areas identified for preserving open space and conserving natural resources. However, these areas are also managed by USFWS, which serves to preserve watersheds and wildlife habitats, and BLM, which serves to manage resources and uses of public lands. BLM and USFWS have preliminarily determined that the facilities and activities associated with the remediation of the groundwater contamination are compatible with management of the BLM lands in the area and are compatible with management of the wildlife refuge. This determination is in large part a result of the need to remediate the plume to address health and safety concerns. Overall, the operation of the proposed project is not anticipated to conflict with the intent of San Bernardino County's policy to maintain environmental quality, preserve open space, and conserve natural resources. Furthermore, all project components would be decommissioned following project implementation. No changes to designated land uses or zoning designations are required for project approval.
Goal D/LU 3: Ensure that commercial and industrial development in the region is compatible with the rural desert character and meets the needs of local residents (San Bernardino County 2007:II-48).	Yes	The proposed project would involve construction of new industrial facilities (i.e., wells, pipelines, and water intake facility) in an area characteristic of the rural desert. All facilities located aboveground would be constructed to blend in with the surrounding landscape and the character of the two communities. In addition, the proposed project would be implemented in large part as a result of the need to remediate the plume to address health and safety concerns, including those of local residents. Furthermore, all project components would be decommissioned following project implementation. No changes to designated land uses or zoning designations are required for project approval.
Resource Conservation Land Use Designation Applicable Purposes: ▸ To encourage limited rural development that maximizes preservation of open space, watershed and wildlife habitat areas. ▸ To establish areas where open space and non-agricultural activities are the primary use of the land, but where agricultural and compatible uses may co-exist (San Bernardino County 2007:II-5).	Yes	The proposed project would construct and operate remediation facilities in areas identified for preserving open space, watershed, and wildlife habitat. These land areas are also managed by USFWS, which serves to preserve watersheds and wildlife habitats in the project area. As analyzed in Section 4.8 and 4.3, "Biological Resources," of this DEIR, the project would not conflict with the resource management goals of USFWS. Thus, the construction and operation of wells and pipelines would not conflict with the overall intent of the Resource Conservation land use designation of San Bernardino County. Furthermore, all project components would be decommissioned following project implementation. No changes to designated land uses or zoning designations are required for project approval. Open space is considered to be the resource intended to be conserved in the project area because no agricultural activities exist in the project area. Based on this premise, it is acknowledged that the proposed project would involve construction of new remediation facilities in areas identified for preserving open space. However, these areas are also managed by USFWS, which serves to preserve watersheds and wildlife habitats, and BLM, which serves to manage resources and uses of public lands. BLM and USFWS have preliminarily determined that the facilities and activities associated with the remediation of the Topock groundwater contamination are compatible with management of the BLM lands in the area and are compatible with management of the wildlife refuge. This determination is in large part a result of the need to remediate the plume to address health and safety concerns. Overall, the operation of the proposed project is not anticipated to conflict with the intent of the County's policy to establish open space as the primary use of the land. Furthermore, all project components would be decommissioned following project implementation. No changes to designated land uses or zoning designations are required for project approval.

Table 4.8-1
Consistency with Land Use Plans, Policies, and Regulations

Policy or Plan Directive	Project Consistent with Policy/ Directive?	Consistency Analysis
Institutional Land Use Designation Applicable Purposes: ▸ To provide areas for development of future public facilities to meet public needs. ▸ To identify potential facility sites in advance of immediate need so that facility design and location may be based on the character of the area being served and can also be compatible with and supportive of the comprehensive plans of agencies within the facility service area (San Bernardino County 2007:II-20).	Yes	The proposed project would be consistent with that intended land use, as these would be facilities that serve the existing operation of the compressor station, which provides the public with gas and electricity. Although the compressor station is a privately owned facility, providing the public gas and electricity is consistent with the goal of meeting public needs by providing utility services.
Open Space Land Use Designation Purpose: To maintain open space on property legally constrained by deed restrictions on the property (San Bernardino County 2007:II-24). This land use category is applied to open spaces, recreational uses, and similar and compatible uses (San Bernardino County 2007:II-30). The Open Space Element of the County General Plan provides a reference to guide the protection and preservation of open space, recreation, and scenic areas, while accommodating future growth within the County (San Bernardino County 2007:VI-1).	Potentially inconsistent; however, inconsistencies are not related to a specific policy purpose of avoiding or mitigating an environmental effect.	The proposed project would construct and operate remediation facilities in areas identified for maintaining open space land uses. Some of these facilities would be constructed and operated on PG&E-owned lands. While some of the project facilities could detract from the open space character of the properties (e.g., aboveground pipelines) the environmental effects resulting from construction of these facilities are addressed in the other topical sections of this EIR (e.g., aesthetics, biology, cultural resources). Because the purpose of this land use designation is not specific to the avoidance or mitigation of an environmental effect, an inconsistency is not a significant environmental effect in and of itself. Furthermore, all project components would be decommissioned following project implementation. No changes to designated land uses or zoning designations are required for project approval.
County of Mohave, Arizona 2005 General Plan		
GOAL 10: To retain the beauty, the natural setting and resources, and the rural character of the County while providing opportunities for coordinated growth and development. Policy 10.6: Proposed non-residential structures adjacent to residential neighborhoods shall be designed and located to protect the privacy of residences.	Yes	The proposed project would involve construction and operation of new remediation facilities near the Topock Marina and mobile home park and in the HNWR. The HNWR is managed by USFWS, which serves to preserve watersheds and wildlife habitats and the outlying residential area of Topock (mobile home park) is an rural development surrounded by the HNWR and the Colorado River. The community of Topock has no land use designation in the County of Mohave General Plan. The USFWS have preliminarily determined that the facilities and activities associated with the remediation of the groundwater contamination are compatible with management of the BLM lands in the area and are compatible with management of the wildlife refuge. This determination is in large part a result of the need to remediate the plume to address health and safety concerns. Overall, the operation of the proposed project is not anticipated to conflict with the intent of the County of Mohave's policy to protect the privacy of residences because as required by mitigation measure LUP-1 all pipelines located within 500 feet of the community of Topock would be constructed underground.

Source: Data compiled by AECOM in 2010

4.9 NOISE

This section discusses existing ambient noise conditions in the project area and the surrounding region; describes the applicable federal, state, regional, and local regulations and policies related to noise; and analyzes the potential construction-related, short-term, and operation-related noise impacts of the proposed project. A discussion of cumulative impacts from noise is provided in Chapter 6 of this DEIR. Noise modeling data used for this analysis are provided in Appendices NO-1 and NO-2 of this DEIR.

4.9.1 EXISTING SETTING

The exposure of people to excessive and chronically elevated noise levels can result in auditory and nonauditory health effects. The effects of noise on people are temporary or permanent hearing loss caused by loud noises and behavioral and broader physiological effects caused by prolonged exposure to elevated noise levels. While the proposed project is in a relatively remote area, some sensitive noise receptors are in the project area at Moabi Regional Park, and the proposed project has the potential to affect those receptors.

4.9.1.1 ACOUSTIC FUNDAMENTALS

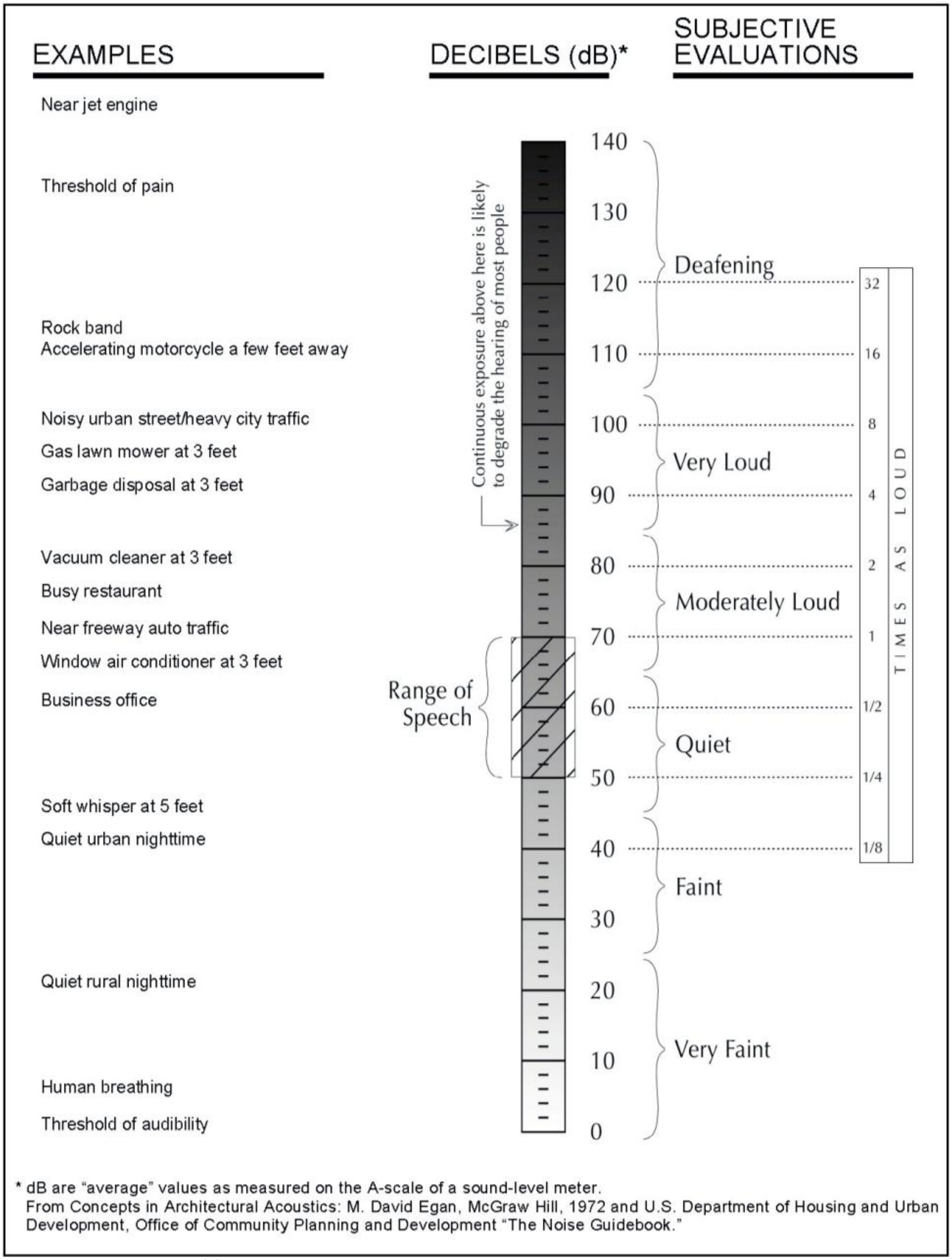
Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature, and can vary substantially from person to person. Common sources of environmental noise and noise levels are presented in Exhibit 4.9-1.

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in Hertz.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system, the decibel (dB) scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the millionfold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added.

For example, a 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100-fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, weighting networks that are dependent on frequency were developed. The standard weighting networks are identified as A through E. A strong correlation exists between the way humans perceive sound and A-weighted sound levels (dBA). For this reason the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.



Source: Data compiled by AECOM in 2008

Common Noise Sources and Levels **Exhibit 4.9-1**

Noise can be generated by a number of sources, including mobile sources (transportation noise sources) such as automobiles, trucks, and airplanes and stationary sources (nontransportation noise sources) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (walls, building facades, berms). Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance (dB/DD). Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 dB to 7.5 dB/DD.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or "shielding" provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods, and human-made features such as buildings and walls may be used as noise barriers.

4.9.1.2 NOISE DESCRIPTORS

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below:

- L_{max} (Maximum Noise Level): The highest A/B/C-weighted integrated noise level occurring during a specific period of time.

- L_{min} (Minimum Noise Level): The lowest A/B/C-weighted integrated noise level occurring during a specific period of time.

- Peak: The highest weighted or unweighted instantaneous peak-to-peak value occurring during a measurement period.

- L_n (Statistical Descriptor): The noise level exceeded n% of a specific period of time, generally accepted as an hourly statistic. An L_{10} would be the noise level exceeded 10% of the measurement period.

- L_{eq} (Equivalent Noise Level): The energy mean (average) noise level. The steady state sound level which, in a specified period of time contains the same acoustical energy as a varying sound level over the same time period.

- L_{dn}/DNL (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dB "penalty" applied during nighttime noise-sensitive hours, 10:00 p.m. through 7:00 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

- CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dB "penalty" for the noise-sensitive hours between 7:00 p.m. to 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the CNEL is typically 0.5 dB higher than the L_{dn}.

- SEL (Sound Exposure Level): The SEL describes the cumulative exposure to sound energy over a stated period of time.

- SENEL (Single Event Noise Exposure Level): An SEL where, the measurement period is defined by the start and end times of a single noise event, such as an automobile passby, aircraft flyover, or individual industrial operations.

4.9.1.3 EFFECTS OF NOISE ON HUMANS

Excessive and chronic exposure to elevated noise levels can result in auditory and nonauditory effects in humans. Auditory effects of noise on people are those relating to temporary or permanent hearing loss caused by loud noises. Nonauditory effects of exposure to elevated noise levels are those relating to behavioral and physiological effects. The nonauditory behavioral effects of noise on humans are primarily associated with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The nonauditory physiological health effects of noise on humans has been the subject of considerable research efforts attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to nonauditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by a number of nonacoustic factors. The number and effect of these nonacoustic environmental and physical factors varies depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment to which an individual has become accustom, the less tolerable the new noise source will be viewed.

A change in sound level of 1 dB is generally not perceivable by humans, excluding controlled conditions and pure tones. Outside of controlled laboratory conditions the average human ear barely perceives a change of 3 dB. A change of 5 dB generally fosters a noticeable change in human response, and an increase of 10 dB is subjectively heard as a doubling of loudness.

4.9.1.4 VIBRATION

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as operating factory machinery, or transient in nature, such as explosions. Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, and acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root mean square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (FTA 2006:7-1 through 7-8, Caltrans 2004:5-7). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration important to the proposed project occurs from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2006:8-1 through 8-8).

4.9.1.5 EXISTING NOISE ENVIRONMENT

The existing noise environment within the project area is influenced primarily by transportation noise emanating from vehicular traffic along Interstate 40 (I-40) and train operations on the Burlington Northern Santa Fe Railway (BNSF). The majority of vehicular traffic noise occurs along I-40 and to a lesser extent along Park Moabi Road and National Trails Road. Noise associated with the operation of the compressor station is audible within the vicinity of the compressor station and the Interim Measure 3 (IM-3) Groundwater Extraction and Treatment Facility (IM-3 Facility); however, because of the existing topography (intervening mesas) noise-sensitive receptors do not have direct exposure to these noise sources. Additional noise sources are occasional aircraft overflights and recreational activities (watercraft operations) at regional parks nearby.

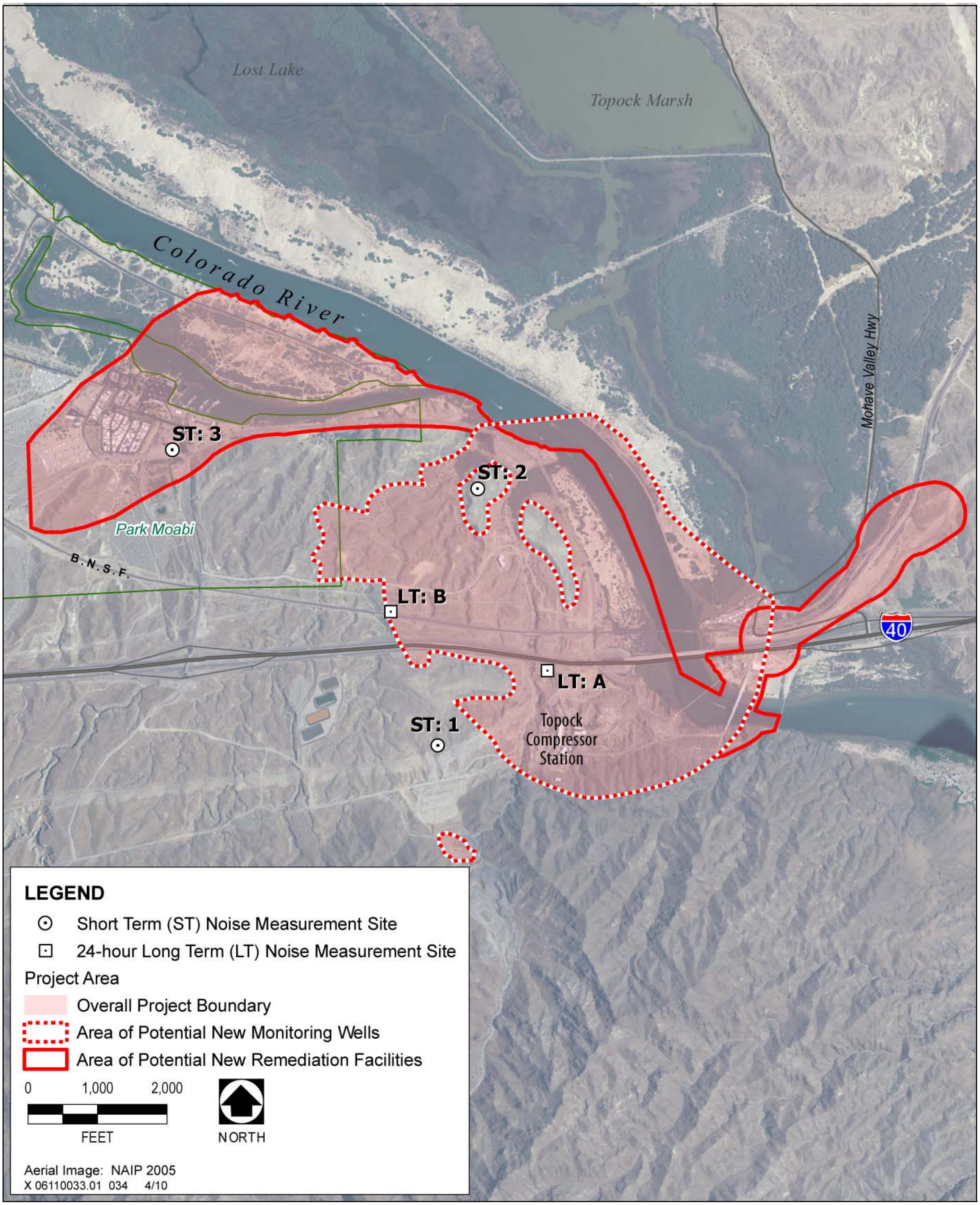
Noise and Vibration-Sensitive Land Uses

Noise-sensitive land uses are generally those uses where noise exposure could result in health-related risks to individuals and places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. The Topock Marina Mobile Home Park (Topock Marina MHP) is an existing residential area that would be considered noise sensitive. Additional land uses such as parks, historic sites, cemeteries, the Havasu National Wildlife Refuge, and other recreation areas are also considered sensitive to increases in exterior noise levels. Schools, places of worship, hotels, libraries, nursing homes, retirement residences, and other places, where low interior noise levels are essential, are also considered noise-sensitive land uses. The Moabi Regional Park is considered a noise-sensitive land use and the County has established transportation noise source standards for park uses, as described below. The park does allow short-term residents for a period of up to 5 months in a given year. The Topock Cultural Area, as described in Section 4.4 of this EIR, is considered a sensitive land use because of the special values this resource has for Native Americans. Changes in land use and modern intrusions, including those related to noise and vibration, could affect these values.

Additional noise-sensitive receptors (rural residences and a mobile home park,) are located across the river from the compressor station and within the project area.

Ambient Noise Survey

An ambient noise survey was conducted in the project area between December 10 and December 11, 2008. Normal daily activities were observed during the ambient noise survey including operation of the compressor station and IM-3 Facility, as well as maintenance activities at existing wells. The purpose of the noise measurements was to establish a baseline ambient noise level for the existing setting. Two measurement sites were chosen to collect long-term (24-hour) noise level data in 1-hour intervals. Three short-term noise measurement sites were chosen to collect 15-minute ambient noise levels. Intervening topography exists between the compressor station and other portions of the project areas in the form of mesas that generally shield noise-sensitive receptors from full exposure of current on-site operations. Exhibit 4.9-2 shows the locations of the short-term and long-term noise measurement sites used for this analysis.



Source: PG&E 2006, adapted by AECOM in 2008

Noise Measurement Locations **Exhibit 4.9-2**

Local roadway traffic, rail operations, aircraft overflights, and wind gusts dominated the noise environment at each noise measurement site. Noise level measurements were taken in accordance with American National Standards Institute (ANSI) standards using a Larson Davis Laboratories (LDL) Model 820 and 824 precision integrating sound level meters (SLM) The SLMs were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure that the measurements would be accurate. This equipment meets all pertinent specifications of the ANSI for Type 1 SLMs (ANSI S1.4-1983[R2006]). The results of the ambient noise survey are summarized in Table 4.9-1.

Table 4.9-1
Summary of Measured Ambient Noise Survey Levels

Long-Term Noise Measurements									
			Average Measured Hourly Noise Levels, dBA						
				Daytime (7 a.m.–10 p.m.)			Nighttime (10 p.m.–7 a.m.)		
Site	Location	Time	L_{dn}	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
A	Adjacent to Interstate 40	12/10/08–12/11/08	77.3	73.0	68.0	84.7	70.4	60.9	85.4
B	Adjacent to BNSF tracks	12/10/08–12/11/08	74.3	65.7	42.3	86.2	68.2	44.6	88.3

Short-Term Noise Measurements					
Site	Location	Time	A-Weighted Decibel Sound Level		
			L_{eq}	L_{min}	L_{max}
1	South of I-40	1:00–1:15 p.m.	47.2	42.3	54.0
2	North of I-40	1:35–1:50 p.m.	41.4	36.3	60.6
3	Moabi Regional Park	1:35–1:50 p.m.	58.4	43.2	73.8

Notes: BNSF = Burlington Northern and Santa Fe Railway; dB = A-weighted decibels; L_{dn} = day-night average noise level; L_{eq} = the equivalent hourly average noise level; L_{50} = the noise level exceeded 50% of a specific period of time; L_{max} = maximum noise level; L_{min} = minimum noise level.
Source: Data collected by AECOM in 2008

In addition to the short term noise measurements conducted in the generally vicinity of the existing compressor station, short-term noise measurements were conducted in close proximity to the existing compressor station and IM-3 Facility. Short-term noise measurements near the compressor station were conducted at four locations (north, south, east and west) around the main compressor components at varying distances of 100–325 feet from the noise source. The noise measurements were then normalized at a distance of 300 feet using accepted attenuation methods. The noise measurements ranged from 58.2–73.1 dB at 300 feet.

