5 OTHER CEQA SECTIONS

This chapter summarizes the environmental impacts of the proposed project for which no mitigation is available to reduce the level of significance to a less-than-significant level, addresses resource areas where no significant impacts were found, and addresses the growth-inducing impacts of the project.

5.1 UNAVOIDABLE SIGNIFICANT IMPACTS

As required by CEQA Guidelines Section 15126.2(b), an EIR must describe any significant impacts that cannot be avoided, including those impacts that can be mitigated but not reduced to a less-than-significant level. Chapter 4 of this DEIR describes the potential environmental impacts of the proposed project and recommends mitigation measures to reduce impacts, where feasible.

5.1.1 CULTURAL RESOURCES

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. Further, 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. As expressed by tribal stakeholders during the NACP, even the transformation of Cr(VI) to trivalent chromium [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 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)**

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 issues, 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, to the extent feasible, 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.

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**.

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 post-war 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)**

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-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.

These measures would reduce but may not completely avoid the potential for significant impacts on identified historical resources identified 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**.

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 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. (IMPACT CUL-2)**

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.

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**.

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. (IMPACT CUL-4)**

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.

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**.

5.1.2 NOISE

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**. **(Impact NOISE-1)**

Mitigation Measure Noise-1: Short-Term Groundborne Noise and Vibration Levels Caused by Construction Activities near Sensitive Receptors.

- Construct new wells as far from vibration-sensitive receptors as feasible.
- Avoid constructing wells during the nighttime hours when in proximity to vibration-sensitive uses.
- A disturbance coordinator shall be designated by the project applicant. The disturbance coordinator 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 shall contact nearby vibration-sensitive receptors, advising them of the construction schedule.

Predicted vibration levels are difficult to determine for comparison with applicable vibration standards under the assumptions used for vibration analysis; however, the potential for exceeding applicable standards still exists, making this impact **potentially significant and unavoidable**. Vibration levels from the construction of additional wells may generate an annoyance or cause sleep disturbance dependent upon the distance between receptor and the location of the well construction.

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.

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. 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.

Although Mitigation Measure NOISE-3 would achieve the normally acceptable exterior noise level standard for places of worship, the unique values associated with the Topock Cultural Area cannot be reconciled with additional project-related noise. The impact would be **significant and unavoidable** after implementation of the measures detailed above.

5.2 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES THAT WOULD BE CAUSED BY THE PROPOSED PROJECT

Section 21100(b)(2)(B) of the CEQA Statutes and Section 15126.2(c) of the CEQA Guidelines require that an EIR analyze the extent to which the proposed project's primary and secondary effects would affect the environment and commit nonrenewable resources to uses that future generations would not be able to reverse. "Significant irreversible environmental changes" include the use of nonrenewable natural resources during the initial and continued phases of the project, should this use result in the unavailability of these resources in the future. Primary impacts and, particularly, secondary impacts generally commit future generations to similar uses. Also, irreversible damage can result from environmental accidents associated with projects. Irretrievable commitments of these resources are required to be evaluated in an EIR to ensure that such consumption is justified (CEQA Guidelines Section 15126.2[c]).

The proposed project would result in the irreversible and irretrievable commitment of energy and material resources during project construction and maintenance, including the following:

- construction materials, including such resources as soil and rocks;
- energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction and maintenance.

The use of these nonrenewable resources is expected to account for a minimal portion of the region's resources and would not affect the availability of these resources for other needs within the region. Construction activities would not result in inefficient use of energy or natural resources. Construction contractors selected would use best available engineering techniques, construction and design practices, and equipment operating procedures. The relatively small commitment of land to project uses is considered less than significant when compared to other types of development, such as urban development, in a local and regional context. Operation and maintenance of the proposed project is anticipated to last for 29 years, (but could occur for up to 110 years) and therefore the use of resources is considered temporary for the purposes of this discussion.

Implementation of the project would eliminate the potential for the contaminated groundwater plume to come into contact with surface waters of the Colorado River or users of groundwater (because of institutional controls). In addition, the proposed project would not result in solid waste byproducts (as opposed to alternatives that include ex situ treatment (treatment plant) and therefore environmental accidents associated with the construction and operation of the proposed project are not considered to be significant.

5.3 ENVIRONMENTAL EFFECTS FOUND NOT TO BE SIGNIFICANT

As required by Section 15128 of the CEQA Guidelines, an EIR shall contain a brief discussion stating the reasons that various possible significant effects of a project were determined not be significant and were therefore not discussed in detail in the EIR. In accordance with the CEQA Guidelines, this section discusses the following issue areas that were found to have no significant impacts with implementation of the proposed project.

5.3.1 AGRICULTURE RESOURCES

This discussion addresses Appendix G Checklist, "Agriculture Resources." which considers whether the proposed project would convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program, to nonagricultural use, conflict with existing zoning for agricultural use or Williamson Act contract, or involve other changes in the existing environment that could result in a conversion of Farmland to nonagricultural use.

1) The project area is characterized by arid conditions and high temperatures. While there are agricultural uses north of the project area and Needles along the Colorado River, the landscape in the project area consists of considerably eroded small to moderately sized terraces with very steep slopes. These conditions are not conducive to agriculture purposes. A review of Farmland Mapping and Monitoring Program 2006 maps indicates that no farmland designated as Prime Farmland, Unique Farmland, or Farmland of Local Importance are within the project area or in the vicinity of the project (California Department of Conservation 2006). No lands under a Williamson Act contract are on or near the project site (California Department of Conservation 2008). A review of aerial photographs from 1936 through 2007 show no historic or current agricultural uses either on or near the project site (CH2M Hill 2007:3-95 through 3-113). Because no agricultural resources have been identified within the vicinity of the project, no direct or indirect impacts on agricultural resources would occur from implementation of the proposed project. Water that is used to irrigate crops in the areas outside the project area could come from the Colorado River or nearby wells. As described in Section 4.12, "Water Supply," the proposed project would not result in consumptive use of groundwater supplies because all water extracted for the remediation effort would be reinjected into the supply, and no interruptions with existing water delivery or supply are likely.

5.3.2 MINERAL RESOURCES

This discussion addresses Appendix G Checklist, "Mineral Resources." The checklist questions ask whether the project would result in the loss of availability of a known mineral resource of value to the region and the residents of the state or result in the loss of availability of a locally important mineral resource recovery site delineated on a local plan.

The California Surface and Mining Act of 1975 required the classification of land into Mineral Resource Zones (MRZs) according to the land's known or inferred potential to contain mineral resources. The portion of the project area that is within California has been classified as MRZ-4. MRZ-4 is defined as areas where geologic information does not rule out either the presence or absence of mineral resources. MRZ-4 is commonly applied to areas of unknown mineral potential that occur within a broader favorable terrain known to host economic mineral deposits (DOC 1985).

There are three general categories of geologic mineral resources that may be present in the project area including:

1. Construction Mineral Materials: Sand, gravel, and crushed rock (San Diego County 2007:2). The federal land management agencies including the U.S. Bureau of Land Management (BLM), the U.S. Fish and Wildlife Service (USFWS), and the U.S. Bureau of Reclamation (Reclamation) refer to these as "saleable mineral resources."

2. Metallic and Rare Minerals: Gold, silver, platinum, iron, copper, lead, zinc, gemstones and semiprecious materials (San Diego County 2007:4). The federal land management agencies refer to these as "locatable mineral resources."

3. Leasable Mineral Resources: Oil, coal, sodium, potassium and geothermal resources. The federal land management agencies refer to these as "leasable mineral resources" (BLM 2008).

It is possible that any of the three resource categories listed above may be present in the project area because the portion of the project area that is located in California is classified as MRZ-4. The classification of MRZ-4 does not rule out either the presence or absence of mineral resources and the classification is also commonly applied to areas that occur within a broader favorable terrain known to host economic mineral deposits (DOC 1985). Metallic, rare, and leasable minerals may also be present, but their existence in the project area is unknown at this time. The project site's geologic units/site stratigraphy and the physical characteristics and setting of the project area, as detailed above, indicate that construction mineral materials, including sand and gravel, are present in the project area.

Although there is the potential for some mineral resources to exist in and around the project area, the proposed project would not significantly reduce the availability of known mineral resources. There are no mining claims on or immediately adjacent to the project site. In addition, the majority of federal lands in the project area are closed to mineral entry (i.e., mining claims) under the General Mining Act of 1872, as amended (BLM 2007:44). Therefore, no impact would occur related to loss of availability of a known mineral resource, either of regional or local importance.

5.3.3 POPULATION AND HOUSING

This discussion addresses Appendix G Checklist, "Population and Housing," impact questions (b) and (c). The checklist questions ask whether the project would displace substantial numbers of existing housing, necessitating construction of new housing elsewhere or displace substantial numbers of people, necessitating construction of replacement housing elsewhere. For a discussion of checklist item (a) regarding the potential for inducement of substantial population growth, refer to Section 5.4, "Growth Inducement."

The proposed project does not involve displacement of existing housing or people. The maximum number of new full-time employees and new residents that could result from construction, operation, and decommissioning of the proposed project is estimated at 295, 88, and 48, respectively. The construction phase, which would result in the most employment, would still only represent 0.012% of growth in the region. It is expected that the majority of these new employees would be from the local employment base. Based on the existing labor pool, there would be no need for new housing to be constructed as a result of the project. No impact would occur regarding these issues.

5.3.4 PUBLIC SERVICES

This discussion addresses Appendix G Checklist, "Public Services." The checklist questions ask whether the project would result in substantial adverse physical impacts associated with the provision of or need for new or altered government facilities, the construction of which could cause significant environmental impacts in order to

maintain acceptable service ratios, response times or other performance objectives for fire protection, police protection, schools, parks or other public facilities.

The maximum number of new full-time employees and new residents that could result from construction, operation, and decommissioning of the proposed project is estimated at 295, 88, and 48, respectively. The construction phase, which would result in the most employment, would still only represent 0.012% of growth in the region. Existing public services would be able to accommodate this slight increase in population while still maintaining acceptable service ratios, response times, or other performance objectives. No new or expanded public services would be required with implementation of the proposed project. Therefore, no impact would occur related to fire protection, police protection, schools, parks or other public facilities.

5.3.5 RECREATION

This discussion addresses Appendix G Checklist, "Recreation." The checklist questions ask if the project would increase the use of existing recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated or include construction of recreational facilities which might have an adverse physical effect on the environment. The maximum number of new full-time employees that could occur with implementation of any of the proposed project would be 40. The addition of up to 40 new residents would not be considered a substantial change in population. Existing recreational facilities would accommodate this slight increase without causing substantial physical deterioration. The project does not propose construction of any new recreational facilities. In addition, operation of the proposed project would not introduce facilities that would preclude existing recreational uses that occur on the Colorado River or the National Wildlife Refuge, which includes boating, wildlife observation and photography, education and interpretation, hunting, and fishing. Therefore, no impact would occur related to recreation.

5.4 GROWTH INDUCEMENT

As required by CEQA, this EIR must discuss ways in which the project could foster economic or population growth or the construction of additional housing, either directly or indirectly, in the surrounding area (CEQA Guidelines, Section 15126.2[d]). Induced growth is any growth that exceeds planned growth and results from new development that would not have taken place in the absence of the proposed project. A project can be determined to have a growth-inducing impact if it directly or indirectly causes economic or population expansion through the removal of obstacles to growth or encourages or facilitates other activities that could significantly affect the environment; actions that are sometimes referred to as "growth accommodating."

The proposed project is located in eastern San Bernardino County, California. The U.S. Census Bureau indicates that the population of San Bernardino County grew from 1,709,434 persons in 2000 to 2,007,800 persons in 2007 (U.S. Census Bureau 2008). This represents an increase of 298,366 persons, or a 17% increase. The city of Needles is the closest urban community to the project area that is located in California. Population data specific to Needles shows the community grew from 4,830 persons in 2000 to 5,290 persons in 2007 (U.S. Census Bureau 2008). This represents an increase of 460 persons, or almost a 10% increase. Based on Southern California Association of Governments (SCAG) projections for San Bernardino County, population growth for the County is expected to continue at a rapid pace, increasing by almost 60% to over 2,397,700 by the year 2020 (San Bernardino County 2007:4A-1).

The proposed project would implement remediation efforts to clean up contaminated groundwater at and in the vicinity of the compressor station. The proposed project would not result in the creation of new residences on or adjacent to the project site. The anticipated employment, both direct and indirect, generated by the proposed project is evaluated in detail in Section 9.2, "Socioeconomics." The estimated total number of new residents as a result of the construction of the proposed project is approximately 590, which would likely be distributed throughout five counties included in the region of influence (ROI). This increase would represent approximately 0.012% growth for the region. The estimated total number of new residents to the ROI as a result of the

operations and maintenance of the proposed project is approximately 88, which would likely be distributed throughout the five counties included in the ROI. This increase would represent approximately 0.0018% growth for the region. The estimated total number of new residents to the ROI as a result of the operations and maintenance of the proposed project is approximately 148, which would likely be distributed throughout the five counties included in the ROI. This increase would represent approximately 0.003% growth for the region. The growth associated with all phases of the proposed project is anticipated to be relatively small in comparison with projected growth for the region and would not be significant.

The project site is currently served by existing roadways, utilities, and public services. While there is the chance that the proposed project could result in off-site infrastructure or service expansions related to electrical systems, which could serve other future development, due to the relatively isolated nature of the area, other limiting factors to development, and the projected growth forecasts, this additional electrical supply is not anticipated to result in substantial indirect growth, if any. For these reasons, implementation of the proposed project would not result in primary or secondary environmental effects related to additional growth.

6 CUMULATIVE IMPACTS

6.1 INTRODUCTION TO THE CUMULATIVE ANALYSIS

CEQA Guidelines Section 15130 requires that an EIR discuss cumulative impacts of a project and determine if the project's incremental effect is "cumulatively considerable." The definition of cumulatively considerable is provided in Section 15065(a) (3):

> "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

According to Section 15130(b) of the CEQA Guidelines:

> [t]he discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

For purposes of this EIR, the project would have a significant cumulative effect if:

- the cumulative effects of other past, current, and probable future projects without the project are not significant and the project's incremental impact is substantial enough, when added to the cumulative effects, to result in a significant impact; or
- the cumulative effects of other past, current, and probable future projects without the project are already significant and the project contributes measurably to the effect. The standards used herein to determine measurability are that either the impact must be noticeable or must exceed an established threshold of significance.

This EIR identifies potentially significant environmental impacts associated with implementation of the proposed project, which are addressed by resource topic in Chapter 4. These issues, and others that could contribute considerably to cumulatively significant effects, are discussed below in the context of cumulative development.

6.2 GEOGRAPHIC SCOPE

The geographic area that could be affected by the proposed project varies depending on the type of environmental resource being considered. When the effects of the project are considered in combination with those other past, present, and reasonably foreseeable future projects to identify cumulative impacts, the other projects that are considered may also vary depending on the type of environmental effects being assessed. The general geographic area associated with different environmental effects of the project defines the boundaries of the area used for compiling the list of projects considered in the cumulative impact analysis. Each section of this EIR considers the specific geographic segment of this growth that is directly related to the individual topic addressed within that section. For example, the analysis of some air quality impacts is based on regional-scale growth; thus a regional perspective must be used to assess cumulative air quality impacts. In the case of aesthetic impacts, given the localized impact area of concern, a smaller more localized area surrounding the immediate project area, as well as a community scale that encompasses the larger community within which the proposed project is located, would be appropriate for consideration. Table 6-1 presents the geographic scales associated with the different resources addressed in this DEIR analysis.

Table 6-1 Geographic Scope of Cumulative Impacts	
Resource Issue	Geographic Scale of Impacts
Aesthetics	Local and community scales
Air Quality	Local (carbon monoxide, particulate matter, air toxics) Air basin/regional (ozone and particulate matter) Global (greenhouse gases)
Biological Resources	Local scale and areas within the same watershed
Cultural Resources	Archaeological survey area (local scale) Topock Cultural Area (local scales) Lower Colorado River Valley (regional scale)
Geology and Soils	Local scale
Hazardous Materials	Local and community scales
Hydrology and Water Quality	Local scale and downstream areas within the same watershed and aquifer
Land Use and Planning	Local scale
Noise	Local scale
Transportation	Regional and local scales
Utilities and Service Systems	Regional and community scales
Water Supply	Regional and local scales
Source: Data compiled by AECOM in 2009	

6.3 RELATED PROJECTS

The CEQA Guidelines allow for the use of two alternative methods to determine the scope of related projects for the cumulative impact analysis:

- List Method—A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency.
- Regional Growth Projections Method—A summary of projections contained in an adopted general plan or related planning document that is designed to evaluate regional or area-wide conditions (CEQA Guidelines Section 15130).

For the purpose of this EIR, both approaches are used. This is due to the localized nature and specific land use of the proposed project, while also considering that the project site is located in an area that has and will continue to experience some regional growth. This method allows for a thorough, project-based cumulative analysis within the defined geographic area of the proposed project. However, certain issues, which extend far beyond the project vicinity (air quality, global climate change), also rely on projections.