Additional short-term noise measurements were conducted at four locations (north, south, east and west) around the IM-3 Facility at varying distances of 38–85 feet. The noise measurements were normalized at a distance of 100 feet using accepted attenuation methods. The noise measurements ranged from 58.9–65.9 dB at 100 feet.

Roadway Traffic Noise

The existing traffic noise level for I-40 was calculated for the roadway segment in the project vicinity using the Federal Highway Administration (FHWA) Federal Highway Traffic Noise Prediction Model, (FHWA-RD-77-108) (FHWA 1978) and traffic data provided in the *2006 Annual Average Daily Truck Traffic on the California State Highway System* (Caltrans 2007:74). The FHWA model is based on California Vehicle Noise Emission (CALVENO) reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and ground attenuation factors. Truck usage and vehicle speeds on project area roadways were estimated from field observations and data from the California Department of Transportation (Caltrans) where available.

Table 4.9-2 summarizes the modeled levels of the traffic noises using a representative distance of 100 feet from the centerline of I-40. The table lists the distances from roadway centerlines to reach the 60 dB, 65 dB, and 70 dB L_{dn} traffic noise contours. Traffic noise modeling results are based on existing average daily traffic (ADT) volumes. The location of the 60 dB L_{dn} contour is 1,187 feet from the centerline of the modeled roadway. The extent to which existing land uses adjacent to project roadways are affected by existing traffic noise depends on their respective proximity and their individual sensitivity to noise. Refer to Appendix NO-1 for complete modeling inputs and results.

Table 4.9-2
Summary of Modeled Existing Traffic Noise Levels

Roadway	Segment	L_{dn} (dB) 100 feet	Distance (feet) from Roadway Centerline to L_{dn} Contour		
			70 dB	65 dB	60 dB
Interstate 40	Junction SR 95 to Stateline	76.1	256	551	1,187
Moabi Park Road	I-40 to National Old Trails Road	45.5	2	5	11

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level; SR = State Route.
Source: Data modeled by AECOM in 2008

Railroad Operational Noise

To determine the amount of noise emanating from BNSF operations, a 24-hour continuous noise measurement was conducted 105 feet from the railroad centerline on December 10–11, 2008 (Site LT: B, as shown in Exhibit 4.9-2). The measurement of the 24-hour continuous noise level was conducted in accordance with ANSI acoustic standards using a LDL Model 820 SLM. The SLM was programmed to collect SENEL data from trains passing through the area, as well as L_{eq} noise levels for each hour of the day.

The 24-hour continuous noise measurement results indicated that the average SENEL associated with operation of an individual train passby was 99 dB SEL at a distance of 105 feet from the railroad centerline. Based on the SENEL noise levels, L_{max} noise levels, and the durations of single events in field data from the continuous noise measurement, 55 trains passed by during the 24-hour monitoring period.

To determine the distances to the railroad noise contours it was first necessary to calculate the L_{dn} at the noise measurement site. This was done using the collected SENEL values, the daily number of trains, and the distribution of daily train operations. In accordance with Federal Transit Administration (FTA) methodologies, the L_{dn} may be calculated as follows (FTA 2006:6-12):

L_{dn} = SENEL + 10 log N_{eq} - 49.4 dBA, where:

SENEL is the average SEL of the event, N_{eq} is the sum of the number of daytime events (7 a.m.–10 p.m.) per day plus 10 times the number of nighttime events (10 p.m.–7 a.m.) per day, and 49.4 is 10 times the logarithm of the number of seconds per day.

At a distance of 105 feet from the railroad tracks, the noise level attributable to overall train activity during the 24-hour measurement period was 73.1 dB L_{dn}. Applying an attenuation rate of 4.5 dBA/DD, which is standard for line sources, the distances to the 60, 65, and 70 dB L_{dn} noise contours were estimated and are presented in Table 4.9-3.

Table 4.9-3 Summary of Existing Noise Levels from the BNSF Railway			
L_{dn} (dB) 105 feet	Distance (feet) from Railroad Centerline to L_{dn} Contour		
	70 dB	65 dB	60 dB
73.1	168	362	780

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level.
Source: Calculations performed by AECOM in 2008

4.9.2 REGULATORY BACKGROUND

4.9.2.1 FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception the EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health and welfare and the environment. Administrators of EPA determined in 1981 that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, noise control guidelines and regulations contained in the rulings by EPA in prior years remain upheld by designated federal agencies, allowing more individualized control for specific issues by designated federal, state, and local government agencies.

To address the human response to groundborne vibration, the FTA has guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines recommend 65 VdB, referenced to as 1 microinch per second (µin/sec) and based on the RMS velocity amplitude for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities); 80 VdB for residential uses and buildings where people normally sleep; and 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices) (FTA 2006:8-3).

4.9.2.2 STATE PLANS, POLICIES, REGULATIONS, AND LAWS

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, noise insulation, and groundborne noise and vibration levels.

Title 24 of the California Code of Regulations

Title 24 of the California Code of Regulations establishes standards that govern interior noise levels that apply to all new multifamily residential units in California. These standards require that acoustical studies be performed before construction begins at building locations where the existing noise levels exceed 60 dB L_{dn}. Acoustical studies are required to establish mitigation measures that will limit maximum levels to 45 dB L_{dn} in any habitable room. Although no generally applicable interior noise standards are pertinent to all uses, many communities in California have adopted 45 dB L_{dn} as an upper limit for interior noise in all residential units.

Governor's Office of Planning and Research

The State of California General Plan Guidelines, published by the state Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of projects within areas that are exposed to specific noise levels. Table 4.9-4 presents acceptable and unacceptable levels of community noise exposure for various land use

Table 4.9-4 OPR Land Use Noise Compatibility Guidelines				
Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dB)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential—low-density single family, duplex, mobile home	<60	55–70	70–75	75+
Residential—multiple family	<65	60–70	70–75	75+
Transient lodging, motel, hotel	<65	60–70	70–80	80+
School, library, church, hospital, nursing home	<70	60–70	70–80	80+
Auditorium, concert hall, amphitheater		<70	65+	
Sports arenas, outdoor spectator sports		<75	70+	
Playground, neighborhood park	<70		67.5–75	72.5+
Golf courses, stable, water recreation, cemetery	<75		70–80	80+
Office building, business commercial and professional	<70	67.5–77.5	75+	
Industrial, manufacturing, utilities, agriculture	<75	70–80	75+	

Notes: dB = A-weighted decibel; CNEL = Community Noise Equivalent Level; L_{dn} = day-night average noise level; OPR = California Governor's Office of Planning and Research.

[1] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

[2] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

[3] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.

[4] New construction or development should generally not be undertaken.

Source: OPR 2003:244–254

categories (OPR 2003:244–254). The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

For the protection of fragile, historic, and residential structures from groundborne vibration, Caltrans recommends a more conservative threshold of 0.2 in/sec PPV for normal residential buildings and 0.08 in/sec PPV for old or historically significant structures (Caltrans 2004:17). These standards are more stringent than the federal standards presented above.

4.9.2.3 Local Plans, Policies, Regulations, and Ordinances

County of San Bernardino 2007 General Plan

The Noise Element in the *County of San Bernardino 2007 General Plan* establishes specific goals and policies to ensure an acceptable noise environment for each land use. This element establishes maximum acceptable interior and exterior noise level criteria for a variety of land uses. These County noise standards are contained in the San Bernardino County Development Code. Applicable goals and policies applied to the proposed project include the following (San Bernardino County 2007: VII-4 through VII-7):

GOAL N 1. The County will abate and avoid excessive noise exposures through noise mitigation measures incorporated into the design of new noise-generating and new noise-sensitive land uses, while protecting areas within the County where the present noise environment is within acceptable limits.

- **Policy N 1.1** Designate areas within San Bernardino County as "noise impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Chapter 83.01 of the Development Code.

- **Policy N 1.3** When industrial, commercial, or other land uses, including locally regulated noise sources, are proposed for areas containing noise-sensitive land uses, noise levels generated by the proposed use will not exceed the performance standards of Table N-2 within outdoor activity areas. If outdoor activity areas have not yet been determined, noise levels shall not exceed the performance standards listed in Chapter 83.01 of the Development Code at the boundary of areas planned or zoned for residential or other noise-sensitive land uses.

- **Policy N 1.4** Enforce the state noise insulation standards (California Administrative Code, Title 24) and Chapter 35 of the California Building Code (CBC).

- **Policy N 1.5** Limit truck traffic in residential and commercial areas to designated truck routes; limit construction, delivery, and through-truck traffic to designated routes; and distribute maps of approved truck routes to County traffic officers.

- **Policy N 1.6** Enforce the hourly noise-level performance standards for stationary and other locally regulated sources, such as industrial, recreational, and construction activities as well as mechanical and electrical equipment.

GOAL N 2. The County will strive to preserve and maintain the quiet environment of mountain, desert and other rural areas.

- **Policy N 2.1** The County will require appropriate and feasible on-site noise attenuating measures that may include noise walls, enclosure of noise generating equipment, site planning to locate noise sources away from sensitive receptors, and other comparable features.

- **Policy N 2.2** The County will continue to work aggressively with federal agencies, including the branches of the military, the U.S. Forest Service, BLM, and other agencies to identify and work cooperatively to reduce potential conflicts arising from noise generated on federal lands and facilities affecting nearby land uses in unincorporated County areas.

San Bernardino County Development Code

To protect people from severe noise levels, the San Bernardino County Development Code sets limits for interior and exterior noise levels generated throughout the community for stationary and mobile sources and vibration levels that affect noise-sensitive land uses. Specifically, Division 3, Countywide Development Standards, establishes the following noise and vibration standards (83.01.080 Noise and 83.01.090 Vibration, San Bernardino County Development Code):

83.01.080 Noise

(a) Noise measurement. Noise shall be measured:

(1) At the property line of the nearest site that is occupied by, and/or zoned or designated to allow the development of noise-sensitive land uses;

(2) With a sound level meter that meets the standards of the American National Standards Institute (ANSI Section SI4 1979, Type 1 or Type 2);

(3) Using the "A" weighted sound pressure level scale in decibels (ref. pressure = 20 micronewtons per meter squared). The unit of measure shall be designated as dB(A).

(b) Noise impacted areas. Areas within the County shall be designated as "noise-impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Subsection (d) (Noise standards for stationary noise sources) and Subsection (e) (Noise standards for adjacent mobile noise sources), below. New development of residential or other noise-sensitive land uses shall not be allowed in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards. Noise-sensitive land uses shall include residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses.

(c) Noise standards for stationary noise sources.

(1) Noise standards. Table 83-2 of the San Bernardino County Development Code - Noise Standards for Stationary Noise Sources (Table 4.9-5) describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties:

Table 4.9-5
Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	7 a.m.–10 p.m. L_{eq}	10 p.m.–7 a.m. L_{eq}
Residential	55 dB(A)	45 dB(A)
Professional Services	55 dB(A)	55 dB(A)
Other Commercial	60 dB(A)	60 dB(A)
Industrial	70 dB(A)	70 dB(A)

L_{eq} = equivalent energy level. The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically 1, 8, or 24 hours.
dB(A) = A-weighted sound pressure level. The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter deemphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.
L_{dn} = day-night noise level. The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10 pm to 7 am). In this way L_{dn} takes into account the lower tolerance of people for noise during nighttime periods.
Source: San Bernardino County Development Code, 83.01.080 Noise

(2) Noise limit categories. No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

(A) The noise standard for the receiving land use as specified in Subsection B (Noise-impacted areas), above, for a cumulative period of more than 30 minutes in any hour.

(B) The noise standard plus 5 dB(A) for a cumulative period of more than 15 minutes in any hour.

(C) The noise standard plus 10 dB(A) for a cumulative period of more than five minutes in any hour.

(D) The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

(E) The noise standard plus 20 dB(A) for any period of time.

(d) Noise standards for adjacent mobile noise sources. Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 83-3 of the San Bernardino County Development Code - Noise Standards for Adjacent Mobile Noise Sources (Table 4.9-6).

Table 4.9-6
Noise Standards for Adjacent Mobile Noise Sources

Land Use		L_{dn} (or CNEL) dB(A)	
Categories	Uses	Interior[1]	Exterior[2]
Residential	Single and multifamily, duplex, mobile homes	5	60[3]
Commercial	Hotel, motel, transient housing	45	60[3]
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

Notes: CNEL = community noise equivalent level. The average equivalent A-weighted sound level (dB[A]) during a 24-hour day, obtained after addition of approximately 5 decibels to sound levels in the evening from 7 p.m. to 10 a.m. and 10 decibels to sound levels in the night before 7 a.m. and after 10 p.m.

[1] The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.

[2] The outdoor environment shall be limited to:
hospital/office building patios
hotel and motel recreation areas
mobile home parks
multifamily private patios or balconies
park picnic areas
private yard of single-family dwellings
school playgrounds

[3] An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.

Source: San Bernardino County Development Code, 83.01.080 Noise

(e) Increases in allowable noise levels. If the measured ambient level exceeds any of the first four noise limit categories in Subsection (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subsection (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

(f) Reductions in allowable noise levels. If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 83-2 - Noise Standards for Stationary Noise Sources (Table 4.9-5) shall be reduced by 5 dB(A).

(g) Exempt noise. The following sources of noise shall be exempt from the regulations of this section:

(1) Motor vehicles not under the control of the commercial or industrial use.

(2) Emergency equipment, vehicles, and devices.

(3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

83.01.090 Vibration

(a) Vibration standard. No ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths (0.2) inches per second measured at or beyond the lot line.

(b) Vibration measurement. Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line next to a parcel within a residential, commercial and industrial land use zoning district.

(c) Exempt vibrations. The following sources of vibration shall be exempt from the regulations of this Section.

(1) Motor vehicles not under the control of the subject use.

(2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

Mohave County, Arizona General Plan

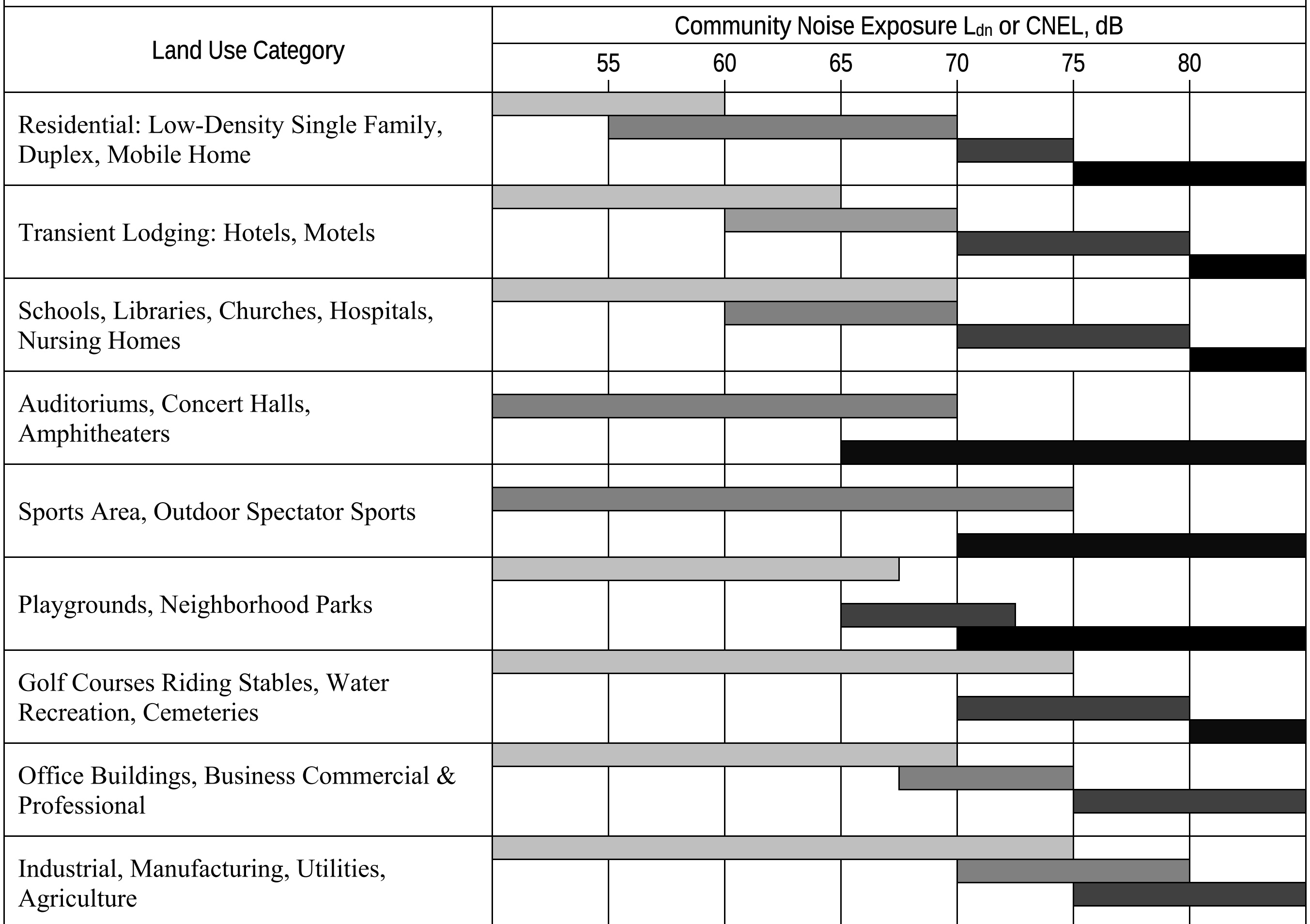
The Noise Element in the *Mohave County, Arizona General Plan* establishes specific goals and policies to ensure an acceptable noise environment for each land use. This element establishes maximum acceptable exterior noise level criteria for a variety of land uses. Applicable goals and policies applied to the proposed project include the following:

GOAL 8: To minimize noise levels throughout the County and, wherever possible, mitigate the effects of noise to provide a safe and healthy environment.

- **Policy 8.1:** The County should establish standards for noise and land use compatibility based on Exhibit V.6 [Table 4.9-7].

- **Policy 8.2:** The County should use the General Plan and zoning ordinance to separate noise-sensitive land uses. For example, new subdivisions should be adequately noise buffered from highways and rail road mainline tracks.

Table 4.9-7
Land Use Compatibility for Community Noise Environments



Normally Acceptable – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise requirements

Normally Unacceptable – New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.

Conditionally Acceptable – New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

Clearly Unacceptable – New construction or development clearly should not be undertaken.

Notes: dB = A-weighted decibel; CNEL = Community Noise Equivalent Level; L_{dn} = day-night average noise level.
Source: Mohave County 2005:51

Mohave County Zoning Ordinance

To protect people from severe noise levels, the Mohave County Zoning Ordinance sets limits for exterior noise levels generated by industrial sources and vibration levels affecting noise-sensitive land uses. Specifically, Section 27.S Industrial Performance Standards establishes the following noise and vibration standards:

C. Locations Where Determinations Are to Be Made for Enforcement Standards.

1. Noise, vibration, radiation, light and glare: at the location of the use creating the same at a point on the source property line which has the highest readings, and at other points off site where the existence of such elements may be more apparent.

2. Noise: at the boundary between the manufacturing district and residential districts, the maximum sound level radiated by any use or facility, other than transportation facilities, temporary construction work or safety relief systems shall not exceed the limits set forth in the following table (Table 4.9-8).

3. Vibration: at the boundary between a manufacturing district and a residential district, earth born vibration from any operation or plant shall not exceed the limits set forth in the following table in the frequency ranges specified (Table 4.9-9).

Table 4.9-8
Mohave County Industrial Noise Performance Standards

Octave band (cps)	37 75	75 150	150 300	300 600	600 1200	1200 2400	2400 4800	4800 9600	A Scale
Daylight decibel band limit (dB re 0.0002 microbar)	90	80	74	69	65	62	60	58	70
Nighttime decibel band limit (dB re 0.0002 microbar)	83	73	67	62	58	55	53	51	63

Notes: cps = cycles per second; dB = A-weighted decibel.
Source: Mohave County Zoning Ordinance, Section 27.S

Table 4.9-9
Mohave County Industrial Vibration Standards

Frequency Cycles per Second	Displacement in Inches
0 to 10	.0020
10 to 20	.0016
20 to 30	.0010
30 to 40	.0006
40 and over	.0005

Source: Mohave County Zoning Ordinance, Section 27.S

4.9.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.9.3.1 ANALYSIS METHODOLOGY

Project-specific information contained in Chapter 3, “Project Description,” and data collected during on-site noise monitoring were used to identify the location of sensitive receptors and existing sources of noise and vibration on the project site. Sensitive receptors and major noise sources near the project site were identified based on existing documentation (e.g., equipment noise levels and attenuation rates) and site reconnaissance data.

To assess potential short-term construction-related noise impacts, sensitive receptors and their relative exposure (considering intervening topography and distance) to project-generated noise levels were identified. Project-generated noise levels were predicted using the FTA Noise and Vibration Impact Assessment methodology (FTA 2006). Reference noise emission levels and the equipment usage factors were based on the FHWA Roadway Construction Noise Model (FHWA 2006). Resulting combined noise levels from the use of specific construction equipment were predicted at identified noise-sensitive receptors.

With respect to long-term (operational-related) transportation noise sources, traffic noise modeling was conducted based on ADT volumes obtained from the transportation analysis prepared for this project (Pack, pers. comm., 2009). The FHWA Highway Traffic Noise Prediction Model RD 77-108 with adaptations for CALVENO factors for standard automobiles, medium trucks, and heavy trucks (over two axles) was used to predict traffic noise levels along affected roadways, based on project-specific trip distribution (Pack, pers. comm., 2009). The project's contribution to the existing traffic noise levels along area roadways was determined by comparing the predicted noise levels (L_{dn}) at 100 feet from the roadway centerline, with and without project-generated traffic.

Potential noise impacts from long-term nontransportation (i.e., stationary) sources were assessed based on existing documentation (e.g., equipment noise levels) and site reconnaissance data. This analysis also included an evaluation of the proposed noise-generating uses that could affect sensitive receptors near the project site.

Groundborne vibration impacts were qualitatively assessed based on existing documentation (e.g., vibration levels produced by specific heavy-duty equipment operations) and the distance of sensitive receptors from the given source.