6.3.1 REGIONAL GROWTH PROJECTIONS

The proposed project is located within a region (San Bernardino County and neighboring Mohave County, Arizona) that has experienced historical and recent growth, and is also projected to experience population increases in the future. Table 6-2 below shows growth trends in the two counties and the cities of Needles, California, and Lake Havasu City, Arizona.

Table 6-2
Regional Growth Projections

Jurisdiction	Year				Percent Change (2000-2030)
	2000	2010	2020	2030	
California					
San Bernardino County, California[1]	1,721,942	2,177,596	2,581,371	2,958,939	72
Unincorporated San Bernardino County, California[2]	NA	346,523	408,654	462,447	33 (2010-2030)
City of Needles, California	4,830[3]	5,658[2]	5,775[2]	5,819[2]	20
Arizona					
Mohave County, Arizona	155,032[3]	221,443[4]	281,668[4]	330,581[4]	113
Lake Havasu City, Arizona	41,938[3]	65,073[4]	86,053[4]	103,093[4]	146

Sources:
[1] California Department of Finance 2007
[2] SCAG 2008
[3] U.S. Census Bureau 2000
[4] Arizona Commerce Department 2006

This type of regional and localized growth has the potential to result in numerous environmental issues such as traffic congestion, air quality degradation, biological habitat loss, water quality degradation, and other environmental changes. This cumulative analysis considers the regional growth trends and the more specific individual projects that are discussed below.

6.3.2 LIST OF PROJECTS IN THE VICINITY

A summary of the projects identified at or within the general vicinity of the compressor station is provided in Table 6-3 and shown in Exhibit 6-1. This is not intended to be an all-inclusive list of projects in the region, but rather a list of projects in the vicinity of the compressor station that have some relation to the setting conditions of the project and are: (1) completed, (2) currently under construction or implementation or beginning construction or implementation, (3) proposed and under environmental review, or (4) reasonably foreseeable. The proposed project is located near the Colorado River, thus projects associated with federal agencies with interests along the river were considered as part of this analysis and included on the project list. While the project site is located in an unincorporated area of the County of San Bernardino, it is in also in the general vicinity of the City of Needles, California; Mohave County, Arizona; and Lake Havasu City, Arizona. For this reason, projects in each of the aforementioned jurisdictions are included in Table 6-3 as well. This analysis is based on information obtained from the U.S. Bureau of Reclamation (Reclamation); U.S. Bureau of Land Management (BLM); U.S. Fish and Wildlife Service (USFWS); the County of San Bernardino and the City of Needles, California; Mohave County and Lake Havasu City, Arizona; and PG&E. The Metropolitan Water District of Southern California (MWD) was contacted for input on any potential MWD related projects to include in this DEIR. MWD indicated that no MWD projects are located in the vicinity of the project area (Koch, pers. comm. 2010).

The existing infrastructure within the project area, including roads, bridges, I-40, railroads, utilities , etc. are not included in the Table 6-3, since all of these past projects in the vicinity of the proposed project are part of the baseline/existing conditions that are described throughout Chapter 4 of this DEIR. Likewise, the construction of the marinas in California and Arizona and nearby industrial facilities, such as the other operators of the six natural gas transmission lines, in the vicinity of the project area are part of the existing conditions of this DEIR.

Table 6-3
List of Projects Located at or within the Vicinity of the Proposed Project

Exhibit 6-1 Map Key	Project Name	Description of Project	Size (Acreage) or Extent	Jurisdiction/ Land Owner	Approximate Distance from Proposed Project (miles)	Status
1. PG&E: Projects at the Compressor Station						
1A	Major Plant Refurbishment	Substantial replacement of and/or modernization of major plant equipment	Within the compressor station footprint	PG&E	On-site	Potential future project
1B	Site Improvement Projects	Minor annual site improvements based on available budget	Within the compressor station footprint and surrounding PG&E facilities	PG&E	On-site	Potential future project
1C	CRMP for Groundwater Extraction and Treatment System	Management plan for cultural resources during remediation activities	Immediate vicinity of the compressor station	PG&E	On-site	Ongoing
1D	Soil Investigation and Remediation	Investigation and remediation of contaminated soils	Immediate vicinity of the compressor station	PG&E	On-site	Potential future project
1E	AOC 4 (Debris Ravine)	Investigation and remediation of contaminated soils	Immediate vicinity of the compressor station	PG&E/DOI	On-site	Initial investigation conducted and potential future project
1F	Upland In situ Pilot Test, Aquifer Testing, Groundwater Well Maintenance and Well Decommissioning	Three work plans to address investigation and remediation of contaminated groundwater	Immediate vicinity of the compressor station	PG&E	On-site	Past project
1G	Site Work Plan for Additional Groundwater Characterization Underneath the Colorado River	Provides measurable data with respect to the location of the contaminated groundwater plume and to confirm effectiveness of an IM	Immediate vicinity of the compressor station	PG&E	On-site	Past project
1H	In situ Hexavalent Chromium Reduction Pilot Test Work Plan	Describes field activities for pilot tests to be conducted to evaluate in situ technologies	Immediate vicinity of the compressor station	PG&E	On-site	Past project
1I	Pore Water and Seepage Study Work Plan	Assesses chromium concentrations during seasonal low river stands and assess geotechnical conditions below the Colorado River	Immediate vicinity of the compressor station Colorado River	PG&E	On-site Less than 1 mile	Past project

Table 6-3
List of Projects Located at or within the Vicinity of the Proposed Project

Exhibit 6-1 Map Key	Project Name	Description of Project	Size (Acreage) or Extent	Jurisdiction/ Land Owner	Approximate Distance from Proposed Project (miles)	Status
1J	Installation of Conveyance Piping and Power Supply for Extraction Well PE-1	Provides piping and electricity to Extraction Well PE-1	Immediate vicinity of the compressor station	PG&E	On-site	Past project
1K	Interim Measures 1 and 2 Emergency Groundwater Extraction and Management	Extraction was required as part of IM-1 and was superseded by IM-2, which floodplain extraction and off-site disposal.	Immediate vicinity of the compressor station	PG&E	On-site extraction/off-site disposal	Past project
1L	Interim Measures 3 Emergency Groundwater Extraction and Management	Provides extraction rate of 130 gallons per minute at TW-2 extraction well during month of highest groundwater discharge rates	Immediate vicinity of the compressor station	PG&E	On-site	Past project
1M	East Ravine/TCS Hydrogeologic Investigation	Provides plume delineation and characterization of groundwater conditions in alluvium and bedrock.	On the TCS property and in ravine to the east	PG&E	On-site	Past and potential future project
1N	Arizona Drilling and Hydrogeologic Characterization Program	Provides characterization of groundwater conditions on the east side of the River (in Arizona)	On the AZ side of the river near Topock, AZ	PG&E	On-site Across the River	Past Project
1O	Pilot Study for well TW-1 on the Compressor Station	Installation of an extraction well on PG&E property to determine hydraulic influence of extraction to the Cr(VI) plume	Immediate vicinity of the compressor station	PG&E	On-site	Past Project
2. U.S. Bureau of Reclamation						
2A	Lower Colorado River Multi-Species Conservation Program	Program to conserve and work toward recovery of endangered species and protect and maintain habitat along the Colorado River	Extends along Colorado River from Lake Meade to Southerly International Border with Mexico	Multiple federal agencies	Less than 1 mile	Ongoing

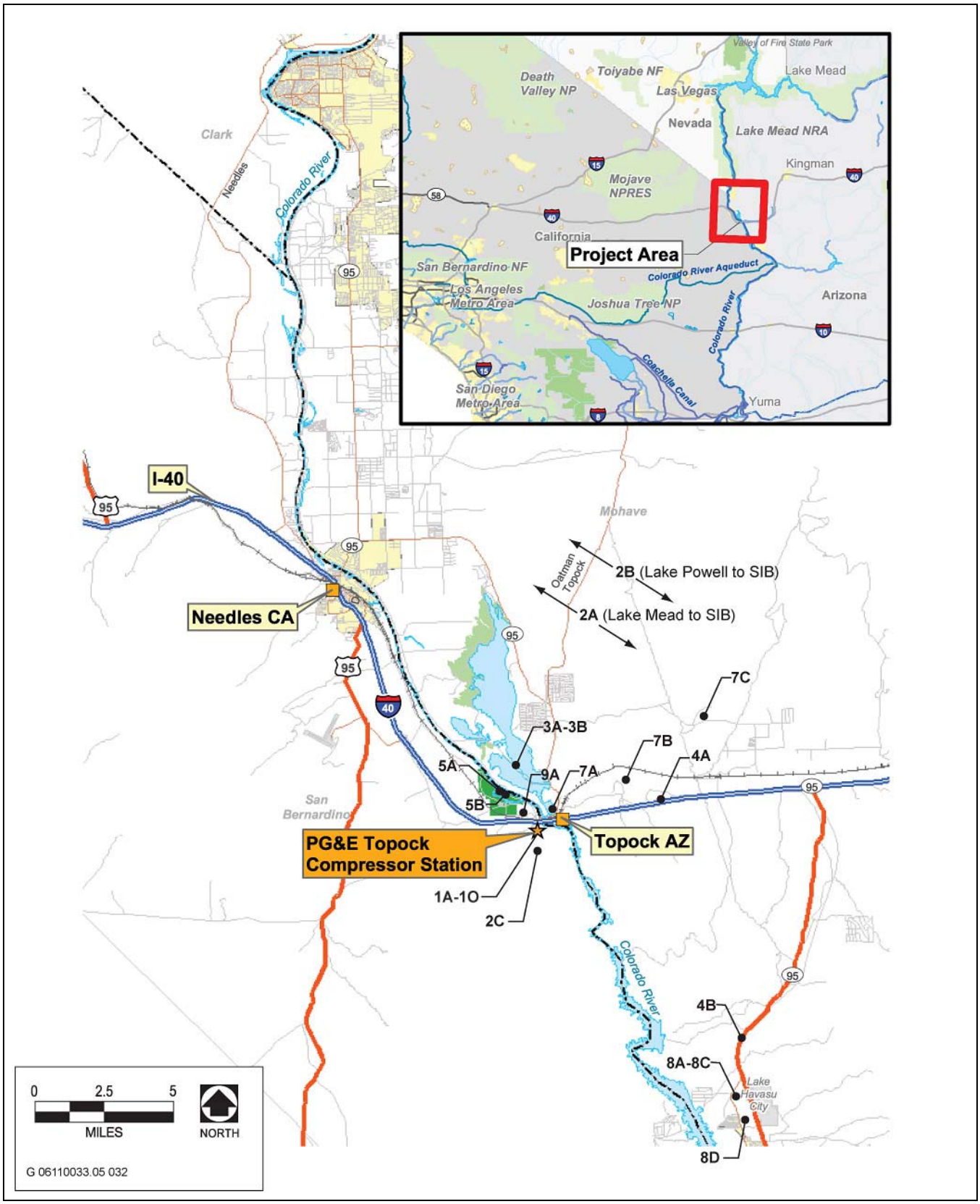
Table 6-3
List of Projects Located at or within the Vicinity of the Proposed Project

Exhibit 6-1 Map Key	Project Name	Description of Project	Size (Acreage) or Extent	Jurisdiction/ Land Owner	Approximate Distance from Proposed Project (miles)	Status
2B	Interim Guidelines for Lower Basin Shortages and Coordinated Operations	Guidelines to address operations at Lakes Powell and Mead during drought and low reservoir conditions	Affects the Colorado River from Lake Powell to Southerly International Border with Mexico	U.S. Bureau of Reclamation	Less than 1 mile	Ongoing
2C	Quarry Operations	Evaluation of nine operating quarry sites, reopening 5 other sites, and establishing two new sites to support projects along Colorado River	Bat Cave No. 1: 40 acres	U.S. Bureau of Reclamation/Bureau of Land Management	Less than 1 mile	Ongoing
3. U.S. Fish and Wildlife Service						
3A	Lower Colorado River National Wildlife Refuges Comprehensive Management Plan	Management plan for refuges along Lower Colorado River, including Havasu National Wildlife Refuge (HNWR)	HNWR: 30 river miles (300 miles of shoreline) between Needles, CA and Lake Havasu City	U.S. Fish and Wildlife Service	Less than 1 mile	Ongoing
3B	Topock Marsh Water Infrastructure Improvement Project on the Havasu National Wildlife Refuge	Replacement and rehabilitation of the HNWR main water delivery system for the Topock Marsh unit	Approximately 63 acres	U.S. Fish and Wildlife Service	Less than 1 mile	Ongoing
4. Arizona Department of Transportation						
4A	Needle Mountain Rest Area Improvements (Interstate 40)	Improvements to an existing highway rest area	To be determined	ADOT	Approximately 3 miles	Proposed
4B	State Route 95 Passing Lanes	New passing/climbing lanes	To be determined	ADOT	Approximately 11 miles	Proposed
5. San Bernardino County						
5A	Moabi Regional Park Improvements	Construction utility hookups, and recreational vehicle spaces	To be determined	San Bernardino County	1 mile	Ongoing
5B	Pirate Cove Resort	Resort with condominiums, camping areas, commercial development, and a 300-slip marina.	To be determined	San Bernardino County	Less than 1.5 miles of the station	Approved and constructed Ongoing

Table 6-3
List of Projects Located at or within the Vicinity of the Proposed Project

Exhibit 6-1 Map Key	Project Name	Description of Project	Size (Acreage) or Extent	Jurisdiction/ Land Owner	Approximate Distance from Proposed Project (miles)	Status
6. City of Needles, CA						
6A	Holiday Inn	Hotel	46,209 sq. ft. (3 stories)	City of Needles	10 miles	Approved and set to begin construction
6B	Solar Project	Solar energy facility	80 acres	City of Needles	10 miles	Ongoing
6C	Social Security Building	Office building	6,596 sq. ft.	City of Needles	10 miles	Approved and constructed
7. Mohave County						
7A	Topock Marina Improvements	Expansion of recreational vehicle spaces	Approximately 20 acres	Mohave County	Less than 1 mile	Proposal not yet formalized
7B	Unnamed 80-acre residential subdivision	Residential subdivision and wastewater treatment plant	80 acres	Mohave County	Approximately 2 miles	Preliminary plat submitted
7C	Sterling	Master planned community pending re-evaluation as a solar power generation site	Approximately 10,000 acres	Mohave County	Approximately 5 miles	Approved in 1999, but not constructed
8. Lake Havasu City						
8A	Airport Business Park	Light industrial business park development	Approximately 80 acres	Lake Havasu City	Approximately 14 miles	Approved. Grading and infrastructure have been completed for Phase 1. Remaining phases will need to be zoned.
8B	Auto Mall	Commercial and retail auto mall development	Approximately 37 acres	Lake Havasu City	Approximately 14 miles	Approved. Two of 12 parcels have been developed.
8C	Shopping Mall	Commercial and retail shopping mall development	Approximately 200 acres	Lake Havasu City	Approximately 14 miles	Approved. Majority of project site has been constructed. Several small out-parcels remain undeveloped.
9. U.S. Bureau of Land Management						
9A	Cathodic Protection System	Installation of cathodic protection system for a gas pipeline by Southern California Gas	Approximately 235 feet	U.S. Bureau of Land Management	Approximately 2,000 feet	Potential future project

Sources: Provided by U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, Arizona Department of Transportation, City of Needles Planning Department, City of Lake Havasu Planning Department, and U.S. Bureau of Land Management



Source: Data adapted by AECOM in 2010

Approximate Location of Cumulative Projects **Exhibit 6-1**

The following briefly describes each of the projects that were considered in this DEIR as part of the cumulative baseline used in conducting the cumulative impacts analysis. PG&E activities at the compressor station are described as a part of the cumulative baseline, followed by a description of activities by other parties.

6.3.2.1 PG&E TOPOCK COMPRESSOR STATION

Major Plant Refurbishment (1A)

Since operation of the compressor station began in 1951, periodic (approximately every 5 years) reviews of the condition of the major plant equipment are conducted by PG&E, in order to determine if improvements or refurbishments are needed. These activities could include substantial replacement and/or modernization of major equipment at the compressor station. According to PG&E, the most recent review was conducted approximately 3 years ago and the preliminary recommendation from the review was that a major refurbishment was considered feasible and may be necessary to comply with anticipated changes in the air regulations. While the refurbishment at the compressor station is still in the planning stages, it is anticipated to be completed within the existing plant footprint and projected to occur after 2012.

Site Improvement Projects (1B)

PG&E staff regularly develops an annual "wish list" of site improvement projects involving on-site features such as roads, drainage systems, and equipment improvements. These projects are implemented based on the availability of funding and the priority assigned to the projects. The projects are limited to the existing footprint of the PG&E facilities and do not involve new facilities or the expansion of plant operations or capabilities.

Cultural Resources Management Plan for Topock Compressor Station Expanded Groundwater Extraction and Treatment System (1C)

A 2004 memorandum of agreement between the Bureau of Land Management (BLM) and the California State Historic Preservation Office (SHPO) required PG&E to develop and implement a cultural resources management plan (CRMP) for the IM-3 project. Through an approved CRMP, the BLM can require consideration and appropriate management of effects on historic properties throughout the term of the project.