Predicted noise levels were compared with applicable standards for determination of significance. Mitigation measures were developed for significant and potentially significant noise impacts.

4.9.3.2 THRESHOLDS OF SIGNIFICANCE

Based on the CEQA Guidelines and the Noise Element of the County General Plans (San Bernardino and Mohave), the proposed project would result in a significant impact with respect to noise or vibration if implementation would:

- expose persons to or generate noise levels in excess of applicable standards (e.g., San Bernardino County and Mohave County general plans, and San Bernardino County Development Code and Mohave County Zoning Ordinance exterior and interior noise levels as shown in Tables 4.9-5, 4.9-6, 4.9-7, and 4.9-8, respectively);
- result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project (where existing ambient noise levels are less than 60 dB a significant increase would be considered +5 dB change in ambient noise levels due to the project, and where existing ambient noise levels exceed 60 dB a significant increase would be considered +3 dB change in ambient noise levels due to the project [FICON 1992, Caltrans 1998]);
- result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project (where existing ambient noise levels are less than 60 dB a significant increase would be considered +5 dB change in ambient noise levels due to the project, and where existing ambient noise levels exceed 60 dB a significant increase would be considered +3 dB change in ambient noise levels due to the project [FICON 1992: 3.5–3.6, Caltrans 1998: 40–43]);
- expose persons to or generate excessive groundborne vibration or groundborne noise levels (San Bernardino County Development Code (83.01.090) and the Mohave County Zoning Ordinance as shown in Table 4.9-9);
- generate noise levels that would conflict with land use compatibility guidelines established for Places of Worship or would result in a conflict with Native American values associated with the Topock Cultural Area;

- expose people residing or working in the area to excessive noise levels, for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport;
- expose people residing or working in the project area to excessive noise levels, for a project within the vicinity of a private airstrip;

Generally for the proposed project, the significance determination of noise- and vibration-related impacts is based on a comparison between predicted noise levels and noise criteria defined by San Bernardino and Mohave Counties. Impacts are considered significant if existing or proposed sensitive receptors would be exposed to noise levels in excess of the San Bernardino County and Mohave County General Plans and San Bernardino County Development Code and Mohave County Zoning Ordinance as described above (see Section 4.9.2, "Regulatory Background") or if implementation of the proposed project would result in an increase in ambient noise levels in excess of the decibel increase outlined in the above thresholds of significance.

The project site is not located within 2 miles of a public or private airstrip. Needles Airport is located 6 miles from the project area's most western boundary; therefore the last two thresholds listed above related to airport-related noise are not considered further in this EIR. For a discussion of land use compatibility with respect to places of worship and the Topock Cultural Area, please refer to Section 4.4, "Cultural Resources."

4.9.3.3 IMPACT ANALYSIS

> Long-Term Operational-Related Nontransportation Noise Impacts. *Operation of the proposed project would not result in any nontransportation noise sources (i.e., water filtration facilities) that would generate noise levels that would result in a noticeable, permanent increase in ambient noise levels at nearby sensitive receptors. Therefore, this would be a* ***less than significant impact****.*

With respect to nontransportation (i.e., stationary) sources, the measured short-term noise level taken north of I-40 (ST: 2), the nearest noise measurement site to the existing IM-3 Facility and nearest sensitive receptor site in California, was 41.4 dB L_{eq} with IM-3 operations occurring as discussed in Section 4.9.1 "Existing Setting." The existing sunshade at the IM-3 Facility acts as an effective noise barrier and IM-3 operations were not audible during the noise measurement. If surface water from the Colorado River is used for the freshwater flushing portion of the proposed project, water treatment facilities would be needed to remove sediment and bacteria prior to injection. These water treatment facilities would be enclosed in new buildings. Based on field observations of existing operations and facilities, construction of new buildings associated with the proposed project would provide adequate noise shielding and associated noise reductions to adjacent sensitive receptors such as local residents and recreationalists boating on the Colorado River or using the Havasu National Wildlife Refuge.
As discussed in Section 3.3.1, "Description of Proposed Project Features," electric submersible pumps would be installed below grade and encased in a subsurface concrete vault. Based on field observations, the concrete vaults reduce all noise impacts of submersible pumps. Thus, operation of water filtration facilities or wells within the project area would not result in a permanent increase in ambient noise levels relative to existing sensitive receptors in the project area above levels existing without the project or consequently expose persons to or generate noise levels in excess of applicable standards. As a result, this impact would be **less than significant**.

> Long-Term Operational-Related Transportation Noise Impacts. *The proposed project would not result in a substantial permanent increase in ambient noise levels relative to existing sensitive receptors in the project area above levels existing without the project or expose persons to or generate noise levels in excess of applicable standards. Therefore, this would be a* ***less-than-significant*** *impact.*

With respect to transportation sources, project-generated traffic noise level increases were predicted based on project-specific information (Haith, pers. comm., 2009). As shown in Table 4.9-10, long-term operation of the proposed project would result in predicted traffic noise level increases along the affected segment of Moabi Road

Table 4.9-10 Summary of Predicted Project-Generated Traffic Noise Level Increase (Moabi Road from Interstate 40 to National Old Trails Road)							
Project Component	L_{dn} at 100 Feet from Roadway Centerline, dB						
	Existing L_{dn}	Existing + Project (Construction/ Decommissioning)	Net Change	Significant Impact?	Cumulative + Project (Decommissioning)	Net Change	Significant Impact?
Freshwater Flushing	46.4	48.6	2.2	No	50.4	4	No

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level.
* Traffic noise levels are predicted at a standard distance of 100 feet from the roadway centerline and do not account for shielding from existing noise barriers or intervening structures.
Source: FHWA RD-77-108 1978, modeled by Fehr & Peers in 2010 (Appendix TR-1)
Data modeled by AECOM in 2009

from I-40 to National Old Trails Road that range from 2.2 to 4 dB under the proposed project. Refer to Appendix NO-2 for calculation details. These would not exceed 5 dB (the level considered substantial for areas where ambient noise levels are less than 60 dB). Thus, project-generated traffic noise would not result in a substantial permanent increase in ambient noise levels relative to existing sensitive receptors in the project area above levels existing without the project or expose persons to or generate noise levels in excess of applicable standards. As a result, this impact would be **less than significant**.

IMPACT NOISE-1 **Groundborne Vibration and Noise Impacts Caused by Construction Activities.** *Implementation of the proposed project would result in the exposure of sensitive receptors to groundborne noise and vibration levels that exceed the applicable standards of the San Bernardino County Development Code (83.01.090) and the Mohave County Zoning Ordinance (Table 4.9-9). These groundborne noise and vibration levels could result in annoyance or architectural/structural damage. As a result, this impact would be* ***potentially significant****.*

Construction and demolition activities on the proposed project site may result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Groundborne vibration levels caused by various types of construction equipment are summarized in Table 4.9-11.

Table 4.9-11 Representative Vibration Source Levels for Construction Equipment		
Equipment	PPV at 25 feet (in/sec)[1]	Approximate Lv (VdB) at 25 feet[2]
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Notes:
1 Where PPV is the peak particle velocity.
2 Where Lv is the RMS velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.
Source: FTA 2006

To evaluate vibration impacts at sensitive land uses and receptors (e.g., annoyance, sleep disruption, damage), the construction activity that would generate the highest PPV or highest VdB (drilling) under the proposed project was analyzed. The project area boundary extends onto the Arizona side of the Colorado River and wells may be constructed near vibration-sensitive land uses and/or receptors (Topock Marina MHP or single family residences). It is not feasible to evaluate vibration impacts at this time due to a lack of information for proposed well location, construction, and decommissioning. However, it is anticipated that vibration standards would be exceeded when these activities occur within 30 feet and 275 feet from a vibration-sensitive land use when conducted in the California and Arizona project areas, respectively (see Appendix NO-2). If construction were to occur within these distances (30 and 275 feet respectively) of a vibration-sensitive land use, damage to property or structures could occur. Annoyance and or sleep disruption related to vibration-sensitive receptors, it is anticipated that vibration standards would be exceeded when these activities occur within 45 feet (see Appendix NO-2). If construction were to occur within this distance (45 feet) of a vibration-sensitive receptor, annoyance and/or sleep disruption could occur. Project-generated construction-related vibration levels have the potential, depending on the location of new wells, to exceed the San Bernardino County Development Code (Section 83.01.090) and/or the Mohave County Zoning Ordinance (see Table 4.9-9). As a result, this impact would be **potentially significant**. **(Impact NOISE-1)**

Mitigation Measure NOISE–1: Short-Term Groundborne Noise and Vibration Levels Caused by Construction Activities near Sensitive Receptors.

- Construct new wells a minimum of 45 feet from vibration-sensitive receptors. Avoid constructing wells within 30 feet of vibration-sensitive land uses located in California and 275 feet of vibration-sensitive land uses located in Arizona;

- A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near the entrance so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator will manage complaints resulting from the construction vibration. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby vibration-sensitive receptors, advising them of the construction schedule.

Timing:	Upon commencement of construction activities being performed in proximity to vibration-sensitive receptors.
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC shall be responsible for ensuring compliance.
Significance after Mitigation:	The impact would be **less than significant** after implementation of the measures detailed above. Mitigation Measure NOISE-1 would ensure construction of new wells would occur sufficient distances from vibration-sensitive land uses and receptors to prevent property damage and annoyances.

IMPACT NOISE-2	Project-Generated Construction-Related Noise Levels. *Implementation of the proposed project would result in intermittent construction activities associated with the installation of new wells, roadways, water conveyance, utilities, roadways, water filtration facilities, operations, and maintenance. These construction activities could potentially expose sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a substantial increase in ambient noise levels. As a result, this impact would be potentially significant.*

Implementation of the proposed project would result in intermittent construction activities associated with the installation, operation, and maintenance of new wells, roadways, water conveyance, utilities, and facilities. These construction activities could potentially expose sensitive receptors such as residents and recreationalists along the Colorado River or using the Havasu National Wildlife Refuge to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels. Construction noise levels in the project area would fluctuate depending on the particular type, number, and duration of usage for the varying equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise-sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Construction generally occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. These variations in the operational characteristics of the equipment change the effect they have on the noise environment of the project area and in the surrounding community for the duration of the construction process.

The site preparation phase typically generates the highest noise levels because of the intensity and required on-site equipment associated with grading, compacting, and excavation. Site preparation could involve backhoes, bulldozers, loaders, excavation equipment such as graders and scrapers, drill rigs, and compaction equipment. Erection of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which may also generate high noise levels. Although a detailed construction equipment list is not currently available, it is expected that the primary sources of noise would include drill rigs, backhoes, compressors, bulldozers, excavators, and other related equipment. Table 4.9-12 depicts the noise levels generated by various types of construction equipment.

Construction equipment can be either mobile or stationary. Mobile equipment (e.g., loaders, graders, dozers) typically move around a construction site performing tasks in a recurring manner. Stationary equipment (e.g., air compressor, generator, concrete saw) typically operate in a given location for an extended period of time to perform continuous or periodic operations. Thus, determining the location of stationary sources during specific phases, or the effective acoustical center of operations for mobile equipment during various phases of the construction process is necessary. Operational characteristics of heavy construction equipment are additionally typified by short periods of full power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

As indicated in Table 4.9-12, operational noise levels for typical construction activities (e.g., new well, water conveyance, utilities, roadway, treatment plant) would generate noise levels ranging from 74 to 90 dB at a distance of 50 feet. Continuous combined noise levels generated by the simultaneous operation of the loudest pieces of equipment would result in noise levels of up to 93 dB at 50 feet. Accounting for the usage factor of individual pieces of equipment, distance, and absorption effects, construction activities on the project site are expected to result in hourly average noise levels of up to approximately 86 dB L_{eq}, at a distance of 50 feet, with maximum noise levels up to 93 dB L_{max} at 50 feet.

Sensitive receptors within the project area include a single-family residence (Arizona), Topock Marina MHP, Moabi Regional Park, and recreationalists using the Colorado River. Noise from localized point sources (such as construction sites) typically decreases by 6 dB to 7.5 dB with each doubling of distance from source to receptor when propagated over land and 5 dB to 6 dB with each doubling of distance from source to receptor when propagated over water. The exact location of proposed project components (e.g., wells, roads, pipelines) has not yet been determined and could occur close to sensitive receptors in the Arizona and California project areas. Project components constructed in the California project area could affect Arizona receptors as well. Construction activities conducted within 1,850 feet and 5,830 feet from California receptors would exceed San Bernardino County's daytime and nighttime noise standards of 55 dB and 45 dB L_{eq}, respectively. Construction activities conducted within 330 feet and 735 feet from Arizona receptors would exceed Mohave County's daytime and nighttime noise standards of 70 dB and 63 dB L_{eq}, respectively.

It should be noted that there are several intervening topographic features (mesas) between California project area construction activities and Moabi Regional Park. The mesas would break line of sight between construction activities and sensitive receptors using Moabi Regional Park. These topographic features would be expected to reduce project-generated construction noise levels during both the daytime and nighttime hours at Moabi Regional Park to inaudible or immeasurable levels under the proposed project. Similarly, vegetation along the Colorado floodplain would help diminish construction-related noise along many portions of the Colorado River.

Table 4.9-12
Noise Emission Levels from Construction Equipment

Equipment Type	Typical Noise Level (dB) @ 50 Feet
Air Compressor	78
Asphalt Paver	77
Auger Drill Rig	85
Backhoe	78
Compactor	83
Concrete Breaker	82
Concrete Pump	81
Concrete Saw	90
Crane, Mobile	81
Dozer	82
Drill Rig Truck	84
Front-end Loader	79
Generator	81
Grader	85
Hoe Ram Extension	90
Jack Hammer	89
Pneumatic Tools	85
Pile Driver	101
Pump	77
Rock Drill	81
Scraper	84
Trucks	74–81
Water Pump	81

Notes: dB = A-weighted decibels.
All equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacturer-specified noise levels for each piece of heavy construction equipment.
Source: Bolt Beranek and Newman Inc. 1981, FTA 2006

Project-generated construction-related noise levels would exceed applicable standards and could consequently result in a temporary substantial increase in ambient noise levels, especially when construction activities would occur during the nighttime hours. As a result, this impact would be **potentially significant**. **(Impact NOISE-2)**

Mitigation Measure NOISE–2: Project-Generated Construction-Related Noise Levels.

- Construction equipment shall be properly maintained per manufacturer specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools shall be shrouded or shielded, and all intake and exhaust ports on power equipment shall be muffled or shielded.

- Construction equipment shall not idle for extended periods of time (more than 15 minutes) when not being utilized during construction activities.

- Construction activities shall include the use of berms, stockpiles, dumpsters, and or bins to shield the nearest noise-sensitive receptor adjacent to construction activities to within acceptable nontransportation noise level standards. When construction activities are conducted within the distances outlined above (i.e., 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively) relative to noise-sensitive uses in the project area, noise measurements shall be conducted by a qualified acoustical consultant at the nearest noise-sensitive land use relative to the construction activities with a sound level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2) to ensure that construction noise associated with the project component complies with applicable daytime and nighttime noise standards. If noise levels are still determined to exceed noise standards, temporary barriers shall be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers shall be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater as defined by the American Society for Testing and Materials' Test Method E90. Placement, orientation, size, and density of acoustical barriers shall be specified by a qualified acoustical consultant.

- A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near construction areas so that it is clearly visible to nearby receivers most likely to be disturbed. In addition, mailing of the same information will be sent to nearby receptors and all tribes. The coordinator will manage complaints resulting from the construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise-sensitive receptors, advising them of the construction schedule.

Timing:	During construction activities being performed within 1,850 feet of noise-sensitive receptors to the east (single family residences in Topock AZ, and the Topock Marina MHP).
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC shall be responsible for ensuring compliance.
Significance after Mitigation:	The impact would be **less than significant** after implementation of the measures detailed above. Mitigation Measure NOISE-2 would ensure the compliance of applicable noise standards and reduce noise levels by 2 dB to 5 dB at the noise-sensitive uses to the east of the project area.

IMPACT NOISE-3	Land Use Compatibility of Future Project Noise Levels with the Topock Cultural Area. *Implementation of the proposed project could result in future noise (construction, operations and maintenance, and decommissioning activities) that could result in conflicts with land use compatibility that exceed the County's standards for Places of Worship or conflict with Native American values associated with the Topock Cultural Area. As a result, this impact would be* ***potentially significant****.*

Implementation of the proposed project could result in future noise that could expose the Topock Cultural Area (a place of worship for Native Americans) to levels that exceed the County's standards or would conflict with Native American values associated with this resource. As noted in Section 4.4, "Cultural Resources" of this EIR, the Topock Cultural Area is considered highly sensitive, and changes in the noise environment would adversely affect Native American participants. Construction, operation, and decommissioning of the proposed project would result in noise levels that conflict with the use of this area. The San Bernardino County Development Code establishes exterior noise standards (55 dB L_{eq} daytime and 45 dB L_{eq} nighttime) for land uses designated as a place of worship. As shown in Table 4.9-1, measured noise levels at ST: 1 (south of I-40) was 47.2 dB L_{eq} and north of I-40 (ST: 2) was 41.4 dB L_{eq}. The dominant noise source during the measurements was existing traffic noise emanating from I-40 and train pass-bys along the BNSF tracks. ST: 2 is the closest portion of this noise-sensitive land use to the existing IM-3Facility. IM-3 operations were not audible during the noise measurement.

Future construction, operations and maintenance, and decommissioning activities associated with the proposed project could increase noise levels within the Topock Cultural Area. There are intervening topographic features (mesas) in the project area that could shield noise emanating from the proposed activities at certain locations within the Topock Cultural Area. However, locations of future project-related activities are not specifically known at this time and it is not feasible to calculate noise levels attributable to the proposed project throughout the project area. Without knowing the specific locations of each noise generating remediation activity, there is no assurance that topographic features would intervene and result in adequate shielding of sensitive receptors from project noise impacts. The potential for future noise to conflict with the values associated with the Topock Cultural Area by Native American participants would still exist and it is expected that any introduction of new noise sources would be perceived as a significant impact by some Native Americans (see Section 4.4 of this DEIR for further information).

Construction and decommissioning of the proposed project are considered short term isolated noise events that would occur over the large project area and could last from one day to five weeks. Operations and maintenance of the proposed project components are predicted to generate relatively low noise levels except when new wells are constructed or wells need to be replaced. These well construction and replacement activities are also considered short term. Ambient noise levels at existing noise-sensitive land uses may experience increased noise levels due to project component activities for short term periods. Meteorological conditions (wind direction) would also affect the noise levels experienced by Native American participants. As a result, this impact would be **potentially significant**. **(Impact NOISE-3)**

Mitigation Measure NOISE–3: Land Use Compatibility of Future Project Noise Levels with Places of Worship and the Topock Cultural Area.

Provided that the proposed project would be required to achieve the normally acceptable exterior noise level standard for places of worship, the following mitigation measure shall be incorporated in the project design:

- Implement all of the mitigation measures outlined for Impact NOISE-1 and Impact NOISE-2;
- Upon completion of detailed project design, the determination of remediation activities and the schedule established to achieve these activities shall be communicated to Native American tribes. PG&E shall maintain a liaison with requesting Tribes to alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.

Timing:	Prior to the commencement of construction activities being performed and on at least an annual basis
Responsibility:	PG&E shall be responsible for the implementation of these measures. DTSC shall be responsible for ensuring compliance.
Significance after Mitigation:	The impact would be **significant and unavoidable** after implementation of the measures detailed above. Although Mitigation Measure NOISE-3 would achieve the normally acceptable exterior noise level standard for places of worship and provide information to Native American participants on the expected timing of noise-generating project activities, but the unique values associated with the Topock Cultural Area cannot be reconciled with additional project-related noise.

4.10 TRANSPORTATION

This section discusses the existing roadway network and transportation facilities in the project area and surrounding vicinity; describes the applicable federal, state, and local regulations and policies related to transportation; describes the existing traffic and circulation conditions within the surrounding area; and analyzes the potential short and long-term impacts from project activities on transportation and traffic. A discussion of cumulative impacts on transportation resources is provided in Chapter 6, “Cumulative Impacts,” of this DEIR.

4.10.1 EXISTING SETTING

This section discusses the transportation-related context in which the proposed project would be constructed and would operate. Provided below is a description of the project area and the street network that serves the project area; a description of existing transit service, bicycle, and pedestrian facilities near the project area; definitions of levels of service (LOS) for intersections and roadway segments; and a summary of current conditions.

The project area is located in the Mojave Desert approximately 12 miles southeast of the City of Needles, California, and 1 mile southeast of the Moabi Regional Park in California (see Exhibit 3-1 in Chapter 3, “Project Description”). The compressor station is one-half mile west of the community of Topock, Arizona, which is situated directly across the Colorado River from the compressor station and 5 miles south of Golden Shores, Arizona.

Automotive and truck transportation have occurred near the project site since the early 1900s. The Old Trails Arch Bridge was a highway bridge erected in 1916 that later became part of Historic Route 66. A portion of historic Route 66 runs through the project site. Rail activities along the route of the current Burlington Northern Santa Fe (BNSF) Railway have occurred near the project site since the 1890s.

The roadway network for the project area is shown in Exhibit 4.10-1 and described below.

4.10.1.1 EXISTING ROADWAY SYSTEM

Regional access to the project area is provided by the Park Moabi Road interchange with Interstate 40 (I-40). Paved road access is provided by Park Moabi Road and National Trails Highway. These roadways are described in detail below.

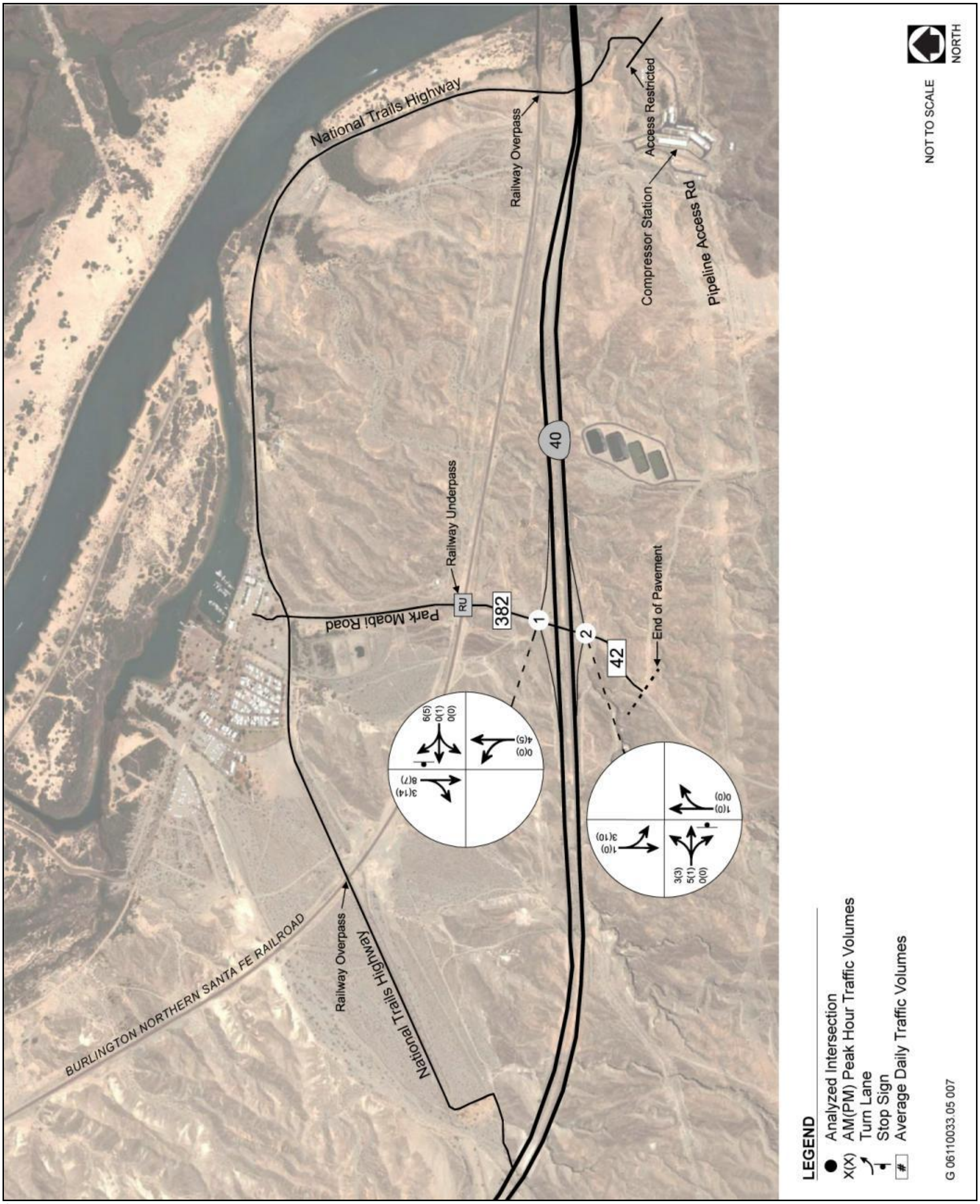
- I-40 is a major west-east highway in the United States. Its western terminus is at its junction with Interstate 15 (I-15) in Barstow, California, and its eastern terminus is in Wilmington, North Carolina. Much of the western portion of I-40, from Oklahoma City to Barstow, parallels Historic Route 66. I-40 has two lanes in each direction in the project area, with a posted speed limit of 70 mile per hour (mph) for passenger vehicles and 55 mph for heavy vehicles or passenger vehicles with trailers.

- National Trails Highway (formerly known as Historic Route 66 and California State Highway 58), is a former federal highway. It has one lane in each direction in the project area. The pavement is in generally poor condition in the project area.

- Park Moabi Road is a two-lane paved facility in the project area, with one travel lane in each direction.

4.10.1.2 EXISTING PUBLIC TRANSIT SYSTEM

Transit service in the general project vicinity is provided by Needles Area Transit. This service is provided in the city of Needles but does not extend to the project area.



Source: Fehr and Peers 2008

Existing Volumes and Traffic Control **Exhibit 4.10-1**

The Burlington Northern Santa Fe Railway has a transit hub in Needles, and two Amtrak trains per day pass through Needles, one train bound for Los Angeles and the other bound for Chicago. There are no at-grade railroad track crossings in the project area. Greyhound Bus Lines also provides two daily stops at Needles. However, neither rail nor bus service is provided at the project area.

No other public transit services (e.g., park-and-ride lots) are provided near the project area.

4.10.1.3 EXISTING BICYCLE AND PEDESTRIAN NETWORK

No existing bicycle or pedestrian facilities are located in the project area.

4.10.1.4 TRANSPORTATION FACILITIES

The following transportation facilities were evaluated for current commute-period ("peak-hour") conditions occurring during the morning (7:00 to 9:00 a.m.) and evening (4:00 to 6:00 p.m.) hours. Roadway segments were evaluated for daily (24-hour) conditions during an average weekday (Tuesday–Thursday). The two existing intersections, both of which are unsignalized, identified for analysis are:

- Park Moabi Road/I-40 eastbound ramps and
- Park Moabi Road/I-40 westbound ramps.

The two existing roadways identified for analysis are:

- Park Moabi Road north of I-40 and
- Park Moabi Road south of I-40.

The intersections and roadway segments assessed in this impact analysis correspond to facilities that provide direct access to I-40 (the ramp terminal intersections and segments of Park Moabi Road) as they would have the highest potential to result in a project impact (e.g., they are the most utilized roadway facilities in the project area today and the proposed project would add traffic to them). Although National Trails Highway is described above, it carries less traffic than Park Moabi Road and is less-likely to have an impact. Therefore, National Trails Highway was not evaluated in detail in the impact assessment.

4.10.1.5 EXISTING INTERSECTION AND ROADWAY SEGMENT OPERATIONS

The operations of roadway facilities are described with the term "level of service" or LOS. LOS is a qualitative description of traffic flow from a vehicle driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined, ranging from LOS A (free-flow operating conditions) to LOS F (congested operating conditions). LOS E represents "at capacity" operations.

The San Bernardino Associated Governments (SANBAG), San Bernardino County's (County's) regional planning agency, has established LOS E as the standard for roadway operations within the county (San Bernardino County 2007:III-5). However, SANBAG also permits each jurisdiction to set its own, more stringent standard. The *County of San Bernardino 2007 General Plan* (County General Plan) establishes LOS D as the minimum acceptable level of service during peak hours in the Valley and Mountain Regions (San Bernardino County 2007:III-47, III-48) and LOS C as the minimum LOS in the Desert Region (San Bernardino County 2007:III-51), which is where the proposed project is located. Therefore, for the purposes of this project, LOS C is considered the minimum acceptable operating level for intersections and roadway segments.

The following data were collected to assess existing conditions in the project area. The intersection count data was collected on December 16, 2008. The roadway segment count data was collected from December 16, 2008 through December 18, 2008. The count locations are shown on Exhibit 4.10-1.

- peak-hour morning and evening counts at the two study intersections;
- average daily traffic (ADT) counts on Park Moabi Road on the two study roadway segments;
- lane configurations, intersection turning radii, speed limits, traffic control, and general pavement conditions in the project area; and
- accident data from the County for facilities near the project area.

Exhibit 4.10-1 also displays the existing lane configurations, traffic control, a.m. and p.m. peak-hour traffic volumes, and the ADT counts collected in the project area.

Roadway Geometric Data

Roadway width information is provided to assess potential safety considerations related to transportation in the project area. Results of this assessment are summarized in Table 4.10-1. Overall, the measured cross-section of Park Moabi Road is consistent with the County's current design standards, when accounting for the shoulder and the roadway. However, the measured half width of the paved roadway was generally 1 foot narrower than the County's standard plans.

Table 4.10-1
San Bernardino County Standards and Existing Roadway Conditions

Roadway	Classification	Required Half Width		Actual Half Width		Standards Met?
		Road	Shoulder	Road	Shoulder	
Park Moabi Road	Desert Road	13 feet	5 feet	11–12 feet	5–6 feet	Required half width standards are not met

Sources: San Bernardino County Transportation Department 1965 (standard drawings, for required roadway half width); Fehr & Peers field measurements (for actual roadway half width), as measured December 2008.

Intersections in the project area have adequate sight distance as no obstructions are present to impede visibility. Turning radii at intersections are consistent with County standards.

Level of Service Criteria for Intersection Operations

For intersection analysis, the methodologies described in Transportation Research Board's 2000 *Highway Capacity Manual* were used to evaluate unsignalized intersections. With this method, operations are defined by the average control delay per vehicle (measured in seconds). The control delay incorporates delay associated with deceleration, acceleration, stopping, and queue move-up time.

Level of Service Criteria for Unsignalized Intersections

Table 4.10-2 summarizes the relationship between driver experience and LOS for unsignalized intersections. Intersection volumes and geometrics are incorporated into the LOS analysis as shown in Exhibit 4.10-1. The LOS results are presented in Table 4.10-3.

Table 4.10-2 LOS Criteria for Unsignalized Intersections		
Level of Service	Description	Average Control Per Vehicle (Seconds)
A	Little or no delays	≤ 10.0
B	Short traffic delays	> 10.0 to 15.0
C	Average traffic delays	> 15.0 to 25.0
D	Long traffic delays	> 25.0 to 35.0
E	Very long traffic delays	> 35.0 to 50.0
F	Extreme traffic delays with intersection capacity exceeded	> 50.0

Note: LOS = level of service

Source: Transportation Research Board 2000

Table 4.10-3 Existing (2008) Peak-Hour Level of Service				
Location	Control	Peak Hour	Delay (Seconds)[1]	LOS
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	9.0	A
		p.m.	8.9	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.4	A
		p.m.	8.5	A

Notes: LOS = level of service; SSSC = side-street stop-control intersection

[1] For side-street stop-controlled intersections, delay for worst movement was calculated using the 2000 *Highway Capacity Manual* methodology.

Source: Data compiled by Fehr & Peers in 2008

The results of the intersection LOS analysis indicate that the two intersections are operating at an acceptable LOS A during the a.m. and p.m. peak hours.

Level of Service Criteria for Roadway Segments

For roadway segments, the existing roadway segment volumes were compared to roadway segment capacities identified in the County General Plan. As shown in Table IV-O-8, “Roadway Daily Volume Thresholds,” of the 2007 County General Plan, LOS C in the Desert Region of the county has a volume threshold of 7,000 ADT. Therefore, roadway segments in the project vicinity are assumed to operate at an acceptable level if the ADT volume is less than 7,000. Table 4.10-4 indicates that the ADT volumes on Park Moabi Road are well below the County’s threshold.

Accident Review

Accident information received from San Bernardino County (Babico, pers. comm., 2008) indicates that no accidents have been reported on County roads in the project vicinity within the past 3 years.

Table 4.10-4 Roadway Segment Analysis			
Location	Acceptable Volume Threshold[1]	Existing Volume	Acceptable?
Park Moabi Road north of I-40	7,000 ADT	382	Yes
Park Moabi Road south of I-40	7,000 ADT	42	Yes

Notes:
ADT = average daily traffic; I-40 = Interstate 40
[1] Based on the threshold in the *County of San Bernardino 2007 General Plan*.
Source: Fehr & Peers 2008

4.10.2 REGULATORY BACKGROUND

4.10.2.1 FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Although I-40 is an interstate freeway, no specific federal plans, policies, regulations, or laws are relevant to transportation unless the proposed project would require improvements to I-40 (e.g., a new interchange). The proposed project does not include modifications to I-40 and therefore no federal plans, policies, regulations, or laws would affect evaluation of the transportation facilities.

4.10.2.2 STATE PLANS, POLICIES, REGULATIONS, AND LAWS

California Department of Transportation (Caltrans) policies are applicable to the proposed project and are summarized in Caltrans' Guide for the Preparation of Traffic Impact Studies (Caltrans 2002). These guidelines identify circumstances under which Caltrans believes that a traffic impact study would be required, information that Caltrans believes should be included in the study, analysis scenarios, and guidance on acceptable analysis methodologies. Caltrans may also need to issue an encroachment permit if project-related activities would occur within the right-of-way for I-40. The proposed project may require water supply from the state of Arizona, where a Caltrans encroachment permit may be required. As long as the encroachment process follows Caltrans requirements, and there are no significant changes in traffic levels of service associated with the potential construction activities in the Caltrans right of way, no state requirements specific to transportation are needed to address the proposed project.

4.10.2.3 REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND LAWS

Regional Transportation Plan

The Southern California Association of Governments (SCAG) adopted a 20-year regional transportation plan (RTP) that includes the project vicinity (SCAG 2008). The RTP identifies and provides a long-range strategy to meet mobility, financial, and air quality requirements for the region. The document also reflects forecasts for population, housing, employment, environmental conditions, and land use for the Southern California region.

As noted above, SANBAG is the regional planning agency responsible for representing San Bernardino County's interests in the Southern California Association of Governments and the RTP. Additionally, SANBAG manages San Bernardino's sales tax initiative for transportation improvements (Measure I) and other funding mechanisms from the federal and state governments. SANBAG is also the local congestion management agency for the project vicinity; as such, SANBAG is responsible for implementing the congestion management program (SANBAG 2003). SANBAG has coordinated with member agencies to implement impact fee programs for new development to mitigate expected impacts on facilities under the congestion management program. The fee program is set up to mitigate congestion on these facilities and therefore no further requirements specific to the congestion management program are required for the proposed project.

County of San Bernardino 2007 General Plan

San Bernardino County has adopted a number of policies pertaining to transportation that may have bearing on decisions related to the proposed project. While the State is not obligated to comply with these policies in the County General Plan, they are referenced below to provide context for the decision makers.

The Circulation and Infrastructure Element of the County General Plan contains the following policies that pertain to traffic and transportation in San Bernardino County (San Bernardino County 2007:III-26 and III-27):

- **Policy CI 5.1:** Implement appropriate design standards for all types of highways as shown in Chapter 83.23 of the Development Code.
- **Policy CI 5.2:** Protect and increase the designed roadway capacity of all vehicular thoroughfares and highways.
  - **Program 1:** Use current and develop new innovative traffic engineering practices to increase roadway capacity and safety such as:
    a. Use a raised median on major arterial highways in urban areas.
    b. Limit access to all categories of major and secondary highways and controlled/limited access collectors from intersecting streets; direct access from abutting properties will only where no reasonable alternatives exist.
    c. Obtain additional right-of-way to accommodate right- and left-turn lanes at major intersections.
    d. Develop special urban interchanges utilizing flyovers in areas requiring high-flow arterial highways.
    e. Synchronize signals.
    f. Maximize the use of intelligent transportation systems (ITS).
    g. Coordinate the development of traffic management centers (TMCs) and traffic operation centers (TOCs) with SANBAG and local cities.
    h. Establish no-parking zones.
    i. Limit peak-hour turning movements.
    j. Block or dead-end existing access roads to main highways.
    k. Establish one-way streets.
    l. Limit truck traffic on certain roads and at specified hours.
    m. Require all residential development proposals adjacent to all categories of major and secondary highways and controlled/limited access collectors to be designed so that direct access from the private property to the roadway will not be needed.
    n. Control lot size frontage to limit access.
    o. Develop minimum separation distances between access points.

p. Accommodate exclusive transit facilities within new roads or those planned for improvement

q. Develop design standards that will establish a minimum distance from intersections to any curb cut.

- **Policy CI 5.3:** Limit, where feasible, access along all roads intersecting major and secondary highways for a distance of 600 feet from the centerline of said highways to the maximum extent possible.
- **Policy CI 5.4:** Utilize road standards appropriate to geographic constraints and which complement the surrounding environment (see Chapter 83.23 of the Development Code).
- **Policy CI 5.5:** Public roadways should be developed consistent with the road standards as indicated in Chapter 83.23 of the Development Code.
- **Policy CI 5.6:** For privately maintained roads, the minimum width should be: (a) no less than a 24-foot-wide (paving, curbs and gutters) with no parking allowed; (b) 30-foot-wide (paving, curbs and gutters) with parking allowed on one side; or (c) a 36-foot-wide (paving, curbs and gutters) with parking allowed on both sides.
- **Policy CI 5.7:** During the review of proposed General Plan amendments or the development of specific plans, ensure accessibility to the site(s) including the quality of existing or proposed roads that will provide access.

In addition to those policies described above, the following transportation policies are applicable to development within this portion of the county (San Bernardino County 2007:III-33 and III-36). Please note that, although these policies relate to new development in the County, they will serve as the basis for significance criteria for activities associated with the proposed project.

- **Policy D/CI 1.1:** The County shall ensure that all new development proposals do not degrade Levels of Service (LOS) on Major Arterials below LOS C in the Desert Region.
- **Policy D/CI 1.2:** Design roads to follow natural contours, avoid grid pattern streets, minimize cuts and fills and disturbance of natural resources and trees wherever possible.
- **Policy D/CI 1.3:** Design road locations and alignments in such a manner to help preserve and protect sensitive habitats.
- **Policy D/CI 1.4:** Preserve the rural character by discouraging required urban-scale improvements such as curbs, gutters and street lighting where the public health, safety and welfare are not endangered.
- **Policy D/CI 1.5:** Along the highways, encourage shared driveways for industrial and commercial uses on adjacent properties to minimize turning movements and traffic congestion.
- **Policy D/CI 1.7:** Encourage strict enforcement of regulations governing the use of off-highway vehicles.
- **Policy D/CI 1.8:** Design road standards and maintain major thoroughfares to complement the surrounding environment within the Desert Region.
- **Policy D/CI 1.9:** Develop an adequate but limited system of all-weather collector roads where demands for roads do not justify secondary or major highway designations.
- **Policy D/CI 1.10:** Reevaluate major and secondary highway designations in remote desert areas with a view to downgrading designations on roads with low traffic counts.
- **Policy D/CI 1.11:** All residential tracts of more than five lots will provide paved access within the project. Subdivisions of less than five lots will also provide paved access within the project under the following circumstances:

a. When needed to control erosion and/or maintain road serviceability, and

b. When the project has access via a County-maintained road that is planned for surfacing within a Local Area Transportation Facilities Plan.

- **Policy D/CI 1.13:** At the discretion of the County Public Works Department, require the dedication of additional highway right-of-way in a new development where there is no predesignation on the General Plan circulation maps, on section lines, quarter section lines and sixteenth section lines as follows:

  a. On section and quarter section lines, a 40-foot half-width shall be dedicated to the County.

  b. On sixteenth section lines, a 30-foot half-width shall be dedicated to the County.

- **Policy D/CI 1.14:** The County should implement a traffic evaluation and monitoring program as follows:

  a. The following evaluation and monitoring program/criteria may be used to determine changes in the traffic level of service and the potential changes that may be caused by development within the project area. The program/criteria outlines below may also be used as guidelines for evaluating traffic changes and the level of service on project area roads:

     i. Residential development of more than 100 units will require a cumulative traffic impact study to ascertain the impact on the roadways and intersections affected by the proposed development.

     ii. All medium sized residential developments (under 100 units but greater than 5) and small commercial developments (under 5,000 square feet) shall be reviewed to determine whether a traffic impact study, to determine the impact on immediately adjacent streets and adjacent intersections, is required.

     iii. Commercial developments of more than 5,000 square feet shall be reviewed to determine whether a cumulative traffic impact study to determine the impact on the adjacent streets and intersections, as well as the roadways and intersections expected to be traveled to access the proposed site, is required.

     iv. Signalized intersection mitigation may be required if a reduction of two or more levels of service is experienced when adding the development traffic to the intersection or as traffic increases. The signalized intersection "Level of Service," as defined in the 1985 Highway Capacity Manual, should not be reduced below LOS C by the operations method, considering only the major traffic movement.

     v. Unsignalized intersection mitigation may be required if the unsignalized intersection level of service, as defined in the 1985 Highway Capacity Manual, decreases one level of service to LOS B on the major, nonstopped street. Mitigation may also be required if the level of service on the minor, stopped street decreases two levels of service or drops below LOS C in accordance with the 1985 Highway Manual.

  b. When traffic reaches 3,000 vehicles or more per day, no-passing zones and centerlines should be marked on the two-lane highways. This would hold for existing roadways as long as adequate width is available on the existing two-lane roadway and accidents are minimal.

4.10.3 Environmental Impacts and Mitigation Measures

4.10.3.1 Analysis Methodology

The roadway segments and intersections analyzed in this study are controlled by Caltrans and San Bernardino County. Based on the level of service policies from the Caltrans traffic impact study guidelines and the County General Plan, LOS C is considered the minimum acceptable operating level.

Trip Generation Assumptions

The proposed project consists of various project phases, which each generate traffic in different ways. Specifically, the project consists of construction activities, operations and maintenance activities (with and without decommissioning activities), and final decommissioning of the remediation facilities. Table 4.10-5 summarizes each project phase and specifics related to traffic-generating components of the project.

Table 4.10-5
Summary of Trip Generation Assumptions for Proposed Remediation Components

Project Phase	Description	Trip Assumptions	Total Daily Vehicle Trip Ends
Construction	Mobilization of equipment, supplies, and workers to and from the site. Trucks would be making deliveries and hauling waste. Construction workers would be present on-site for installation of remedy.	During a maximum work week, there would be 40 truck and 68 vehicle trips per week. Each vehicle would have two daily trip ends: one to the site and one from the site. Trucks have a PCE of 3.0. Daily trips would account for 20% of the weekly trip assumption.	48 daily truck trip ends with PCE applied, 28 daily vehicle trip ends equals 76 daily trip ends.
Construction with O&M	As remedy infrastructure is installed, O&M would begin with staff on-site for site management, operations, maintenance, and treatment. Construction would overlap 50% with full O&M.	During a maximum work week, half of the trip ends would be related to the construction phase for additional well construction. For O&M activities, on a peak day there would be two trucks arriving on-site per day (one tanker truck for treatment chemicals, one delivery truck), and 14 vehicles (two operators, one regular maintenance vehicle, one nonroutine maintenance vehicle, seven sampling/ maintenance workers, three PG&E personnel). Each vehicle would have two daily trip ends and trucks have a PCE of 3.0.	38 daily trip ends for construction, 40 daily trip ends for O&M equals 78 daily trip ends.
O&M with Decommissioning	O&M activities would continue at 100% while the decommissioning of the IM-3 Facility begins.	For O&M activities, on a peak day there would be two trucks arriving on-site per day (one tanker truck for treatment chemicals, one delivery truck), and 14 vehicles (two operators, one regular maintenance vehicle, one nonroutine maintenance vehicle, seven sampling/maintenance workers, three PG&E personnel). IM-3 decommissioning during a maximum week would involve 26 trucks and 300 vehicles (full scale). Each vehicle would have two daily trip ends and trucks have a PCE of 3.0. Daily trips would account for 20% of the weekly trip assumption.	40 daily trip ends for O&M, 76 daily trip ends for IM-3 equals 116 daily trip ends.
Decommissioning and Removal of Remedy	IM-3 decommissioning occurs at full scale while remedy infrastructure is installed in the construction phase are removed.	IM-3 decommissioning during a maximum week would involve 26 trucks and 300 vehicles (full scale). Removal of Remedy during a maximum week would involve 28 trucks and 200 vehicles. Each vehicle would have two daily trip ends and trucks have a PCE of 3.0. Daily trips would account for 20% of the weekly trip assumption.	152 daily trip ends for IM-3 decommissioning (full scale), 114 daily trip ends for removal of remedy equals 266 daily trip ends.