The CRMP has been developed in response to that requirement. It describes for PG&E, project officials, the BLM as lead federal agency, DTSC as project lead, and the SHPO, the measures that will be taken to avoid or minimize harm to significant cultural resources. It includes a plan for identifying, evaluating, and managing cultural resources within an expanded area of potential effect (APE) of 1,815 acres and describes various treatment measures designed to address effects on historic properties that may result from the groundwater extraction and treatment system remediation measures.

An important element of the CRMP is the transportation management plan (TMP). The TMP analyzes the expected amount and types of road traffic and its expected effects on segments of Historic Route 66, an important historic property eligible for listing on the National Register of Historic Places. The TMP also specifies protective measures to control the amount of vehicular traffic on the roadbed to levels that would not cause significant harm to the roadway and includes specific measures to avoid or minimize damage to the historic roadbed.

Soil Investigation and Remediation (1D)

Areas of soil contamination with elevated concentrations of chemicals of potential concern (COPCs), surface stains, and hazardous debris have been identified both within the compressor station boundary and in the surrounding area. As noted in Section 2.2.5, "Ongoing Evaluation of Soils Contamination," the identification and remediation of contaminated soils is a separate, but related, project that will be addressed by DTSC in the future as additional analytical data regarding the extent of soil contamination becomes available and evaluated. Additional environmental review for soil remediation activities will be conducted in compliance with CEQA prior

to a soil remedy decision similar to the manner addressed for groundwater. Information regarding the soil investigation and potential remediation techniques are described herein in order to evaluate the potential cumulative impacts.

Identification and investigation of areas where soil may have been affected by the compressor station operations began in 1987. The location of identified solid waste management units (SWMUs) and areas of concern (AOCs) at the compressor station are shown in Exhibits 4.5-6 and 4.5-7, and a description of each of the SWMUs and AOCs to be further investigated is provided in Section 4.5.1.5.

Recently, additional areas of potential historical waste handling were identified through interviews with former employees or were directly observed through field investigations. Some of these areas are identified in PG&E's January 29, 2010, response letter to DTSC's inquiry of past waste burning activities (PG&E 2010). These areas of potential concern, as well as other areas discovered during the site investigation, will be evaluated and added to a future addendum of the 2007 Resource Conservation and Recovery Act (RCRA) facility investigation/remedial investigation (RFI/RI) report.

Since 1987, a number of characterization and remediation activities have been completed or are currently ongoing at the identified SWMUs/AOCs:

- *Past and Planned Soil Characterization*. Investigations to characterize the concentrations and distribution of the COPCs were performed from 1988 to 2003 and during autumn 2008. Data from these investigations and during soil cleanup activities described below are being compiled and evaluated. Additional investigations to supplement these past investigations are anticipated to continue.

- *Past and Current Soil Cleanup Activities*. Past remediation activities have included excavation and off-site disposal of soil, debris, and construction/building materials at a number of the identified SWMUs and AOCs (CH2M HILL 2007). These activities included limited soil cleanup from 1988 to 1990 associated with the closure activities at several former hazardous waste treatment units (SWMUs 5, 6, 7, 8, 9, AOC 18, and Units 4.3, 4.4, and 4.5); in 1993 associated with the closure activities at SWMU 10; in 1995–1996 associated with the closure activities of Former 300B Pipeline Tank; and remediation of stained soil, debris, and construction/building materials at AOC 5, AOC 6, AOC 9, AOC 14 and AOC 19 from 1990 to 2002. PG&E is currently also implementing an interim remediation effort at AOC 4 consisting of excavation and off-site disposal of contaminated fill and waste debris through a Time Critical Removal Action as required by the U.S. Department of Interior (CH2M Hill et al. 2009). Following completion of the interim remediation effort, AOC 4 data will be combined with data from past investigations and evaluated to determine whether additional investigation or remediation is necessary at that location.

Potential contaminants identified in soils at and near the compressor station to date include total petroleum hydrocarbons, polycyclic aromatic hydrocarbons, other semivolatile organic compounds, volatile organic compounds, and metals, including Cr(VI) and total chromium [Cr (T)] (see Section 4.5, "Geology and Soils," for a discussion of all known AOCs and SWMUs). Dioxins were also identified as contaminants in soil at AOC 4.

Investigation and cleanup of contaminated soils associated with the long-term operation of the compressor station is being conducted under both RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act. Soils in the project area are known to have been contaminated through the wastewater discharge directly to Bat Cave Wash (AOC-1) starting in 1951 and through the use of percolation beds (SWMU-1) from 1964 to 1970. The contaminant associated with the former percolation beds is mainly chromium, as Cr(VI) and Cr(T). In addition, soil may have been contaminated through spills and leaks of cooling water and other fluids at the compressor station. Additional data regarding the extent and type of contamination will be collected to assess these other AOCs and SWMUs to complete Volume 3 of the RFI/RI. Currently, it is anticipated that Volume 3 of the RFI/RI will be completed in 2013.

The characterization of each SWMU/AOC required to prepare the RFI/RI is not complete at this time; therefore, the subsequent risk assessment necessary for the determination of remedial action objectives and the identification of potential remedial alternatives for the final preferred soil remediation or technology or method, or combination of technologies, to address the different contaminants and conditions at locations with soil contamination have not yet been decided. However, planning for final remedial action for soils is proceeding in a manner consistent with the planning for the final remedial action for groundwater, only on a different schedule. DTSC, however, does not anticipate that remedial action will be necessary for groundwater contamination to trigger remedial action for soil contamination. Groundwater remediation facilities in areas of soil contamination (e.g., construction of pipelines or utilities within Bat Cave Wash or within the compressor station or construction of remediation or monitoring wells south of the railroad tracks) will be designed and constructed to protect the integrity of the groundwater remedial structures in the event of possible future soil remediation, as well as to ensure access to the areas of possible future soil remediation.

Such division of remedial activities at the Topock site is common at remediation sites. Clean up of the groundwater is considered a priority because of the proximity of the Cr(VI) groundwater plume to the Colorado River and the degradation of the water within a beneficial groundwater basin at the Topock site.

Potential Remediation Methods and Technologies

Cleanup of chemicals of concern in soils at and around the Topock site can be accomplished using a variety of remediation methods and technologies. In consideration of the multiple separate SWMUs and AOCs with varying historical uses, different potential contaminants, and variation in the extent of soil contamination (notably depth below the ground surface), soil remediation may require multiple methods or technologies, and the remedial technology or combination of technologies may not be the same at each SWMU/AOC. However, based on the factors mentioned above, the remedial methods/technologies that are likely to be most appropriate for cleanup of soil are assumed to consist of the following:

- excavation and off-site disposal,
- excavation and on-site treatment,
- soil flushing,
- solidification/stabilization,
- in situ chemical reduction,
- capping, and
- institutional controls.

The following sections describe each of these potential soil remediation methods/technologies and the estimated range of scenarios for each.

Excavation and Off-Site Disposal

Overview of Excavation and Off-Site Disposal

Excavation and off-site disposal involves the physical removal of contaminated soil from the source area and transportation of the soil to an approved and permitted disposal site (landfill), treatment facility, or recycling facility. Contaminants and their concentrations in the soil will determine the disposal requirements, and which landfills and/or treatment or recycling facilities are permitted for final treatment, disposal, or reuse of the soil.

Equipment used for excavation may include backhoes, dozers and loaders, excavators, scrapers, haulers, graders, screw augers, and other equipment. The excavated soil is typically staged for loading, prior to being loaded into haul vehicles for transport to the off-site treatment, recycling or disposal facility. If chemical concentrations in the excavated soil exceed established acceptance limits for off-site facilities, some soil treatment may be required before disposal. Treatment may be performed at the off-site facility or on-site (see on-site soil treatment technologies below). If soil concentrations are known and on-site treatment is not required, excavated soil can be

directly loaded into the haul vehicle. Prior to transport, the haul vehicle is prepared, which may include placing a plastic liner in the bed of the haul vehicle before loading and covering the loaded bed to prevent dust emissions. Clean soil or other appropriate fill material is transported to and placed in the excavation locations to establish final ground surface topography, and appropriate surface materials are placed to support future land use.

Implementation of Excavation and Off-Site Disposal

The method of soil excavation will depend upon several factors, and these factors may vary among the SWMUs/AOCs. These factors include the area for excavation, the depth of contaminated soil, the surface topography, proximity and types of in-place structures, land uses during the construction period, available area for excavated soil staging and loading onto the haul vehicles, requirements for maintaining excavation side wall stability, site access for excavation equipment and the haul vehicles, and field support requirements to safely perform the field operations and confirm, through sampling and field observations, that the removal of the contaminated soil has met the remedial criteria. To the extent practicable, excavated soils requiring off-site treatment, recycling or disposal is stockpiled, transferred to bins, and/or separated from soils suitable for reuse as backfill. Chemical analysis may be performed to evaluate whether the excavated soil is contaminated and to appropriately characterize the soils for off-site treatment, recycling, or disposal. Depending on contaminant concentration levels, all excavated soils may not be transported for off-site treatment, recycling, or disposal, but may be temporarily stored for reuse at the site.