Notes: O&M = operations and maintenance; PCE = passenger car equivalent

Source: PG&E 2010, data compiled by Fehr & Peers in 2010

Volume Forecasts

To develop trip generation, this analysis uses the number of employees at the project area for each stage and the estimated number of trucks serving the project to develop information for trip generation for each project phase:

The following assumptions are built into the trip generation estimates:

- Each heavy vehicle serving the site represents two trips: one inbound trip and one outbound trip.
- A passenger car equivalency (PCE) factor of 3.0 was applied to all heavy vehicle trips. A PCE of 3.0 essentially states that one heavy vehicle occupies as much capacity on a roadway as three-passenger cars. Therefore, each heavy vehicle trip is multiplied by 3 before conducting any LOS capacity assessment.
- During the construction phase, all construction workers would arrive during the morning peak hour and would depart during the evening peak hour (a conservative assumption for the types of activities required). For operations and maintenance and decommissioning phases, the same assumption regarding on-site workers has been made. All on-site workers would arrive in single-occupancy automobiles.
- All trucks would arrive on-site in the morning and would depart in the evening peak hour, representing a conservative assumption of the types of activities required.

Table 4.10-6 identifies the estimated daily trip generation for each phase of the project. Table 4.10-7 identifies the estimated peak-hour trip generation.

Table 4.10-6
Estimate of Daily Trip Generation

Project Phase	Trip Generation
Construction	76
O&M with 50% Construction	78
O&M with 50% Decommissioning	116
Decommissioning with Removal of Remedy	266

Notes: This information is based on information from PG&E regarding construction, operations and maintenance, and decommissioning. Trip generation is based on the maximum numbers summarized in Table 4.10-5. The results are based on the assumption that site workers make two daily trips occurring in the peak hour. Trips are presented as passenger-car-equivalent trips. See text for additional details.
Source: Data compiled by Fehr & Peers in 2010

Table 4.10-7
Estimate of Peak-Hour Trip Generation

Project Phase	Trip Generation	
	AM	PM
Construction	38	38
O&M with 50% Construction	39	39
O&M with 50% Decommissioning	58	58
Decommissioning with Removal of Remedy	133	133

Notes: This information is based on information from PG&E regarding construction, operations and maintenance, and decommissioning. Trip generation is based on the maximum numbers summarized in Table 4.10-5. The results are based on the assumption that site workers make two daily trips occurring in the peak hour. Trips are presented as passenger-car-equivalent trips. See text for additional details.
Source: Data compiled by Fehr & Peers in 2010.

Trip Distribution Assumptions

The trip distribution to and from the project area was estimated by reviewing the proposed haul routes to and from the project area, population centers near the project area, potential landfill sites, and the existing travel patterns in the project area. Based on review of this information, it is estimated that the following distributions would occur:

- To/from the west on I-40 = 60%
- To/from the east on I-40 = 40%

The trip distribution within the project area was estimated by reviewing the potential well locations, the existing location of the compressor site, and the location of decommissioning activities. The following trip distribution would occur at the project site:

- To/from north of I-40 = 75% of construction, operations and maintenance, and removal of remedy (decommissioning)
- To/from south of I-40 = 25% of construction, operations and maintenance, and removal of remedy

Trip Assignment

Using the trip generation and trip distribution estimates described above, the project trips were assigned to the roadway network. Project trip distribution and trip assignment estimates are summarized for each project phase in Exhibits 4.10-2 through 4.10-5.

4.10.3.2 THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines, the proposed project would have a significant impact related to transportation if it would:

- degrade a roadway segment currently operating at an acceptable LOS C or better to LOS D, E, or F or add traffic to a roadway segment operating at an unacceptable level;

- degrade an unsignalized intersection currently operating at an unacceptable LOS C or better to LOS D, E, or F or add traffic to a roadway segment operating at an unacceptable level;

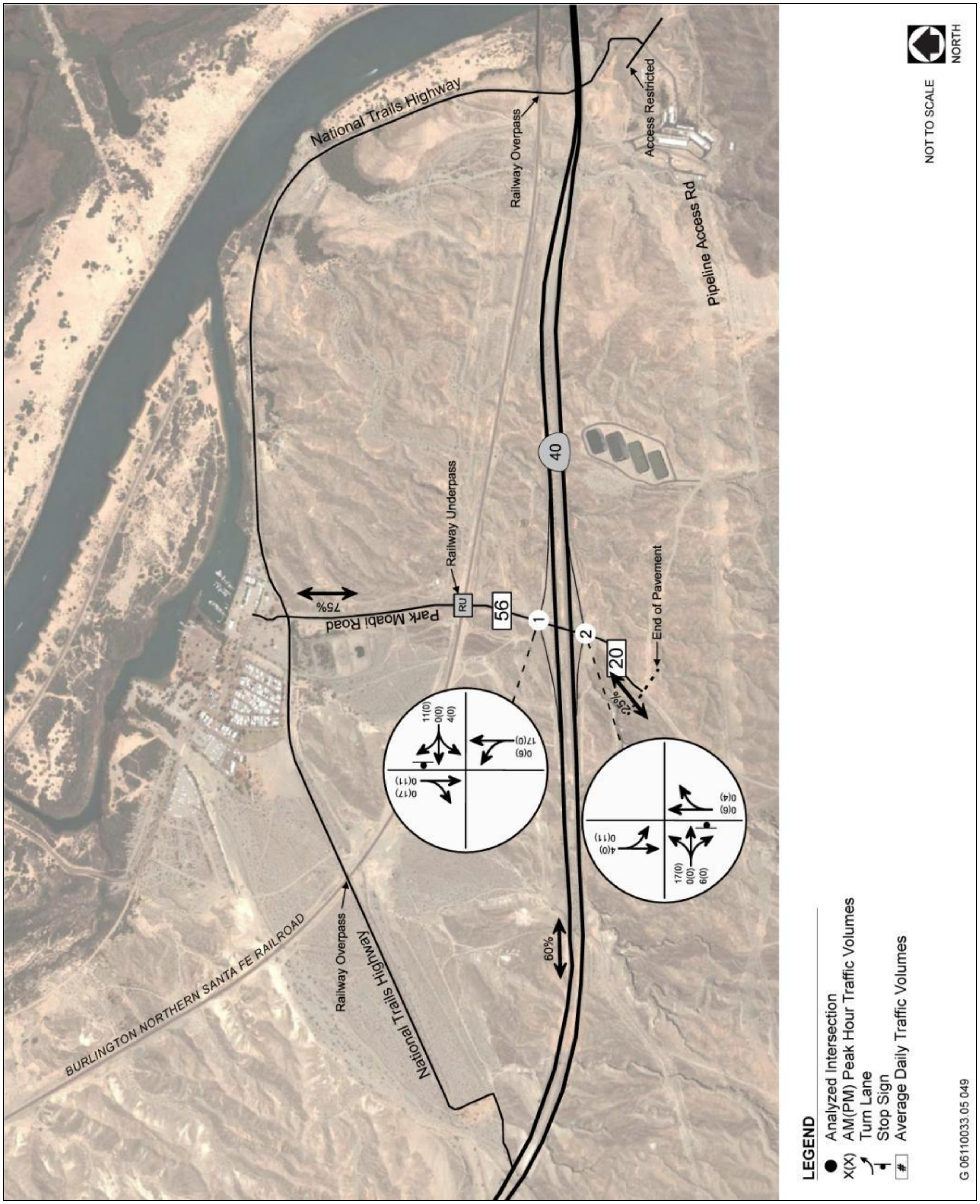
- substantially increased hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses; or

- conflict with adopted policies, plans, or programs supporting alternative transportation.

4.10.3.3 IMPACT ANALYSIS

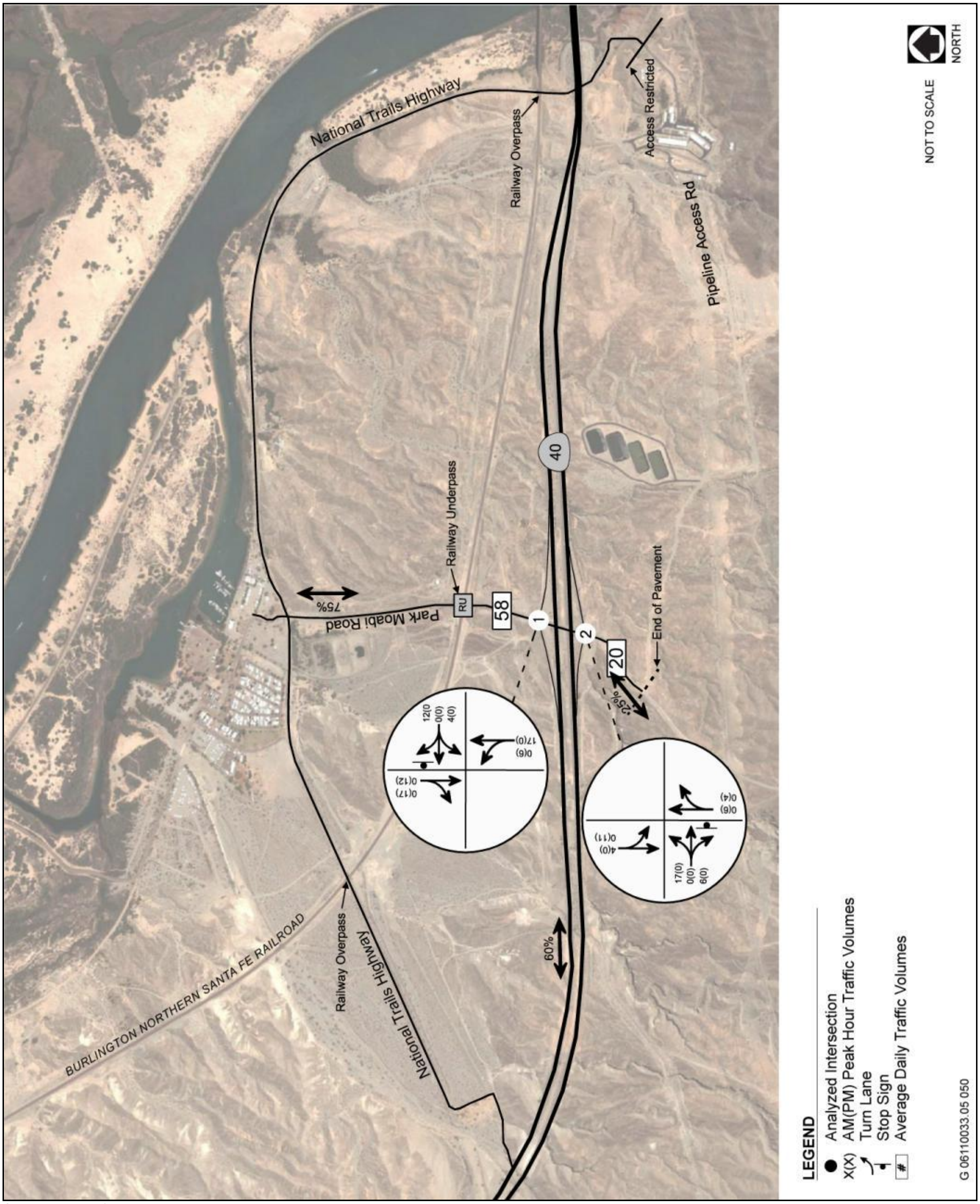
> *Potential to Degrade Intersection and Roadway Operations to Unacceptable Levels. The proposed project would generate additional traffic during construction, operation and maintenance, and decommissioning of the proposed project, however, it would not degrade LOS of roadway segments. Because the study facilities all currently operate at an acceptable level and the proposed project would not add traffic to a roadway segment that is operating at unacceptable levels, this impact would be **less than significant**.*

As shown in Tables 4.10-8 and 4.10-9, all roadway segments and study intersections, including unsignalized intersections, currently operate at an acceptable level of service and would continue to operate acceptably during construction, operations and maintenance, and decommissioning. Roadway segment and intersection volumes for each project phase are shown in Exhibits 4.10-6 through 4.10-9.



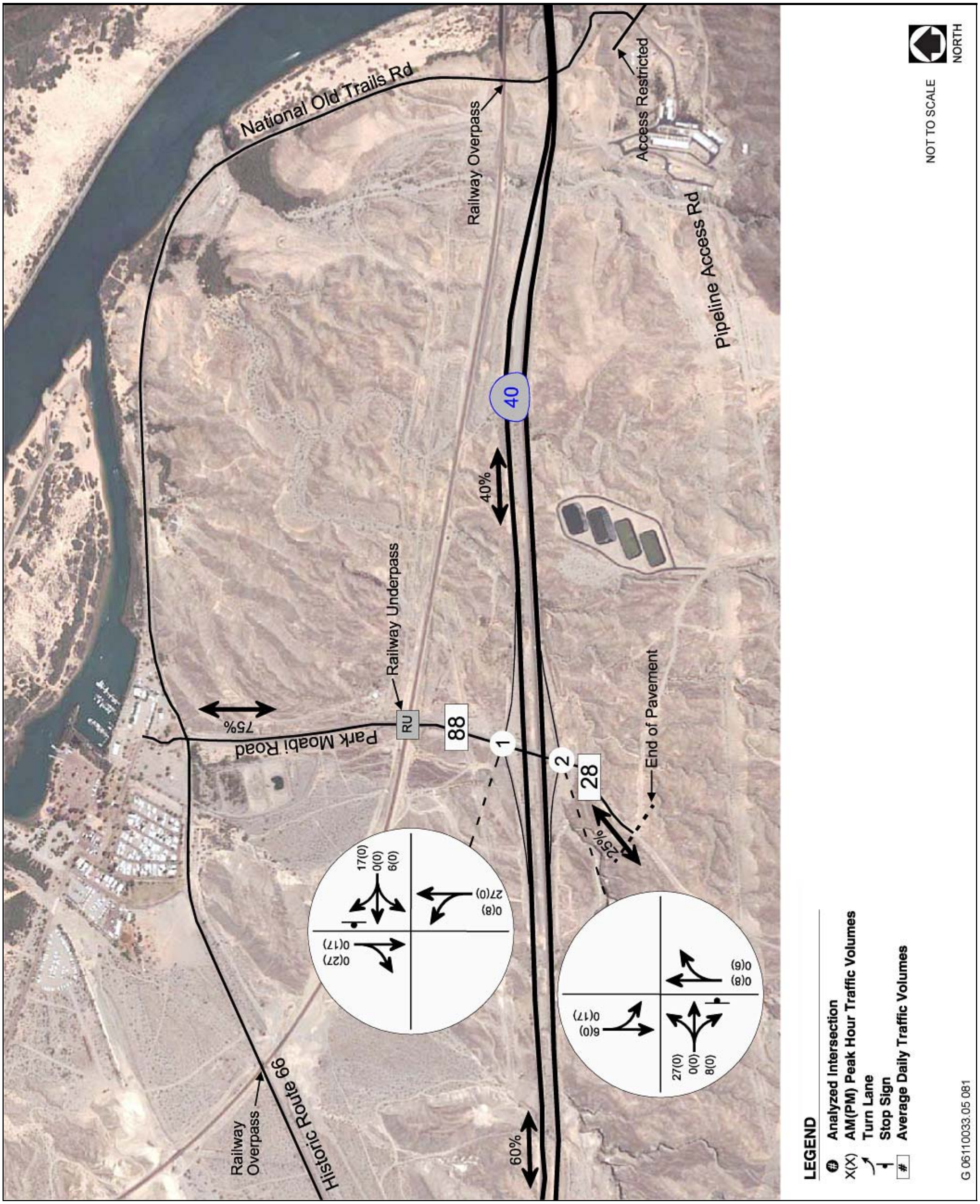
Source: Fehr & Peers 2010

Construction Trip Assignment Volumes **Exhibit 4.10-2**



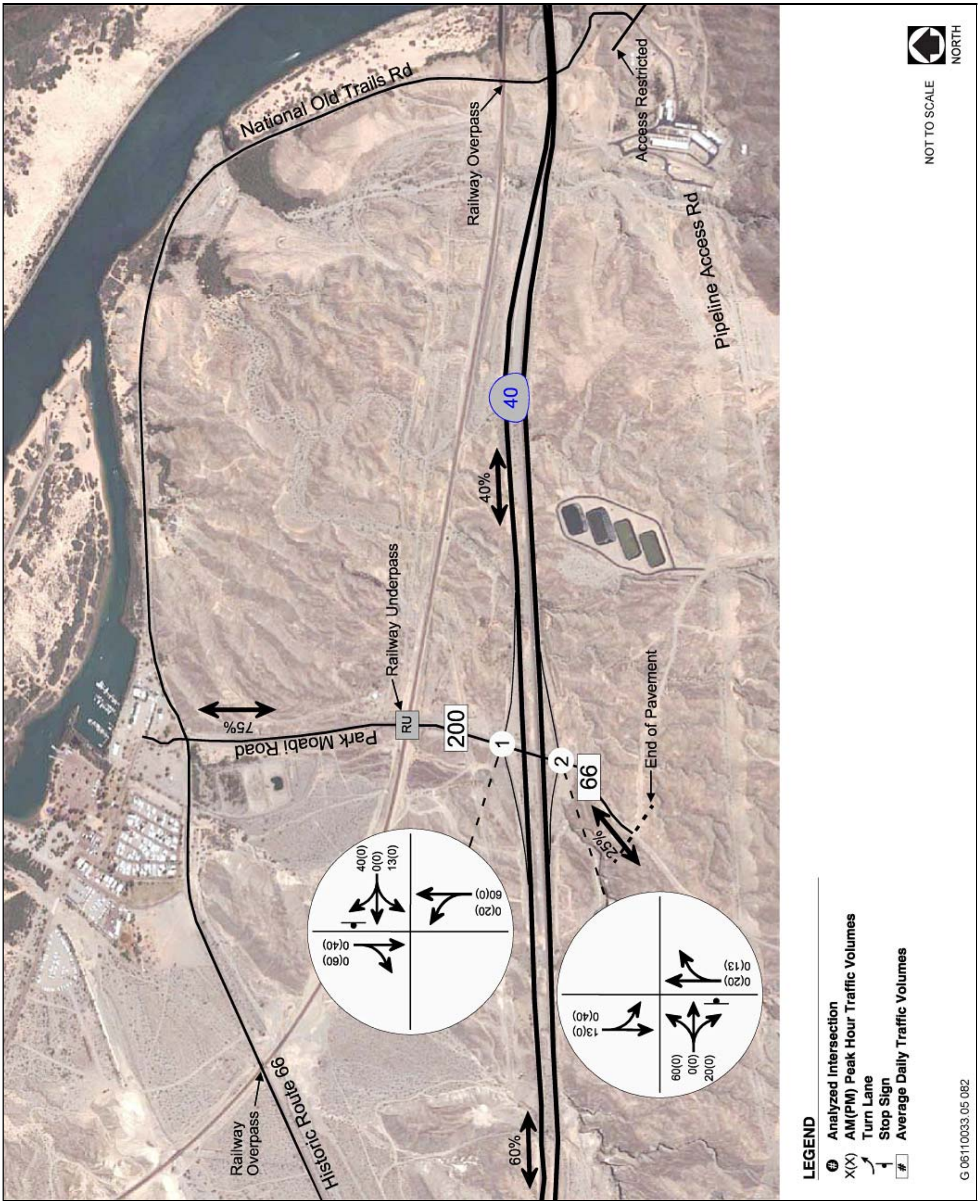
Source : Fehr & Peers 2010

Construction (50%) with O&M Trip Assignment **Exhibit 4.10-3**



Source : Fehr & Peers 2010

O&M with Decommissioning Trip Assignment **Exhibit 4.10-4**



Source : Fehr & Peers 2010

Decommissioning Trip Assignment **Exhibit 4.10-5**

Table 4.10-8
Existing plus Project Roadway Segment Analysis

Location	Acceptable Volume Threshold[1]	Volume	Acceptable?
Existing Conditions			
Park Moabi Road north of I-40	7,000 ADT	382	Yes
Park Moabi Road south of I-40	7,000 ADT	42	Yes
Existing plus Construction Conditions			
Park Moabi Road north of I-40	7,000 ADT	438	Yes
Park Moabi Road south of I-40	7,000 ADT	62	Yes
Existing plus Construction plus O&M Conditions			
Park Moabi Road north of I-40	7,000 ADT	467	Yes
Park Moabi Road south of I-40	7,000 ADT	62	Yes
Existing plus O&M plus Decommissioning Conditions			
Park Moabi Road north of I-40	7,000 ADT	470	Yes
Park Moabi Road south of I-40	7,000 ADT	70	Yes
Existing plus Decommissioning Conditions			
Park Moabi Road north of I-40	7,000 ADT	582	Yes
Park Moabi Road south of I-40	7,000 ADT	108	Yes

Notes: ADT = average daily traffic; I-40 = Interstate 40; O&M = operations and maintenance
[1] Based on the threshold in the *County of San Bernardino 2007 General Plan*.
Source: Data compiled by Fehr & Peers in 2010

Table 4.10-9
Existing plus Project Level of Service

Location	Control	Peak Hour	Delay (Seconds)[1]	LOS
Existing Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	9.0	A
		p.m.	9.0	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.4	A
		p.m.	8.5	A
Existing plus Construction Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	8.9[2]	A
		p.m.	9.1	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.6	A
		p.m.	8.5	A
Existing plus Construction plus O&M Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	8.9	A
		p.m.	9.1	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.6	A
		p.m.	8.5	A
Existing plus O&M plus Decommissioning Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	8.7	A
		p.m.	9.0	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.6	A
		p.m.	8.5	A
Existing plus Decommissioning Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	9.0	A
		p.m.	9.2	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.9	A
		p.m.	8.6	A

Notes: LOS = level of service; SSSC = side-street stop-control intersection
[1] For SSSC intersections, delay for worst movement was calculated using the 2000 Highway Capacity Manual methodology.
[2] LOS may improve at unsignalized intersections based on methodology applied for worst-approach delay.
Source: Data compiled by Fehr & Peers in 2009