Following completion of the excavation, clean soil or other appropriate backfill material is transported to and placed in each excavation. The backfill materials may be transported to the site from an off-site or on-site source. The backfill material is compacted to establish final ground surface topography. Depending on the location and future land use, site restoration may include establishing vegetation; erosion and drainage control; and/or placement of concrete, asphalt or other suitable building material.

Implementation of excavation and off-site disposal may include constructing access roads and staging areas; managing waste, soils, and materials; and controlling traffic and health, safety, and security.

Excavation and off-site disposal is intended to meet the objectives of the remedial actions immediately after construction, so that no operation and maintenance period would exist for the materials remaining on-site (operation and maintenance would likely be required at the off-site permitted facility).

Excavation and On-Site Treatment

This technology involves excavation of contaminated soil and treatment of the excavated soil, typically within the area of contamination at the site, rather than at an off-site treatment facility. Different treatment methods may be considered depending on the type of contaminants present.

Overview of Excavation and On-Site Treatment

For this technology, excavation is performed as described for the excavation and off-site disposal component, with the excavated soil transported as necessary to the on-site treatment area. Soil treatment depends on the contaminant(s) present and the contaminant(s) concentration. Possible treatment methods for different types of contaminants include:

- petroleum hydrocarbons and other organic compounds—soil (i.e., compost-like) piles for biodegradable organic compounds and soil washing,
- metals (including chromium)—soil washing, and
- hexavalent chromium—chemical reduction.

An on-site area with suitable physical conditions (notably flat topography and good access) and sufficient area is needed for the on-site treatment. Sufficient area is required for the storage and handling of both the untreated and treated soil, equipment for the soil treatment process(es), and management of any residual products from the treatment. A description of potential on-site technologies for soil treatment is provided below.

Soil Piles: Soil piles are an ex situ treatment method that have typically been applied for the biotreatment of contaminated soil, notably soil containing hydrocarbon.

Soil Washing: Soil washing is an ex situ process that uses liquids (usually water and sometimes water with chemical additives) and a mechanical scrubbing process to separate contaminants from soil. The scrubbing combined with physical and chemical processes removes contaminants from the soil and concentrates contaminants into a smaller volume of treatment residue. This residue stream can be further treated on-site or transported to an off-site treatment, recycling, or disposal facility.

Chemical Reduction: Chemical reduction is an ex situ technology for treating oxidized contaminants, such as materials containing Cr(VI), that involves the addition of a chemical reducing compound to the soil to enhance a chemical oxidation–reduction reaction and reduce the contaminant forming a less hazardous, less mobile, or inert compound, such as the reduction of Cr(VI) to Cr(III) and/or other inorganic or organic compounds subject to reduction.

Implementation of Excavation and On-Site Treatment

Excavation: The implementation method for excavation will essentially be the same as previously described for excavation and off-site disposal component. Excavated soil is transported to the on-site location for ex situ treatment.

On-Site Treatment: One treatment method or a combination of methods may be used for the on-site treatment of soils, with the method(s) determined by the chemical contamination in the soil, as well as the treatment requirements. Implementation considerations for the different on-site treatment approaches are described below.

Soil Piles—The excavated soils will typically be placed over a low permeability liner to minimize the possibility of contaminants leaching below ground surface. The excavated soils would be mixed with additives (e.g., water, bulking agents, nutrients, chemicals) and then placed in aboveground treatment cells. The soil piles would likely be covered to prevent dust emissions and erosion from rain events and to minimize moisture loss. To maintain suitable conditions for biotreatment and in consideration of the climatic conditions at the site, the completed soil pile would also likely need an irrigation system to add water to the pile. Except for the initial mixing of additives to the soil and subsequent addition of water as necessary, soil piles are a passive treatment approach. Chemicals, such as a reducing agent, can be included with the water addition.

Soil Washing—The excavated soils will typically be placed over a low permeability liner to minimize the possibility of contaminants leaching below ground surface. Before washing, the soil undergoes particle size separation to remove oversized material (coarser sand and gravel particles) and to concentrate the contaminants, because most contaminants are associated with soil particles with a finer grain. Oversize materials and other materials not suitable to soil washing are separated out and are assumed to be managed similar to excavated soils in the excavation and off-site disposal component. Besides water, the washwater generated from the soil washing process can include additives that enhance the separation of contaminant(s) from the soil. Depending on the contaminant(s), additives may include acids, bases, surfactants, solvents, chelating agents, and/or sequestering agents. The wash water from soil washing may be treated on-site and recycled back to the soil washing process.

The typical components associated with soil washing are:

- soil screening and separation of oversized particles,
- soil scrubbing/washing,

- separation of treated soils from wash water,
- wash water treatment, and
- management of treated soil (drying followed by replacement at the site as clean backfill).

Chemical Reduction—The chemical reduction process typically comprises the following steps:

- Contaminated soil is excavated and screened to separate oversized material and other material not suitable for chemical reduction.

- Reducing chemicals, in aqueous or gaseous form, are added to the soil and the soil and reducing chemicals are mixed in a reactor.

- The reagent/soil mixture is transferred to a separator, where excess reagent is removed and recycled back into the reactor. The treated soil is washed and the chemical sludge separated from the soil. The treated soil and chemical sludge are separately dewatered.

- Water from the soil washing process is recycled back to the soils washer. The dewatered chemical sludge is combined with the oversized material for disposal.

Requirements for chemical reduction are similar to those described for soil washing.

Backfill: Following on-site treatment, the soil is expected to be transported to and replaced in the area of excavation, if appropriate. The backfill soil is compacted to establish final ground surface topography. Soil that is not suitable for backfill would be managed on-site or transported off-site to an appropriate disposal or recycling facility as described for the excavation and off-site disposal component.

The implementation of ex situ treatment at the on-site location may include constructing access roads and staging areas; managing waste, soils, and materials; and controlling traffic and health, safety, and security.

Ex situ treatment in an on-site location is intended to meet the remedial action objectives immediately after construction, so that no operation and maintenance period would exist for the materials remaining on-site. Depending on the location and future land use, additional material may be placed at the surface such as a vegetation layer of asphalt/concrete, and site restoration may include establishing vegetation, placement of concrete/asphalt or other suitable building material, and/or erosion and drainage control.

Soil Flushing

Overview of Soil Flushing

Soil flushing is an in situ treatment technology that is commonly used in combination with a groundwater remedial technology. The soil flushing process involves infiltrating water, with or without additives (such as surfactants), through contaminated soils to flush (in situ wash) contaminants from the soil into the underlying groundwater for collection by downgradient wells that are extracting groundwater and/or for treatment within downgradient in situ treatment zones for groundwater. Additives are typically surfactant compounds that enhance the solubility of the contaminants and improve the efficiency of the flushing process.

Soil flushing is typically coupled with groundwater treatment to allow contaminants flushed from soil to be addressed by the groundwater remediation system(s).

Infiltrated water with additives and desorbed contaminants that are flushed into the underlying groundwater may need treatment to meet the objectives of the groundwater remedial action. Water used for infiltration in the soil flushing may be from an off-site or an on-site source.

The primary requirement for soil flushing is that groundwater can be captured, extracted, and treated or that the groundwater can be treated in situ to meet the objectives of the groundwater remedial action. Other considerations may include the efficiency of the flushing solution to contact the targeted subsurface soil, washing of the contaminants beyond the target area of the groundwater remediation system, and/or the introduction of surfactants to the subsurface. In addition, soil flushing could reduce soil porosity.

Implementation of Soil Flushing

The application of soil flushing may be suited to localized areas with contaminants that are soluble in water and present above cleanup levels in vadose zone soils. The flushing process would mobilize and induce vertical migration of contaminants to groundwater. The contaminants are later addressed through the groundwater remediation system.

Implementation would be constrained to those areas that are underlain by permeable soils to allow for percolation of the flushing solution applied to flush the contaminants The flushing solution would be applied either by flooding the surface of the area to be treated or by injection through trenches, infiltration galleries, or injection wells. The delivery method is based on factors such as soil properties, soil heterogeneity, depth, and extent of contaminant, and physical conditions at the area to be treated. The areas selected for soil flushing would also have to be accessible for installation of the flushing solution application method and for the flushing solution delivery via piping or tanker truck. Preparation for application of soil flushing may include removing surface vegetation, removing concrete/asphalt pavement, and/or grading to control drainage.

For flooding, containment berms may need to be constructed to control application.