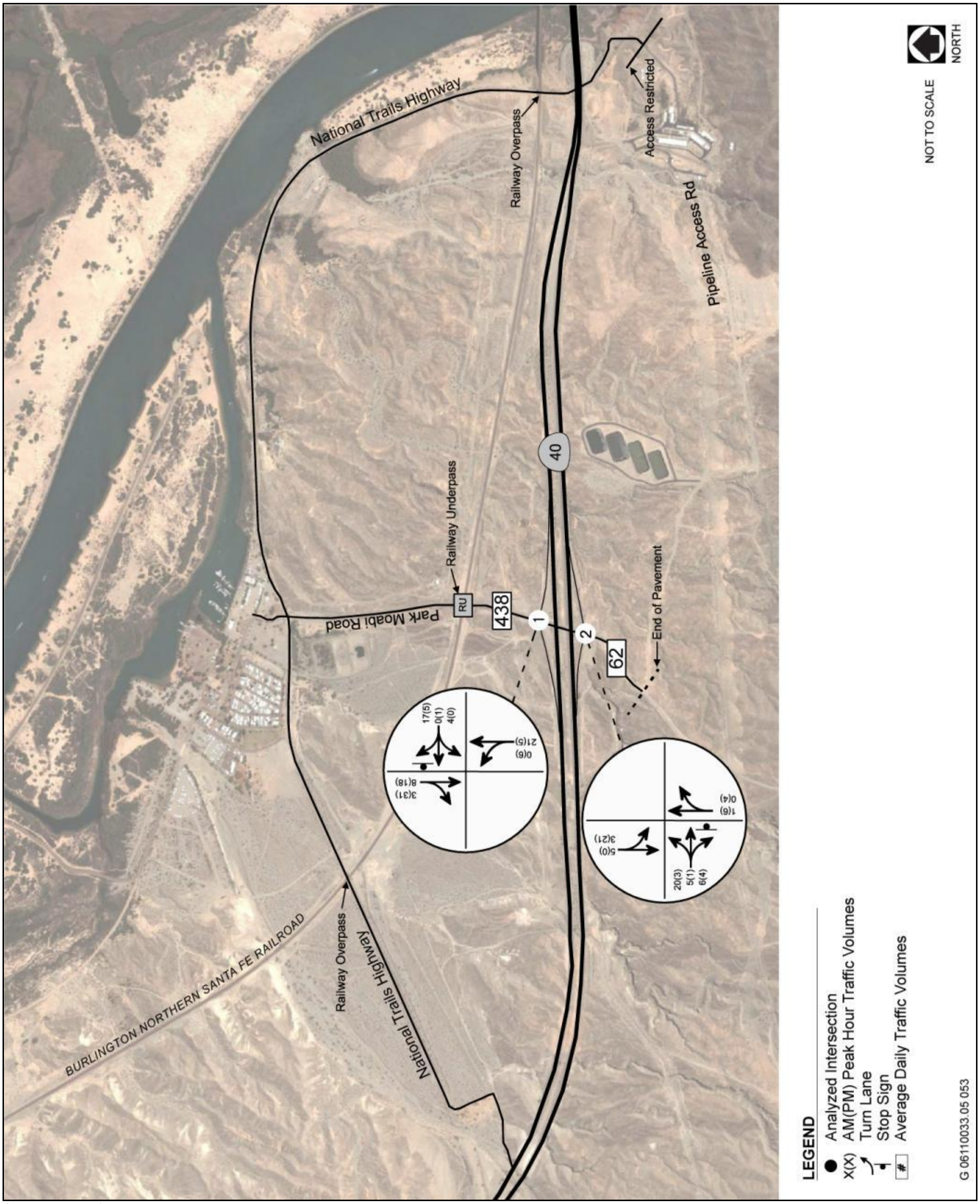
All roadway segments and intersections operate at an acceptable LOS with all phases of the proposed project; therefore, the impact would be **less than significant**. No mitigation would be required.

Potential to Increase Hazards due to Project Design Features. *The existing cross-section of Park Moabi Road does not meet current county roadway standards; however, the proposed project would not affect the overall safety of this road or increase the potential for transportation-related hazards. This impact would be less than significant.*

San Bernardino County has developed standard roadway cross-sections to ensure the safe and efficient movement of all modes of travel on their roadways. Standards for Park Moabi Road are presented in Table 4.10-1, as is the current cross-section of the roadway. As shown in the table, the existing cross-section of the roadway does not meet current county roadway standards in that the paved roadway is 1 foot more narrow than intended by County standards. This is a preexisting condition that is currently used by traffic, including heavy trucks, that access the project area, and there are no known hazards or safety concerns presented by this condition. While the proposed project would add heavy traffic to this roadway during the construction, operations and maintenance, and decommissioning phases of the project, this increase in traffic is not anticipated to pose a hazard or safety concern such that it would result in a significant environmental impact. Impacts related to transportation hazards would be less than significant. No mitigation would be required.

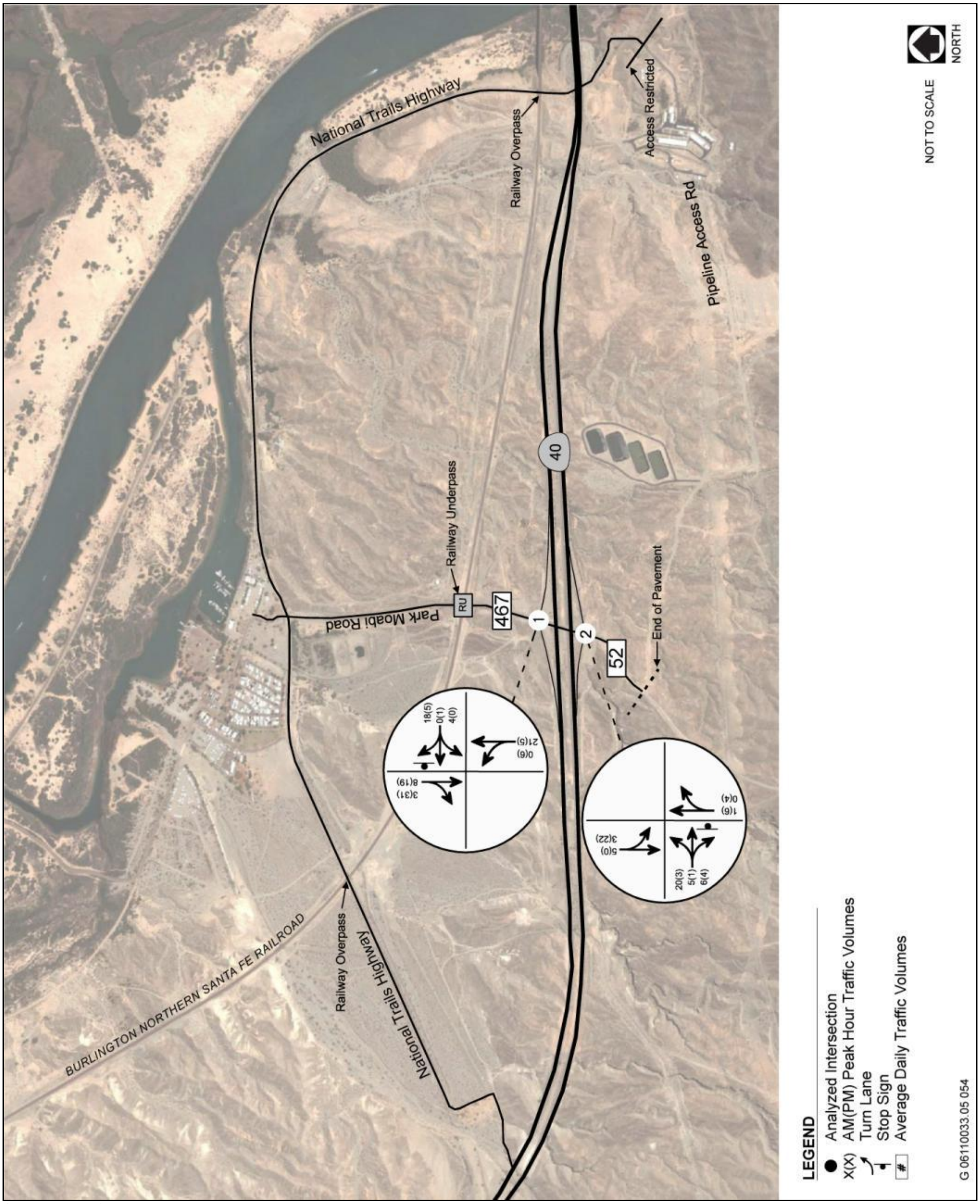
Potential to Conflict with Adopted Policies, Plans, or Programs Supporting Alternative Transportation. *The proposed project would not conflict with any adopted policies, plans, or programs supporting alternative transportation in the study area. Therefore, this impact would be less than significant.*

As described in Section 4.10.1.2, no alternative transportation facilities are in the study area that would be affected by construction, operations and maintenance, and decommissioning of the proposed project. Additionally, as described in Section 4.10.2.3, the proposed project would not conflict with any specific plans or policies supporting alternative transportation. Therefore, this impact would be **less than significant.** No mitigation would be required.



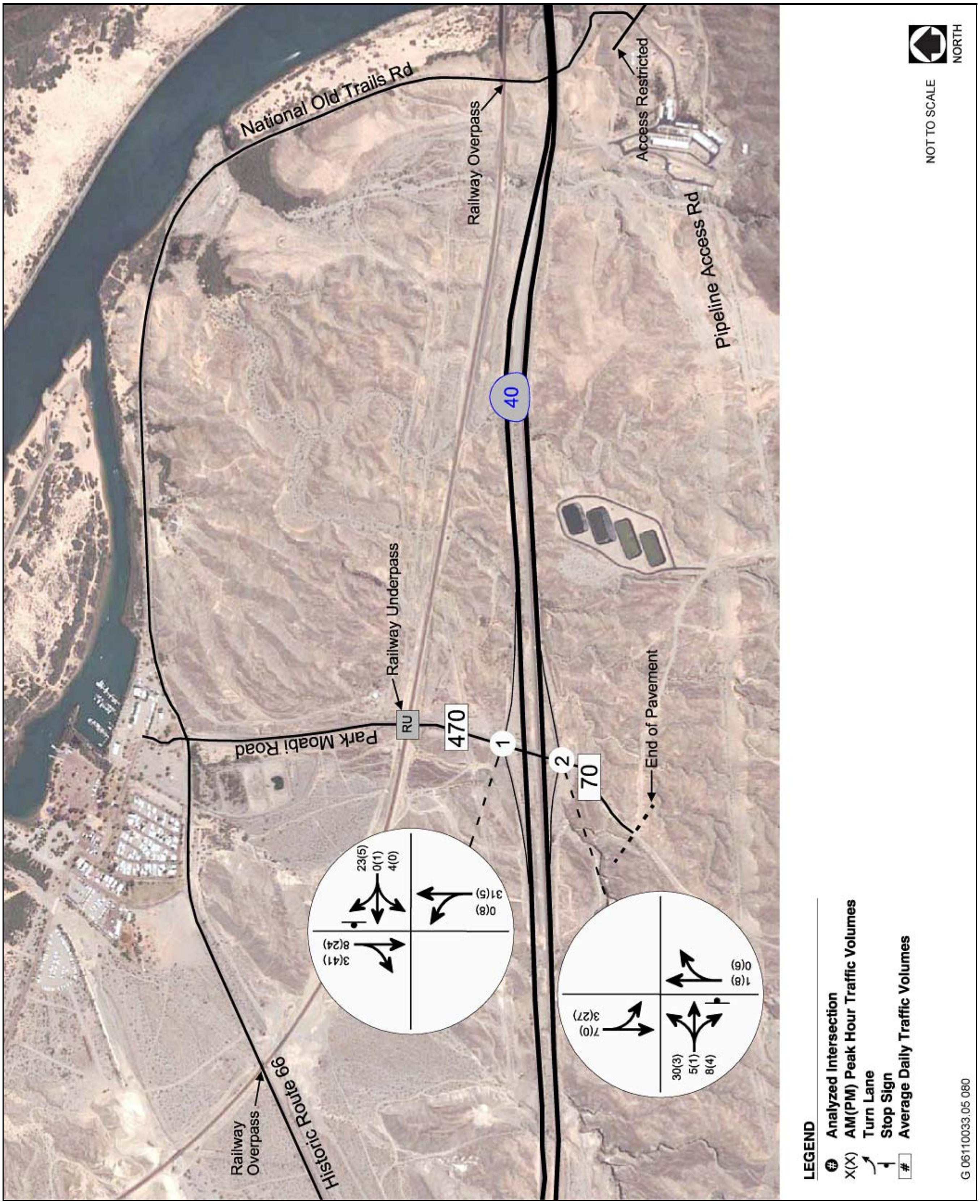
Source: Fehr & Peers 2010

Existing with Construction Volumes **Exhibit 4.10-6**



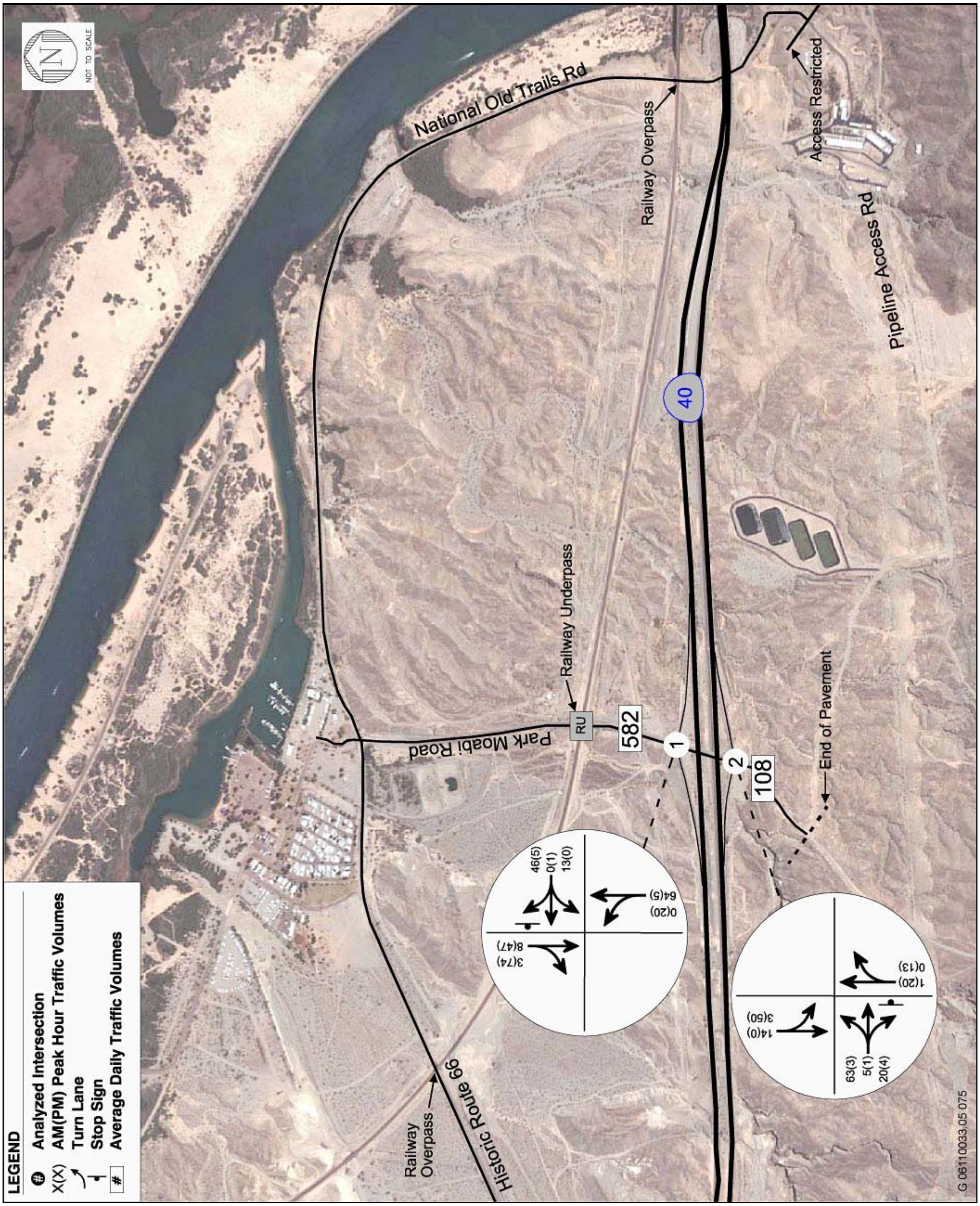
Source: Fehr & Peers 2010

Existing with O&M Construction Volumes **Exhibit 4.10-7**



Source: Fehr & Peers 2010

Existing with O&M and Decommissioning Volumes **Exhibit 4.10-8**



Source: Fehr & Peers 2010

Existing with Decommissioning Volumes **Exhibit 4.10-9**

This page is left intentionally blank.

4.11 UTILITIES AND SERVICE SYSTEMS

This section analyzes the potential for the proposed project to result in impacts caused by increased demand for utility services. This section provides a description of existing utilities and solid waste facilities, applicable federal, state, regional, and local regulations and policies; and analyzes the potential for the construction, operation and maintenance, and decommissioning phases of the proposed project to result in significant environmental impacts.

Section 4.6, “Hazardous Materials,” describes the current management of hazardous solid and liquid waste at the compressor station and the IM-3 Facility, the federal and state regulatory framework that governs these substances, and the potential hazardous impacts of the proposed project. Section 4.7, “Hydrology and Water Quality,” addresses the management of stormwater at the compressor station and the IM-3 Facility as well as the potential impacts associated with new sources of stormwater runoff that would be generated by the project. The potential environmental impacts associated with increased water demands generated by the project are discussed in Section 4.12, “Water Supply.”

4.11.1 EXISTING SETTING

4.11.1.1 WASTEWATER

The compressor station currently discharges nonhazardous wastewater (i.e., domestic graywater and sewage) to on-site leach fields, which are specifically managed for uses at the compressor station. The IM-3 Facility discharges sewage and graywater to a 2,000-gallon storage tank, which is pumped into a tanker truck and disposed of by a wastewater disposal contractor approximately every 2 weeks (104,000 gallons annually) (Russell, pers. comm., 2009).

The Colorado River Basin Regional Water Quality Control Board (RWQCB) issues Waste Discharge Requirements (WDR) for discharges associated with industrial activities within its jurisdiction under Order No. 97-03-DWQ (General Permit No. CAS000001 [General Industrial Permit]). This permit defines discharge limitations and waste stream management requirements for a specific project. WDRs were issued to PG&E for discharging treated groundwater by three different methods at the compressor station: discharge to the Colorado River, discharge to land by subsurface injection, and discharge to Class II surface impoundments. The IM-3 Facility discharges treated water in injection wells as part of the IM-3 corrective action, as discussed in Section 4.7, “Hydrology and Water Quality.”

4.11.1.1 STORMWATER

Stormwater runoff at the compressor station and the IM-3 Facility normally evaporates quickly or is absorbed on-site because of the dry conditions that prevail at the site and the porous nature of local soils. The IM-3 Facility has a general stormwater permit to discharge stormwater to the surrounding landscape and dry washes from the Colorado Basin RWQCB. To comply with the general permit, a stormwater pollution prevention plan (SWPPP) and notice of intent (NOI) are required. Upon submittal of the NOI, a Waste Discharge Identification (WDID) number (736IO19443) was issued for the Topock project area. The SWPPP for the Topock project area (*Industrial Storm Water Pollution Prevention Plan Topock Compressor Station Groundwater Treatment System Interim Measure No. 3*; CH2M Hill 2005) was prepared to identify sources of pollutants that may affect discharges from the site and to implement BMPs to reduce pollutants in discharges that may impact receiving water quality. Section 4.7, “Hydrology and Water Quality,” describes permitting requirements for stormwater runoff that may occur during ground-disturbing construction associated with the proposed project.

4.11.1.2 ELECTRICITY AND NATURAL GAS

The City of Needles currently supplies electricity to PG&E as a commercial customer. The City provides electricity for the existing IM-3 Facility and compressor station via their electrical distribution system, including the Eagle Pass Substation and a 12,470 volt line with a conductor size of #4 ACSR. The compressor station primarily generates its own electricity on-site itself, but can call on backup supply from the City of Needles. During the past year, the compressor station and the IM-3 facility required approximately 1.8 million total kilowatt-hours (Lindley, pers. comm., 2010).

Constructed in the 1930s and 1940s, the electrical line is approximately 20 miles long and travels from the City to Moabi Park and then on to PG&E. According to the City, although the line operates at one-third capacity in cooler months, during the hotter months, when electrical demand is at a peak (4 to 5 months of the year), the line operates at maximum capacity and becomes unreliable (Lindley, pers. comm., 2010).

Natural gas used at the compressor station is drawn from the pipeline itself. The IM-3 Facility does not currently use natural gas. Southwest Gas Company would serve the IM-3 Facility if gas were required and has existing lines adjacent to the compressor station (Russell, pers. comm., 2009).

4.11.1.3 SOLID WASTE DISPOSAL

The major solid waste streams and associated transporters and disposal facilities are identified in Table 4.11-1.

The compressor station is currently served by Allied Waste Services for solid nonhazardous waste disposal. Currently, PG&E produces 520 cubic yards per year of operational/incidental non-hazardous solid waste. Allied Waste Services provides large steel roll-off bins that when full are removed from the compressor station. The contents are disposed of at the Mohave Valley Landfill, east of Bullhead City, Arizona.

In addition to nonhazardous waste, operation of the IM-3 Facility produces 90 cubic yards per year of residual waste stream, or sludge, from the chromium reduction treatment system. This sludge is considered a hazardous waste because of its toxicity, and is sent on a monthly basis for disposal at the Kettleman Hills Landfill. The Kettleman Hills Landfill is a chemical waste disposal and treatment site with a capacity of 5,700,000 cubic yards, operated by Chemical Waste Management. The 1,600 acre site employs 120 people, and accepts waste from all over the west, but mostly serves California. General types of disposal include construction and demolition debris, contaminated soil remediation, hazardous waste treatment, liquid waste, municipal solid waste and special solid waste (WM 2010). The Kettleman Hills Landfill is a CERCLA approved facility which offers hazardous waste treatment storage and disposal options and is one of less than 30 commercial chemical waste sites in the country, and one of less than ten sites licensed to take PCBs. More information on hazardous materials is included in Section 4.6, “Hazardous Materials,” of this DEIR.