For trench, infiltration gallery, and injection well applications, the areal extent, and depth occurrence of the contaminant and the radial influence of the treatment are the factors in determining the number and extent of the flushing solution delivery. For those treatment areas requiring installation of trenches or infiltration galleries, the area would need to be accessible to equipment such as a backhoes or tracked excavators. The soils removed from the excavation for the trenches or infiltration galleries would be segregated and contained in bins or stockpiles. The trenches or infiltration galleries would be constructed with perforated piping to allow for controlled release of the flushing fluid. The trenches would typically be backfilled with a uniform gravel and potentially covered with the excavated soils or imported soils. Any remaining soils not backfilled would be managed as described for the excavation and off-site disposal component.

The areas for construction of injection wells, if selected, would need to be accessible to drilling equipment for installation of injection points within a gridded network. Soil cuttings generated during installation of injection wells would be contained in roll-off bins or stockpiles and characterized for off-site treatment, recycling, or disposal and/or reuse on-site.

The implementation of soil flushing may include constructing access roads and staging areas; managing waste, soils and materials; and controlling traffic and health, safety, and security.

Following the construction of the flushing solution delivery systems, an operations and maintenance period is anticipated to meet the remedial action objectives. Following attainment of remedial action objectives, a verification period would likely take place, followed by decommissioning of well, piping, tanks, and other treatment equipment. Depending on the location and future land use, site restoration may include establishing vegetation; erosion and drainage control; or placement of concrete, asphalt, or other suitable building material.

Solidification/Stabilization

Overview of Solidification and Stabilization

Solidification/stabilization reduces mobility of contaminants in the environment through both physical and chemical means. Solidification generally refers to a physical process where a semisolid material such as soil is treated, resulting in a solid matrix with greater compressive strength, lower permeability, and the encapsulation of contaminants. Stabilization typically refers to a chemical process that actually binds the matrix of the contaminant such that its constituents are immobilized. Both processes tend to trap or immobilize contaminants within their "host" medium. Typical binding/stabilizing agents include Portland cement, pozzolanic binders (a siliceous or aluminosiliceous material, which form a cementlike solid when combined with materials containing calcium hydroxide), and various kiln dusts. Most of these materials are highly alkaline and form a solidified matrix when mixed with the contaminated soil. Leachability testing is typically performed to measure the degree that the contaminant is immobilized following treatment.

Solidification and stabilization can be performed in situ or ex situ. The ex situ method involves excavation and staging of the soil, screening to remove larger diameter material or other material not suitable to the solidification/stabilization treatment, blending binding agents and water with the excavated soil, and stockpiling treated soil for testing prior to off-site disposal or placement back in the excavation. The in situ method involves injection or mixing of stabilizing agents into soils, addition of water if necessary, and in-place mixing with equipment such as the bucket of a backhoe or track hoe to thoroughly mix and stabilize the soils in place.

The solidification/stabilization process may require laboratory and field treatability studies prior to its full-scale implementation. These studies are used to define the appropriate concentration of the binding/stabilizing agents; the effectiveness of the solidification/stabilization in binding the contaminants, especially for soils with multiple constituents of concern; mixing requirements to achieve the desired contaminant immobility, which is a key consideration in performing the solidification/stabilization in situ or ex situ; and other field implementation requirements and/or limitations, especially for in situ applications.

In situ solidification/stabilization or ex situ solidification/stabilization that is returned to the excavated area may not be suitable for all future land uses. Depending on future land use, additional material may be placed at the surface, such as part of site restoration as a vegetation layer or asphalt/concrete.

Implementation of Solidification and Stabilization

Ex Situ: For the ex situ implementation of solidification/stabilization, many implementation aspects for excavation and on-site treatment previously described are applicable. Solidification/stabilization of the excavated soil would typically occur at a central area; therefore, the excavation and transport of the contaminated soil, as well as the central treatment area requirements, would be consistent to those previously described for the excavation and on-site treatment component. In addition, soil screening may be performed to remove oversized material or other material not suitable to the solidification/stabilization treatment.

The excavated soils would be mixed with binding/stabilizing agents and then an appropriately constructed area treatment cell to allow sufficient time for the reaction of the agents with the soil. The type of binding/stabilizing agent(s) will depend on the chemical(s) present in the contaminated soil. Depending on the desired degree of mixing, the method of mixing could range from using the bucket of an excavator to processing the soil through a pug mill (i.e., a machine in which materials such as soil are simultaneously ground and mixed with a liquid). Following the mixing, the processed soil would be covered as necessary to control erosion and dust emissions in the staging area. Backfilling the original excavations with the treated soil is similar to that described for the excavation and off-site disposal component.

In Situ: For the in situ implementation of solidification/stabilization, the depth of contaminated soil, along with the chemical contaminants present, are key factors. Preparation for in situ application may include removing

surface vegetation, removing concrete/asphalt pavement, and/or grading to control drainage. If the extent of contaminated soil is shallow, the bucket of the excavator can be used to mix the solidification/stabilization agent(s) with the soil. For deeper depths of contaminated soil, soil augers or other equipment may be used. Augers have a hollow stem shaft with a single flight auger. As the auger penetrates the soil, a slurried reagent is pumped through the hollow shaft and injected into the soil by means of jets located on the auger flight. As the auger moves to the bottom of the treatment zone, a vertical column of solidified/stabilized soil is created. Overlapping of adjacent columns is used to ensure complete mixing of affected soil with the solidified/stabilized agent.

Implementation of solidification/stabilization may include constructing access roads and staging areas; managing waste, soils, and materials; and controlling traffic and health, safety, and security.

Solidification/stabilization is intended to meet the remedial action objectives immediately after construction, so that no operation and maintenance period would exist for the materials remaining on-site. Soil treated by in situ solidification/stabilization or ex situ solidification/stabilization that is returned to the excavated area may not be suitable for all future land uses. Depending on location and future land use, additional material may be placed at the surface, such as a vegetation layer or asphalt/concrete, and site restoration may include establishing vegetation, placing concrete/asphalt or other suitable building material, and/or controlling erosion and drainage. Any treated soil not backfilled will be managed similarly to excavated soils in the excavation and off-site disposal component.

In Situ Chemical Reduction

Overview of In situ Chemical Reduction

In situ chemical reduction applies to Cr(VI) or other oxidized chemicals that, when reduced, have a much lower potential environmental and/or human health risk. Application of this technology involves the addition of reagents to react with targeted constituents in soil resulting in a chemical reaction that reduces oxidation. This reaction converts hazardous contaminants to compounds that are nonhazardous or less toxic and more stable, less mobile, and/or inert.

Reductants can be introduced in either liquid or gaseous form. When using liquid reductants, this process would be similar to soil flushing described above except that only a fraction of the contaminant would be flushed to the groundwater. Much of the contaminant would be reduced by contact with the reductant within the unsaturated zone. In situ reduction using gaseous injection would involve injecting a gaseous reductant, such as sulfur dioxide or methane, into a network of wells.

Implementation of In-Situ Chemical Reduction

In situ chemical reduction applications may be suited to localized areas with contaminants subject to reduction at concentrations in vadose zone soils above cleanup levels. The in situ chemical reduction process treats the contaminant in place and reduces the contaminant mass through redox reactions to convert the contaminant to a less hazardous, less mobile, or inert compound. Whether added in liquid or gaseous form, a key condition for successful application of this technology is the ability to achieve uniform distribution of the reductant through the soil zones affected by the target contaminants.

Implementation of in situ chemical reduction would be constrained to those areas that are underlain by permeable soils to allow for the solution to percolate and be distributed to the soils with the contaminants. The liquid phase solution would be applied either by flooding the surface of the area to be treated or by injection through trenches, infiltration galleries, or injection wells as previously described for the soil flushing application. Preparation of the surface may include removing surface vegetation, removing concrete/asphalt pavement, and/or grading to control drainage.

A gas-phase application is typically used in injection wells to deliver reductant to the contaminated soils. The delivery method and injection well network are based on factors such as soil properties, soil heterogeneity, depth, and extent of contaminant. A well network may be needed to enhance distribution of the gaseous reductant throughout the zone of contaminated soil. This network could include wells for injection of gaseous reductant and extraction of soil vapor, with the extraction well operating under vacuum to induce the movement of gaseous reductant through the subsurface soil. Extraction would continue until the gaseous reductant in the soil vapor is detected at the extraction well.

The areas selected for in situ chemical reduction would also have to be accessible for installation of the solution application method and for the treatment solution or gas delivery via piping or tanker truck.

For flooding, construction of containment berms may be needed to control application.