4.11.2 REGULATORY BACKGROUND

4.11.2.1 FEDERAL AND STATE PLANS, POLICIES, REGULATIONS, AND LAWS

No federal or state regulations or laws related to utilities and service systems are applicable to the proposed project. Section 4.6, “Hazardous Materials,” reviews the regulatory setting for the corrective action at the compressor station, including the federal Resource Conservation and Recovery Act and California’s delegated authority to regulate hazardous waste and associated state laws and regulations developed pursuant to this delegated authority. Section 4.7, “Hydrology and Water Quality,” provides a regulatory context for the regulation of stormwater discharge and groundwater discharge in injection wells.

Table 4.11-1 Summary of IM-3 Major Solid Waste Streams and Disposal Facilities	
Disposal Facility	Waste Stream/Totals per Year
Allied Waste, LaPaz County Landfill 26999 Highway 95, Parker, AZ 85344	Miscellaneous nonhazardous waste
Chemical Waste Management, Inc., Kettleman Hills Landfill 35251 Old Skyline Road, Kettleman City, CA 93239	Hazardous waste treatment system solids/sludge90 cubic yards/year[1] (2009)
Liquid Environmental Solutions 5159 West Van Buren, Phoenix, AZ 85043	Nonhazardous reverse osmosis concentrate/2,800,000 gallons per year (2008)

Note:

[1] This total does not include periodic cleaning of the TCS ponds, which produces over 100 tons of solid waste per pond.

Source: CH2MHill 2005:12-1 through 12-2; Russell, pers. comm., 2009

PG&E Memo dated January 11, 2010.

4.11.2.2 REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Because the project site is not located in an incorporated city, no municipal laws or regulations related to utilities and service systems are applicable to the proposed project.

4.11.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section reviews the potential of the proposed project to result in impacts caused by increased demand for utilities during the construction, operation and maintenance, or decommissioning phases of the proposed project. In this section solid waste means nonhazardous and hazardous waste streams that would be disposed of in municipal landfills.

4.11.3.1 THRESHOLDS OF SIGNIFICANCE

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the CEQA Guidelines. The proposed project would result in a significant impact related to utilities and service systems if it would:

- exceed wastewater treatment requirements of the applicable regional water quality control board or exceed available capacity to treat wastewater by the wastewater treatment provider;
- generate solid nonhazardous waste in excess of permitted landfill capacity;
- exceed the capacity of existing distribution systems or require or result in the construction of new facilities for the generation or transmission of electrical power that would have significant environmental effects; or
- require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

The proposed project would result in the construction and operation of a groundwater remediation system and would not require the construction or expansion of new wastewater treatment facilities. Therefore no impacts would occur, and this threshold is not considered further in this EIR.

4.11.3.2 IMPACT ANALYSIS

Potential to Exceed Wastewater Treatment Requirements or Require a New Wastewater Facility. *The proposed project would not generate substantial amounts of domestic wastewater. Because the proposed project would not include wastewater-intensive facilities, the impact on local wastewater would be* ***less than significant****.*

The proposed project consists of the construction, operation, and eventual decommissioning of water treatment facilities, such as water conveyance infrastructure, the in situ reactive zone, and extraction and injection wells. The construction, operation, and decommissioning of these facilities would not generate substantial amounts of domestic wastewater (sewage or gray water). Because these are not wastewater-intensive facilities, it is not anticipated that the proposed project would generate effluent that would exceed applicable standards or capacity, nor would the proposed project require the construction of new treatment facilities. The proposed project would also require the continued operation, maintenance, and eventual decommissioning of the IM-3 Facility. The IM-3 Facility currently discharges nonhazardous wastewater to a 2,000-gallon tank on-site, which is removed by a wastewater disposal contractor. Because this effluent is disposed of by the wastewater contractor and handled consistent with applicable requirements and regulations, it is assumed that it would not exceed applicable water treatment standards and does not exceed existing treatment capacity. The ongoing operation of IM-3 and the construction of the final remedy thus would not substantially increase the amount of wastewater generated at the compressor station and thus would not exceed available treatment capacity or require the construction of new treatment facilities. As a result, this impact would be **less than significant**, and no mitigation would be required.

Potential to Exceed Permitted Landfill Capacity. *The proposed project would generate incidental nonhazardous waste and hazardous waste during construction, operation, and decommissioning of the proposed project. Sources of waste during construction include construction debris (empty cement and sand bags, pallets and scrap material, empty drink and food containers, and plastic sheeting). Sources of waste anticipated during operations could include soil cuttings, drilling mud and rinse water, as well as incidental construction debris associated with repairs or routine maintenance and trash generated by construction personnel such as food and drink containers. Decommissioning of the proposed project, including IM-3, would generate a variety of construction debris, including concrete, metal sheeting, and pipe. Because the projected waste stream would not exceed the available daily capacity of relevant landfills this impact would be* ***less than significant****.*

Table 4.11-2 reviews the remaining capacity, daily capacity, and date at which operations are anticipated to cease for several landfills that could hypothetically serve the project area. The compressor station is currently served by Allied Waste Services for solid nonhazardous waste disposal and the Kettleman Hills Landfill for hazardous waste disposal.

Allied Waste Services provides solid waste disposal for nonhazardous wastes. Large steel roll-off bins are provided that, when full, are removed from the compressor station. The contents are disposed of at the Mohave Valley Landfill, east of Bullhead City, Arizona. However, Allied Waste Services was not forthcoming with information about their permitted or daily capacity. Table 4.11-2 therefore provides data on other landfills near the project site that could serve the facility and thus imparts a baseline for determination of whether the proposed project would exceed existing or foreseeable future capacity. This table identifies the Barstow Sanitary Landfill as the landfill with the smallest daily capacity (750 tons per day) among the identified facilities for which daily capacity is known, and the smallest remaining capacity (924,401 cubic yards). Thus, this capacity is used as a threshold to determine if the proposed project has the ability to exceed available capacity.

Table 4.11-2 Landfills in the Vicinity, Permitted Capacity, and Anticipated Facility Lifespan				
Landfill	Remaining Capacity	Maximum Daily Capacity	Distance from Topock (approx.)	Anticipated Cease of Operations
Kettleman Hills Landfill			375 miles	
Landers Sanitary Landfill	1,100,000 cubic yards	1,200.00 tons/day	110 miles	1/1/2013
Barstow Sanitary Landfill	924,401 cubic yards	750.00 tons/day	135 miles	5/1/2012
California Street Landfill	6,800,000 cubic yards	829.00 tons/day	155 miles	1/1/2042
Victorville Sanitary Landfill	82,200,000 cubic yards	3,000.00 tons/day	155 miles	10/1/2047
Mohave Valley Landfill	Unknown	Unknown	20 miles	unknown

Note: Data are presented by California Integrated Waste Management Board as a combination of mass (tons/day) and volume (cubic yards).
Source: California Integrated Waste Management Board 2008

Nonhazardous Waste Disposal

It is estimated that 2,400 total cubic yards of solid waste, including incidental trash, would be generated from proposed project construction. Construction could include investigation derived waste (drill cuttings and water associated with well construction), which would be disposed of as hazardous or nonhazardous waste depending on its classification.

Operation of the proposed project would generate nonhazardous waste that would include incidental trash (i.e., food containers and other routine waste) generated by personnel, and construction materials from repair of constructed facilities, which would be anticipated to total up to 200 cubic yards per year (3.8 cubic yards per week). Thus, these waste streams are anticipated to be minimal in relation to available or foreseeable capacity and would thus be less than significant.

The IM-3 Facility would continue to operate in a manner similar to existing operations until decommissioned. These activities are not significant sources of solid waste in relation to existing capacity because ongoing operation of IM-3 would only produce incidental nonhazardous waste such as construction debris associated with repairs and trash generated by personnel operating the facility that would be less than significant.

Decommissioning of the proposed project, excluding the IM-3 Facility, would occur for up to 1 year and would generate between 8,000 and 36,000 cubic yards of solid waste. Assuming a maximum time frame of 12 months with a volume of 36,000 cubic yards, decommissioning would generate approximately 100 cubic yards per day (on average). While the precise mass that this volume of waste would generate would vary depending on the mixture of constituent wastes, this volume would not exceed the maximum daily capacity of 750 tons per day identified at the Barstow Sanitary Landfill. For these reasons, this waste stream would be less than significant.

The decommissioning of IM-3 would involve demolition of the existing IM-3 Facility, extraction and injection wells, all associated infrastructure, and pipelines. This activity is anticipated to generate between 1,000 and 5,000 cubic yards of solid waste. Assuming a worst-case scenario, the decommissioning would generate 5,000 cubic yards over 1 year and would generate a daily volume of approximately 13.8 cubic yards per day. While the precise mass that this volume of waste would generate would vary depending on the mixture of constituent wastes, this volume would not exceed the maximum daily capacity of 750 tons per day identified at the Barstow Sanitary Landfill.

The California Integrated Waste Management Board expresses the maximum daily capacity, or “throughput,” of permitted facilities in tons per day. Of the identified landfills, the smallest daily capacity is 750 tons per day

(Barstow Sanitary Landfill). While the total mass of the estimated daily volume of waste (5 cubic yards per day) for construction of the proposed project would vary depending on the mixture of materials, no probable scenario exists under which this volume, or even an increase in volume by an order of magnitude (a ten-fold increase, or 50 cubic yards), could exceed the 750 tons per day capacity of the Barstow Sanitary Landfill. Therefore, construction of the proposed project would not exceed the permitted capacity available on a daily basis and thus would not result in a significant impact.

Much of the material generated during decommissioning of PG&E facilities is diverted and reclaimed under existing practices (Russell, pers. comm., 2009). Structural and cladding metal for buildings, such as beams and roof panels or wall siding, is disposed of with scrap metal recyclers who reclaim these materials. Concrete and asphalt structures that are demolished are sold to recyclers where such materials are nonhazardous (free from contamination). Plastic materials are recycled where possible. Large liquid storage tanks are typically cleaned, inspected, and resold when they are confirmed as clean and free of hazardous substances. These practices would be applied to the proposed project analyzed here, and thus substantial portions of anticipated waste streams would be diverted and possibly reclaimed. For these reasons, the impacts on nonhazardous solid waste facilities would be less than significant.

Hazardous Waste Disposal

In addition to nonhazardous waste produced by the project, as discussed above, operation of the proposed project would also produce hazardous waste. Hazardous wastes would potentially include soil cuttings and mud rotary well installation waste (drilling mud); and decommissioning rinse water. Investigation-derived waste materials that would likely be generated include groundwater, drill cuttings, and incidental trash. It is estimated that implementation of the proposed project would generate 300 cubic yards per year hazardous waste requiring offsite disposal. Hazardous waste associated with the proposed project operations would likely be sent for disposal at the Kettleman Hills Landfill, in Kettleman City, California or the Clean Harbors Buttonwillow Landfill in Buttonwillow, California. The Kettleman Hills Landfill is a chemical waste disposal and treatment site with a currently permitted capacity of 10,700,000 cubic yards at the B-18 landfill (CH2M HILL 2009: 2-6). A 4,900,000 cubic yard expansion of the B-18 landfill was approved in December 2009 (Chemical Waste Management, Inc.2010). The Clean Harbors Buttonwillow Landfill is fully permitted to manage hazardous wastes and can handle waste in bulk (solids and liquids). The Buttonwillow Landfill has a permitted capacity of over 10,000,000 cubic yards, while the current constructed landfill capacity is 950,000 cubic yards (Clean Harbors Environmental Services 2010). The estimated 300 cubic yards per year of hazardous waste generated by the proposed project would not exceed the permitted capacity of either the Kettleman Hills Landfill or the Clean Harbors Buttonwillow Landfill. The impact would be less than significant.

Because the proposed project would not generate nonhazardous or hazardous waste streams in excess of existing capacity during construction, operations, or decommissioning, this impact is **less than significant**. No mitigation is required.

IMPACT UTIL-1 **Potential to Require or Result in the Construction of New Facilities for the Generation or Transmission of Electrical Power That Would Have Significant Environmental Effects.** *Operation of the proposed project would require up to 1.6 million kilowatt-hours of electricity annually. This electricity would either be generated on-site or would be provided by the electrical supply and delivery system for the City of Needles. Because the source of electricity and delivery system for the proposed project has not been identified, impacts associated with the proposed project's electrical demand would be* ***potentially significant****.*

Operation of the proposed project (primarily energy needed to move water through the remediation system) would require up to 1.6 million kilowatt-hours of electricity annually. The City of Needles currently supplies the compressor station and IM-3 Facility with electricity via its electrical distribution system. PG&E is a commercial customer. During the past year, the compressor station and the IM-3 Facility required approximately 1.8 million total kilowatt-hours. According to the City, although the line operates at one-third capacity in cooler months, during the hotter months, when electrical demand is at a peak (4 to 5 months of the year), the line operates at maximum capacity and becomes unreliable. The City has stated that the existing electrical line would not be able to accommodate up to 1.6 million additional kilowatt-hours that could be required for the proposed project, if, for example, energy use from the IM-3 Facility cannot be reduced during operation of the proposed project. Currently, the City does not have plans to upgrade or expand its electrical facilities (Lindley, pers. comm. 2010).

It is possible that the proposed project would generate electricity on-site using natural gas-fired generators that would draw fuel from the existing gas pipeline. If it is determined that the construction of new gas-fired generators on-site is necessary, they would be located within the project boundary. It is also possible that the proposed project could have an electric demand greater than what can be produced on-site, thereby requiring additional electric supply from the City of Needles. The amount of energy that would be supplied by the City of Needles, if any, is unknown at this time. However, if the demand is great enough, the system may require upgrades to improve reliability or expand capacity (generate additional electricity) from the City of Needles, which may result in environmental impacts. Because the final remedy, engineering details and implementation schedule associated with the final remedy have yet to be identified and adopted (and because the effectiveness of the proposed project and continued need for IM-3 is uncertain at this time), selection of the source of electricity for the proposed project and the delivery system has not been made. The specific environmental impacts associated with the proposed project's demand for electricity therefore remain undetermined. Because the extent of demand is not known, impacts related to energy demand are considered **potentially significant**. **(Impact UTIL-1)**

Mitigation Measure UTIL-1: Potential to Require or Result in the Construction of New Facilities for the Generation or Transmission of Electrical Power That Would Have Significant Environmental Effects.

The proposed project would require additional electrical power. If it is determined that the proposed project would require additional off-site electrical supply, the project applicant shall coordinate with the City of Needles to provide for the continued maintenance, development, or expansion of electric systems to the project site necessary to accommodate the project demand, which is estimated at 1.6 million kilowatt-hours of electricity annually for the proposed project, in combination with the 1.8 million kilowatts used to power the IM-3 Facility, for a total of approximately 3.4 million kilowatts of electricity annually until IM-3 is decommissioned or significantly reduced. If it is feasible to reduce reliance on the IM-3 Facility and thereby reduce its associated energy demands, while phasing implementation of the final remedy, the additional energy demands of the project could possibly be met through on-site generation.

Timing:	During design and prior to construction, provide funding for the development or expansion of electric systems from the City of Needles if required to implement the final remedy.
Responsibility:	PG&E shall be responsible for the implementation of this mitigation measure. DTSC would be responsible for ensuring compliance.
Significance after Mitigation:	This impact would be reduced to **less than significant** after mitigation because sufficient energy supplies would be fulfilled through either phasing of remedial activities and on-site electrical generation or negotiated with the City of Needles prior to the construction and implementation of the proposed project.

This page is left intentionally blank.

4.12 WATER SUPPLY

This section describes the water supply that would be required to support the proposed project. Impacts are evaluated based on the estimated consumptive use of water associated with construction and operation of the proposed project, the existing water supply available, and actions needed to provide water supply that could potentially lead to physical environmental effects. The proposed project does not meet the California Water Code definition of a project requiring a formal water supply assessment.[1] However, the availability of a water supply adequate to serve the needs of the proposed project was considered by DTSC and is discussed below.

4.12.1 EXISTING SETTING

4.12.1.1 THE LOWER COLORADO WATER SUPPLY PROJECT

The proposed project is located in a remote area where the only readily available source of water is the Colorado River, either directly by diverting surface water or indirectly by pumping groundwater, which is recharged by the Colorado River.

Use of the Colorado River is subject to numerous laws, judicial rulings, decrees, contracts, and agreements collectively known as the "Law of the River" (see "Regulatory Background" below). Broadly, this body of law requires that water from the Colorado River only be diverted by entities with valid water contracts and establishes California's apportionment of Lower Colorado River Basin water at 4.4 million acre-feet[2] per year (maf/yr). For many years, California has been diverting water in excess of its apportionment by consuming water that goes unused by other Colorado River Basin states, such as Arizona, Utah, and Colorado. Once these other states are diverting their full amounts, it is anticipated that there will be only infrequent periods of surplus, and that California's diversions will be limited to 4.4 maf/yr (Colorado River Basin RWQCB 2006:1-7 and 1-8).

No new water rights to California's basic apportionment of 4.4 maf/yr are available because the entire allocation is either held by pre-1929 water rights holders or is under contract to water agencies in Southern California. However, Congress recognized that there are water users in California adjacent to the Lower Colorado River who either do not hold rights or whose rights are insufficient to meet their present or future needs. The Lower Colorado Water Supply Act of 1986 (Act) authorized the U.S. Bureau of Reclamation (Reclamation) to construct, operate, and maintain the Lower Colorado Water Supply Project (LCWSP) to help address these users. The LCWSP makes up to 10,000 acre-feet annually (afa) available to eligible entities for nonagricultural use along the Colorado River in California. The water is the result of an exchange agreement between Reclamation and the Imperial Irrigation District (IID) and the Coachella Valley Water District (CVWD), who agreed to forego a portion of their right to divert Colorado River water in exchange for an equivalent quantity and quality of groundwater pumped from wells drilled as part of the LCWSP and delivered into the All-American Canal (Colorado River Board 2009a:2). The project is being developed in two stages. The wells for stage 1 had a combined design capacity of 5,000 afa and were completed in 1996. Construction of stage 2 facilities to produce the remaining 5,000 acre-feet of exchange water authorized by the act is to be carried out at a time when there is a demonstrated need and funding for additional facilities (Colorado River Board 2009a:6). Pursuant to the Act and as part of the LCWSP, in 1992 Reclamation entered into a contract with the City of Needles (City) under which the City is entitled to divert and supply Colorado River mainstream water for up to 3,500 afa of consumptive use.[3] The City serves as the sole administrator for LCWSP water for nonfederal entities. The City enters into subcontracts with project beneficiaries, based on recommendations of eligibility to receive

[1] SB 610, signed into law in 2001 (Chapter 643, Statutes of 2001) requires public water systems to prepare water supply assessments for residential projects with more than 500 dwelling units or development projects meeting certain criteria defined in the Water Code.

[2] An acre-foot is defined as the volume of water that would cover 1 acre to a depth of 1 foot. It is equivalent to about 325,851 gallons.

[3] Under the Reclamation Contract consumptive use is defined as water withdrawn for use that is not returned to the water supply source. In this context, it refers to the amount diverted less the amount reinjected to the groundwater basin (Brownlee 2009b).

LCWSP water from the Colorado River Board of California and approval from Reclamation. In addition to the 3,500 afa, the U.S. Bureau of Land Management (BLM) has entered into an intra-agency agreement for up to 1,150 acre-feet per year of LCWSP water for consumptive use on BLM-administered lands in California (Colorado River Board 2009b:1).

Actual usage by the City of Needles, its subcontractors, and BLM is less than the 5,000 afa initially made available for the LCWSP. In March 2007, Reclamation, the City, and Metropolitan Water District of Southern California (MWD) entered into an agreement for MWD to buy excess capacity from the LCWSP in years when it is available. During that time frame, it was also discovered that the capacity of the existing LCWSP stage 1 wells exceeds 5,000 afa and is closer to 8,300 afa. The LCWSP well fields are now operated at their higher capacity, obviating the need to construct stage 2 in the near term (Brownlee, pers. comm., 2009a).

4.12.1.2 GROUNDWATER DIVERSIONS OF COLORADO RIVER WATER

In the 1990s, the United States Geological Survey in cooperation with Reclamation developed an “accounting surface” methodology to identify wells outside the floodplain of the Lower Colorado River that yield water that will be naturally replenished with water from the river. Prior to the development of the accounting surface method, water pumped from many wells outside the flood plain was not included when accounting for consumptive use of Colorado River water (USGS 1994:1).

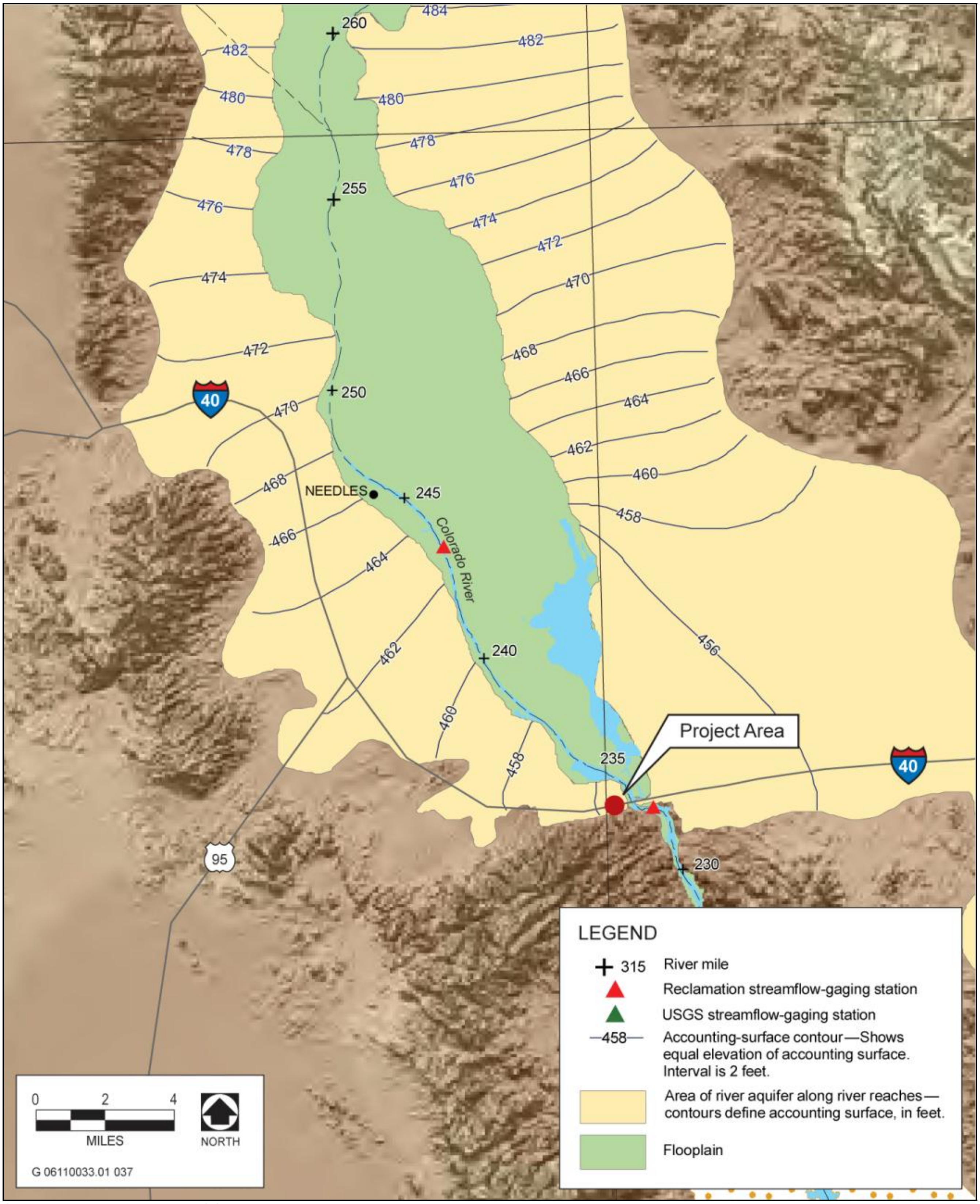
Groundwater extracted by pumps located within the accounting surface would be naturally replenished by Colorado River water and thus a valid Colorado River Water contract with Reclamation is required in order to legally pump the water. The accounting surface was updated in 2008 based on more recent available data on river discharge and cross-sectional profiles, and using improved groundwater modeling tools (USGS 2008:1). Exhibit 4.12-1 shows the project area in relation to the accounting surface. All existing wells within the project area and those proposed as part of the project are within the Colorado River Water accounting surface.

4.12.1.3 EXISTING PACIFIC GAS AND ELECTRIC COMPANY ENTITLEMENTS AND USAGE

Before development of the LCWSP, PG&E received water for the compressor station from City-owned wells on the Arizona side of the Colorado River. The water is pumped across the Colorado River through piping mounted on a pipe bridge and then through aboveground pipelines to two aboveground water tanks located south of the compressor station, where the water is stored for use in the operation of the facility on an as-needed basis for cooling towers, dust control, and other on-site purposes. In addition, a small amount of between 1,000 to 1,500 gallons per year (0.0031 to 0.0046 afa) of drinking water for use by employees at the compressor station is currently purchased by PG&E and trucked in by an outside purveyor (Doss, pers. comm., 2010). Despite their location in Arizona, water diverted at these wells is counted as part of California’s allocation per the U.S. Supreme Court’s Decree in Arizona v. California (US. Supreme Court 2006:29–30) and now is included as part of the City’s LCWSP entitlement under its contract with Reclamation.

After the LCWSP was developed, pursuant to the contract between Reclamation and the City, in 2003 the City entered into a Subcontract with PG&E to supply LCWSP water to the compressor station (PG&E 2003). The Subcontract was amended in 2004 to bring the total current contracted entitlement of LCWSP water for PG&E to 422 afa of consumptive use (PG&E 2004). The points of diversion under the Subcontract may be anywhere in the general vicinity of the PG&E Topock Compressor Station property and are not restricted to a location on the PG&E-owned property itself (Brownlee 2009b). PG&E currently uses LCWSP water extracted under its Subcontract agreement with the City at the compressor station and at the existing IM-3 Facility.

The IM-3 Facility includes four extraction wells in the floodplain portion of the project area, a treatment plant, and two injection wells, which inject treated groundwater into the alluvial aquifer. Exhibit 4.12-2 shows the location of the IM-3 extraction and injection wells. A substantial percentage (more than 95% in 2008 and 2009) of the water extracted for use at the IM-3 Facility is reinjected into the groundwater table (Doss, pers. comm., 2010).



Source: Data adapted by AECOM in 2010

Water Accounting Surface Contours **Exhibit 4.12-1**

The small percentage of water that is not reinjected into the groundwater table is contained in waste brine that is generated during the reverse osmosis treatment process.

PG&E's actual annual consumptive use to date has been less than PG&E's full LCWSP entitlement of 422 afa. Consumptive use at the compressor station fluctuates depending on facility operations and climate conditions, ranging from roughly 70 to 100 afa. The IM-3 Facility has a net consumptive use (extraction less reinjection) of between 10 and 20 afa (PG&E 2007, 2008a, 2008b).

4.12.1.4 FUTURE AVAILABILITY OF WATER

The 1992 exchange contract between Reclamation and IID and CVWD provides that if the quality of groundwater produced by the LCWSP wells is poorer than the quality of Colorado River water above Imperial Dam, the exchange may be halted at IID's and CVWD's discretion. However, there have been no water quality problems to date with the operation of stage 1, and MWD has agreed to establish a trust fund to protect future LCWSP users should the increased pumping result in water quality deterioration at the well fields (Chen, pers. comm., 2009). Thus, at this time indications are that the LCWSP will continue to operate at the authorized capacity for the term of the PG&E-Needles Subcontract.

The LCWSP Subcontract between the City and PG&E expires in 2045, when the Needles-Reclamation LCWSP Contract expires (Colorado River Board 2009b). However, The Needles-Reclamation LCSWP contains a renewal option for an additional fifty years (Reclamation 1992). It is expected that the City will extend its LCWSP Contract with the Reclamation for an additional fifty years, thereby extending the Subcontract as well.

4.12.2 REGULATORY BACKGROUND

4.12.2.1 FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

The Colorado River is managed and operated under numerous compacts, federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the Law of the River (Reclamation 2009:1-3). This collection of documents apportions the water and regulates the use and management of the Colorado River among the seven basin states and Mexico. Following is a synopsis of significant documents pertaining to the project area:

- The Colorado River Compact of 1922: This compact defines the relationship between the basin states.
- Boulder Canyon Project Act of 1928: This act apportioned to California the consumptive use of 4.4 maf/yr of water from the Colorado River plus one-half of any surplus water that was unapportioned by the compact. This act required all users of the river to have a contract with the Secretary of the Interior.
- California Seven Party Agreement of 1931: This agreement helped settle the conflict between California agriculture and municipal interests over Colorado River water priorities by reaching consensus on the amounts of water to be allocated on an annual basis to each entity. (Note: This agreement did not take into account the existence of present perfected[4] and other water rights along the Colorado River.)
- 1964 U.S. Supreme Court Decree in *Arizona v. California*: The decree recognized present perfected water rights (pre-1929 rights), recognized Indian Winter and federally decreed rights, and affirmed the need to have a contract with the Secretary of the Interior.

[4] Present perfected right, as defined by the Supreme Court, means perfected water rights existing as of June 25, 1929, the effective date of the Boulder Canyon Project Act (Colorado River Board 2009a)

- 1979, 1984, & 2000 Supplemental Decrees and the 2006 Consolidated Decree in *Arizona v. California*: Quantified the present perfected rights and the Indian Winter and federally established rights recognized in the 1964 decree.
- 1986 Lower Colorado Water Supply Project Act: Authorized Reclamation to construct the Lower Colorado Water Supply Project to make up to 10,000 afa of exchange water available to eligible entities for nonagricultural use along the Colorado River in California.
- December 2007 Record of Decision for Colorado River Interim Guidelines: This record of decision:
  - established rules for shortages, specifying who will take reductions and when they take them;
  - established operational rules for Lake Powell and Lake Mead;
  - established rules for surpluses for distribution of the extra water; and
  - encouraged new initiatives for water conservation with mechanisms for water conservation credit.

4.12.2.2 State Plans, Policies, Regulations, and Laws

Senate Bill (SB) 610, signed into law in 2001 (Chapter 643, Statutes of 2001), amended Sections 10910–10915 of the California Water Code. The law requires public water systems to prepare water supply assessments for residential projects with more than 500 dwelling units or development projects meeting certain criteria defined in the Water Code. The water supply assessment must determine whether available water supplies are sufficient to serve the demand generated by the project along with the region's reasonably foreseeable cumulative demand under average-normal-year, single-dry-year, and multiple-dry-year conditions, as projected over a 20-year period.

The proposed project does not meet the Water Code definition of a project requiring a water supply assessment. However, the availability of a water supply adequate to serve the project was considered by DTSC and is discussed below in the impacts evaluation. DTSC's determination that a water supply assessment is not required for the proposed project is based on California Water Code Section 10910-10915 (SB 610). The proposed project, for example, does not fall within the definition of a "project" under 10912, subdivision (a), which defines "project" as (1) a proposed residential development of more than 500 dwelling units; (2) a proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space; (3) a proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space; (4) a proposed hotel or motel, or both, having more than 500 rooms; (5) a proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area; (6) a mixed-use project that includes one or more of the projects specified in this subdivision; or (7) a project that would demand an amount of water equivalent to, or greater than, the amount of potable water required by a 500 dwelling unit project (California Water Code, Section 10912, subd. [a]). None of the above provisions have been found to apply to the proposed project.

The proposed project also does not involve a change in the type of historic use of water at the site and will not require any new water supplies from a public water system. The proposed project would not result in any increase in potable water supply service, including service from a public water system such as the City of Needles. Thus, DTSC concluded that the provisions of SB 610, codified in California Water Code Section 10910, et seq., do not apply to the proposed project.

4.12.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

Other than the federal and state laws pertaining to water supply identified above, there are no specific regional or local plans that affect the proposed project.

4.12.3 Environmental Impacts and Mitigation Measures

4.12.3.1 Analysis Methodology

The impacts of project implementation on potable water supplies were evaluated by comparing existing entitlements with future consumptive use associated with the project. The analysis considered all three phases of the proposed project: construction, operation and maintenance, and decommissioning. One acre-foot per year is the minimum amount of water that can be contracted through the LCWSP. For the purposes of this analysis, consumptive use of less than 1 afa was considered negligible.

4.12.3.2 Thresholds of Significance

The water supply analysis in a CEQA document is governed by California case law that requires the lead agency to consider both the relative certainty of new water supplies that a project would require and the impacts that could result from the use of those new water supplies. The following discussion introduces the principles governing water supply analyses in CEQA documents and distinguishes between the analysis of the certainty of supplies and the impact of providing those supplies. These principles are as follows:

1. An EIR may not assume a solution to problems of water supply, but must instead present sufficient facts to evaluate the pros and cons of supplying the required water. (*Santiago County Water District v. Orange* [1981] 118 Cal.App.3d 818, 829.)

2. The water supply analysis for large, multiphase projects may not be limited to the first few years or phases. Furthermore, the first or programmatic document for such a project may not defer analysis to future phases, but must analyze reasonably foreseeable impacts of supplying required water. The tiering principle does not allow deferral to future studies or documents. (*Santa Clarita Organization for Planning the Environment v. County of Los Angeles* [2003] 106 Cal. App. 4th 715, 723.)

3. An EIR evaluating a planned land use project must assume that all phases of the project will eventually be built and will need water. The EIR for such a project must analyze the impacts of supplying water to the entire project. (*Stanislaus Natural Heritage Project v. County of Stanislaus* [1996] 48 Cal.App.4th 182, 206.)

4. Future water supplies for a project must bear a reasonable likelihood of proving to be available. While absolute certainty is not required, water supplies must be identified with more specificity as projects progress from general to specific phases (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* [2007] 40 Cal. 4th, 412, 434). "Where, despite a full discussion, it is impossible to confidently determine that anticipated water sources will be available, CEQA requires some discussion of possible replacement sources or alternative to use of the anticipated water, and of the environmental consequences of those contingencies." (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* [2007] 40 Cal. 4th 412, 432.)

5. Although much of the case law focuses on the issue of certainty, the ultimate issue under CEQA is not whether an EIR establishes a likely source of water, but whether the document adequately analyzes the reasonably foreseeable impacts of supplying water to the project. (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* [2007] 40 Cal. 4th, 412, 434.)

The discussion of water supply in this section follows these principles. Accordingly, this analysis looks at both the certainty of water supplies and the impacts that would result from those supplies. Based on the CEQA Guidelines, the proposed project would have a significant impact on water supply if it would:

- have insufficient water supplies available to serve the project from existing or permitted entitlements and resources, or require new or expanded entitlements; or

- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (i.e., the production rate of preexisting nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

4.12.3.3 IMPACT ANALYSIS

> Increased Demand for Water Supplies. *No consumptive use would be associated with the in situ treatment and freshwater flushing elements because all extracted water would come from the Colorado River Basin and would be returned to the Colorado River Basin via reinjection wells within the Colorado River accounting surface. Drinking water for use by construction personnel would be trucked from off-site. Other construction and operation and maintenance activities would require a small amount of water that would be served by PG&E's existing LCWSP entitlement. PG&E's existing LCWSP entitlement is sufficient to serve the project needs during construction, operation and maintenance, and decommissioning. This impact would be* ***less than significant****.*

PG&E's actual annual consumptive use to date has been less than PG&E's full LCWSP entitlement of 422 afa. Consumptive use at the compressor station fluctuates depending on facility operations and climate conditions, ranging from roughly 70 to 100 afa. The IM-3 Facility has a net consumptive use (extraction less reinjection) of between 10 and 20 afa (PG&E 2007, 2008a, 2008b). Thus, combined consumptive use at the compressor station and IM-3 Facility under existing conditions is between 80 and 120 afa, leaving over 300 afa of entitlement that can be used to serve the proposed project.[5] The consumptive water use associated with each phase of the project is summarized in Table 4.12-1 and discussed in detail below.

Table 4.12-1
Annual Water Use by Phase

Phase	Estimated Change In Consumptive Water Use Relative To Current Use
Construction	2–3 afa for 3 years
Operation and Maintenance	
IRZ	None. Would divert and reinject up to 1,033 afa
Freshwater flushing	None. Would divert and reinject approximately 807 afa (max 1614 afa).
Well monitoring	Negligible* amount for purging and sampling of wells.
Decommisioning	
Deconstruction activities	2-3 afa for 1 year
IM-3 decommissioning	Decrease of 10 to 20 afa

Note: afa = acre-feet annually; IRZ = in situ reactive zone.
* For the purposes of this analysis, water use of less than 1 afa is considered negligible.
Source: Doss, pers. comm., 2010.

[5] The consumptive use at the IM-3 Facility is the small percentage of water that is contained in waste brine and precipitated solids that are generated during the reverse osmosis treatment and phase separation processes. The proposed project would use in situ treatment rather than the processes in use at the IM-3 Facility, and thus would not result in the consumption of additional water during operation and maintenance activities.

Construction

Water use associated with construction would include drinking water for construction personnel, dust suppression, soil conditioning during construction, installation of remedial/monitoring wells, and treatment startup over a construction period of up to 3 years. Drinking water to be used by personnel during construction would consist of bottled water from off-site sources brought on-site by contractors. This is estimated to be at most 0.025 acre-feet during the course of construction. Portable chemical toilets would be used for construction personnel sanitation and would not require additional water. All other water used during construction would be trucked to work sites from the existing water storage tanks at the compressor station. The tanks are filled with LCWSP pumped from Arizona wells. (See 4.12.1.3 for a more detailed description of the compressor station supply.) Consumptive water use during construction is estimated to be 7 to 9 acre-feet total for the duration of construction (3 years). The use of 7–9 acre-feet over the course of the 3-year construction period would average a 2–3 afa increase over existing conditions. The existing entitlement is more than sufficient to accommodate this short-term increase in use. The impacts of water use associated with construction would be **less than significant**.

Operations and Maintenance

The aspects of the operation and maintenance of the proposed project that involve water use are in situ treatment (extraction, conveyance, and reinjection of water in the in situ reactive zone [IRZ] at a rate of 640 gallons per minute [gpm] or 1,033 afa), freshwater flushing (extraction, conveyance, and reinjection of 500 gpm or 807 afa), and the sampling of monitoring wells (less than 0.1 afa).

For in situ treatment, the assumed flow rate of groundwater extracted from the extraction wells, amended with carbon substrate, and reinjected, is approximately 640 gpm or 1,033 afa. Conveyance for this element would include leak detection and alarm systems to prevent losses during conveyance and reinjection. Because all water diverted would be reinjected, the net consumptive use would be approximately zero.

It is estimated that the water needs for freshwater flushing would be approximately 500 gpm or 807 afa, which would all be returned to the groundwater. Conveyance for this component would include leak detection and alarm systems to prevent losses during conveyance and reinjection. Water for freshwater flushing could be diverted from a new surface diversion from the Colorado River, or from new groundwater wells within the Colorado River accounting surface in California or Arizona. Any of these points of diversion are permitted under PG&E's LCWSP, which allows diversion anywhere in the general vicinity of the compressor station property (Brownlee 2009b). Because all water would be diverted from the Colorado River Basin and would be returned to groundwater within the Colorado River Basin, the net consumptive use would be approximately zero.

During implementation of the proposed project, existing and new monitoring wells would be periodically sampled to collect data to evaluate the performance of the action to obtain the remedial goals. Sampling frequency could vary between wells and over different stages of the operations and maintenance period. Sampling could be as frequent as daily for some wells during certain periods, or as infrequently as every 10 years for some wells during certain periods. Well sampling typically involves purging a volume of water from the well and collecting a sample for testing. Purge and sampling water from well sampling would represent a negligible amount of water (less than 0.1 afa).

Because all water extracted for in situ treatment and freshwater flushing would come from the Colorado River Basin and would be returned to the Colorado River Basin via reinjection wells within the Colorado River accounting surface, the only consumptive use associated with the operation and maintenance phase would be the negligible amount used during monitoring well purging and sampling. PG&E's existing entitlement is sufficient to serve the project needs during operation and maintenance and this impact would be **less than significant**.

Decommissioning

The length of time required to decommission all elements of the proposed project is estimated to be up to 1 year. The IM-3 Facility would also take approximately 1 year to decommission. Because the IM-3 Facility is not a component of the proposed project, it would be decommissioned after the final remedy is considered to be operating properly and successfully. Most of the other facilities proposed as part of the project would be decommissioned following the completion of the remedial action, although it is possible that freshwater supply wells or the surface water intake structure may not be decommissioned and could be transferred to another use. Construction activities associated with decommissioning include decontamination of pipelines. For the purposes of this analysis, it was assumed that decommissioning activities would require similar water supply to construction activities, about 2 afa. Decommissioning of IM-3 would result in a reduction in consumptive water use of 10 to 20 afa. However, to provide a conservative analysis, this reduction in consumptive water use is not assumed to take place before other remedial actions are completed because the exact timing of IM-3 decommissioning is uncertain. PG&E's existing entitlement is sufficient to serve the deconstruction activity needs during decommissioning. Overall, decommissioning results in a reduction of consumptive water use. This impact would be **less than significant**. No mitigation would be required.

IMPACT WATER-1	Depletion of Groundwater. *While, from a water supply perspective, the consumptive use associated with the project is very small, localized effects on the groundwater table near the freshwater extraction wells are possible. Depending on where the extraction wells are sited, existing nearby supply wells could be adversely affected. This impact would be **potentially significant.***

Implementation of the proposed project would not substantially deplete groundwater supplies. From a water supply perspective, the consumptive use associated with the proposed project is very small. However, the project does involve pumping water from the groundwater basin and reinjecting it in different locations. Localized effects on the groundwater table, particularly near the freshwater extraction wells, are possible and would depend on pumping rates and the proximity and depth of other wells.

The ultimate number and specific locations of the wells that make up the proposed project has not been determined at this time because the locations are dependent on several factors. The maximum number of new wells that would be installed in the project area considered within this EIR is 170, which includes both remediation and monitoring. Exhibit 3-4 in Chapter 3, "Project Description," portrays a conceptual idea of what the distribution of remedy facilities could look like in the project area, including possible locations of wells and pipelines. However, wells could be located anywhere within the area of potential facility locations. Final locations of wells would be determined during final design in consultation with the landowners and/or other entities with rights-of-way. Final locations also would be determined in consideration of treatment efficiency, accessibility for construction and operation and maintenance, topography, sensitive cultural and biological resources, and existing infrastructure.

The extraction wells are not anticipated to produce a drawdown that would substantially adversely affect other water users such that existing land uses could not be supported, based on the range of potential locations for new extraction wells, which are all within approximately 2 miles of the existing compressor station. However, as explained above, the locations, depths, and pumping rates of the wells (particularly the freshwater extraction wells that could be sited in California or Arizona) have not been determined. A few known water supply wells are within the area of potential well locations that could potentially be affected. These include two private wells in Arizona and the San Bernardino County Park Moabi water supply (PG&E 2008c).

Given the potential for adverse effects depending on the location, depth, and pumping rates associated with the freshwater flushing element of the project, this impact is considered **potentially significant**. **(Impact WATER-1)**

Mitigation Measure WATER-1: Depletion of Groundwater.

To mitigate potentially significant effects on local groundwater levels associated with the freshwater extraction wells, in the event that freshwater is to be supplied from wells rather than from a surface intake, a hydrologic analysis shall be conducted during the design phase of the project to evaluate the proposed pumping rates for extraction, the potential cone of depression, and the extraction effect on any existing wells in proximity. Proximity shall be defined by the cone of depression boundary of any well to be used in the extraction process. Extraction well location and/or extraction rates shall be adjusted during project design based on this analysis to ensure that extraction does not substantially adversely affect the production rates of existing nearby wells (e.g., adversely affect well production such that existing land uses would not be supported). It shall be demonstrated using computer simulations or other appropriate hydrologic analysis that production rates of existing nearby wells will not be substantially affected before the installation of any new freshwater extraction wells.

Timing:	Mitigation Measure WATER-1 shall be implemented during final project design. The hydrologic analysis shall be completed during project design and be used to inform well siting during 100% design to avoid impacts if feasible. Demonstration that the performance criteria have been met shall be verified by DTSC before final approval of the design of this project component.
Responsibility:	PG&E shall be responsible for implementation of these measures. DTSC shall be responsible for ensuring compliance.
Significance after Mitigation:	Implementation of this mitigation measure would reduce this impact to **less than significant** because it would reduce the potential for localized changes in groundwater level that would substantially adversely affect wells in the vicinity.