For trench, infiltration gallery, and injection well applications, the areal extent and depth occurrence of the contaminant and the radial influence of the treatment are the factors in determining the number and extent of the flushing solution delivery. For those treatment areas requiring installation of trenches or infiltration galleries, the area would need to be accessible to equipment such as a backhoes or tracked excavators in order to install trenches or infiltration galleries. The soils removed from the excavation for the trenches or infiltration galleries would be segregated and contained in bins or stockpiles. The trenches or infiltration galleries would be constructed with piping perforated to allow for controlled release of the flushing fluid. The trenches would be backfilled typically with a uniform gravel and potentially covered with the excavated soils or imported soils. Any remaining soils not backfilled would be managed as described for the excavation and off-site disposal component.

Implementation of in situ chemical reduction may include constructing access roads and staging areas; managing waste, soils and materials; and controlling traffic and health, safety, and security.

Following the construction of the in situ chemical reduction system, an operations and maintenance period is necessary to attain the remedial action objectives, followed by a verification period and decommissioning of well, piping, tanks and other treatment equipment. Depending on the location and future land use, site restoration may include establishing vegetation; erosion and drainage control; and placement of concrete, asphalt, or other suitable building material.

Capping

Overview of Capping

Capping involves the construction of an engineered cover or a capping system on top of the contaminated soil area to contain and minimize exposure of the soil contaminants to the environment and to humans. A capping system may consist of liners and covers or only a cover system. If the soil contamination is not deep and control of leachate and/or downward migration is an objective of the remediation, liners can be installed on the bottom and sides using natural (low permeability soil or clay) and/or synthetic barriers to prevent liquids and waste from migrating into underlying soils. Engineered covers, constructed of synthetic membrane liners, low permeability soils, and/or concrete, asphalt, or other building materials are installed on top of the contaminated soil area to keep water (surface water or precipitation) from infiltrating the contaminated soil while maintaining a protective cover to secure the materials in place and prevent humans or burrowing animals from contacting the contaminated soil. If infiltration is not of concern, the cover can be constructed of permeable materials of sufficient depth to prevent contact between potential receptors and contaminated soil.

Construction of a cap does not reduce toxicity, mobility, or volume of contaminated soil, but the cap does mitigate migration and direct exposure to human and ecological receptors. The effective life of the capping system can be extended by long-term inspection and maintenance. In addition, precautions must be taken to ensure that the integrity of the cap is not compromised by current or future land use activities. Therefore this technology is assumed to include long-term management and institutional controls to supplement the remedial technology.

Implementation of Capping

Prior to installing an engineered cover, the surface of the area to be capped may be contoured to enhance positive runoff drainage. This surface contouring may extend beyond the area to be capped to divert surface runoff away from areas being capped, which enhances the long-term integrity of the cap and/or to more effectively keeps the contaminated soil from percolating water. A layer of coarse sand or engineered drainage layer may be placed over the cover to collect and transport the water off the surface of the cover. A protective soil layer may be added to protect the underlying cover components and support vegetative growth. In developed areas, bedding material such as sand may be placed over the contaminated soil, and surface material such as concrete or asphalt placed over the bedding material.

For those areas requiring installation of a cap, the area would need to be accessible to construction equipment such as backhoes, dozers and loaders, scrapers, haulers, excavators, graders or other equipment in order to prepare the surface and for placement of the cap materials. The area of a cap depends on the footprint of the area to be capped and possible surrounding surface contouring. Soils removed for the installation of the cap would typically be segregated and managed as described in the excavation and off-site disposal component.

Capping material (such as low-permeability soils) from an off-site location may be transported to the site. Alternatively, capping material from an on-site source, if deemed appropriate, may be used. Analytical testing (geotechnical and/or chemical) may be performed on the source of the capping materials to assess suitability. If appropriate to enhance the long-term integrity of the cap, additives may also be added to the capping material to enhance soil binding. If a synthetic material were used such as a high-density polyethylene (HDPE) cover, rolls of HDPE sheets would be placed and welded together to provide a low permeability cover material that would then typically be covered with a soil layer. Soil would be compacted for stability and to establish final ground surface topography. Depending on the location and future land use, site restoration may include establishing vegetation at the surface.

In lieu of soils for capping material, pavement (asphaltic concrete or concrete) may be applicable for some areas, such as at the compressor station. Standard construction practices associated with pavement installation are anticipated to be used for any area being paved for purposes of installing a cap. Soils removed for placement of the pavement would be managed as described in the excavation and off-site disposal component.

Implementation of capping may include constructing access roads and staging areas; managing waste, soils and materials; and controlling traffic and health, safety, and security.

Capping does not reduce toxicity, mobility, or volume of contaminated soil; therefore, periodic inspections are needed to confirm the integrity of the installed caps. Based on findings from these inspections, maintenance activities may be needed to restore the integrity of the cap and/or make modifications to surface water drainage patterns to protect the cap integrity. Cap maintenance activities may extend from minor patch work of the soil or pavement cap to replacement of the installed cap with a new cap. An institutional control would be implemented during the operation and maintenance period to prevent disturbance of the cap system by future site activities.

Institutional Controls

Land use controls or other forms of institutional controls are expected be incorporated into the remedial alternative development. Controls are likely to include restrictions on residential or other sensitive uses, restrictions on the use of groundwater and development of water supplies, and access restrictions such as road closures or vehicular barriers.

AOC 4—Debris Ravine (1E)

On June 24, 2009, the U.S. Department of the Interior (DOI) issued an action memorandum entitled “Request for Time-Critical Removal Action Number 4 at AOC 4 Debris Ravine, Pacific Gas and Electric Topock Compressor Station.” This action memorandum directs PG&E to stabilize and mitigate the threat of release of contaminated

material at AOC 4, which is comprised of the area known as the Debris Ravine. The Debris Ravine is a narrow, steep-sided arroyo that drains into Bat Cave Wash at the southwest corner of the facility. Most of AOC 4 is on PG&E property and outside of the facility fenceline; however, it extends to the west onto Havasu National Wildlife Refuge property.

Historical operations in this area are not well documented; however, over the years some 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. Prior to June 2009, 69 soil samples were collected at AOC 4. This sampling has indicated the presence of 18 constituents with maximum concentrations that exceed recognized human health and/or ecological health soil screening levels. Of particular note were Cr(VI) at 42 times the Industrial California Human Health Screening Levels (CHHSL), lead at three times the Industrial CHHSL, and polyaromatic hydrocarbons at 92 times the Industrial CHHSL. Additional data was collected pursuant to the June 29th DOI action memorandum that included additional soil samples, an asbestos survey, a survey of surface soils using a field X-ray fluorescence analyzer, and geotechnical borings.

In response to the June 29th DOI action memorandum and additional data collection conducted at AOC 4, PG&E developed a work plan to stabilize and mitigate the threat of release of contaminated material at AOC 4. Work began in December 2009 and consisted of the removal of contaminated debris and fill material and disposal of these materials in a suitable landfill to stabilize and mitigate the threat of release. Removal of the contaminated debris and fill material consists primarily of mechanical excavation using standard-reach and long-reach excavators and hoisting and winching equipment, with some manual collection and excavation and vacuum excavation. The two primary areas targeted for removal are the western portion of the north slope of the ravine and a smaller area along the service road in the eastern portion of the AOC. Approximately 4,000 cubic yards would be removed from these two areas. Because full characterization of the AOC has not been completed, additional removal may be required. Material stockpiling and other support/staging areas are located on the compressor station site and on other approved nearby properties. Soil samples taken after removal of the materials will be collected to characterize soil conditions. Slope stabilization and erosion control measures will also be implemented following removal of the materials. The removal action is scheduled to be complete in the summer of 2010.

Upland In Situ Pilot Test, Aquifer Testing, Groundwater Well Maintenance and Well Decommissioning (1F)

PG&E submitted three work plans to DTSC: (1) In situ Hexavalent Chromium Reduction Pilot Test Work Plan—Upland Plume Treatment, (2) Work Plan for Hydraulic Testing Bedrock Wells, and (3) Well PGE-6 Revised Decommissioning Work Plan. The purpose of the pilot test was to evaluate the feasibility and effectiveness of using an in situ technology to reduce hexavalent chromium in groundwater to the less soluble trivalent form directly within the subsurface. The aquifer tests provided additional information on the migration of contaminated within the project area. The third work plan proposed decommissioning of a fourth well (PGE-6) at the site.

Site Work Plan for Additional Groundwater Characterization under the Colorado River (1G)

DTSC approved a Corrective Action Work Plan that authorized the drilling of up to four slant boreholes from the California shoreline of the Colorado River. Following the drilling and testing of the boreholes, six groundwater monitoring wells were constructed in the boreholes. The project provided measurable data with respect to the location of the southern boundary of the existing hexavalent chromium groundwater plume at the project site, and to confirm the effectiveness of an interim measure (i.e., IM-3) being implemented to control the hydraulic gradient of the groundwater plume away from the Colorado River.

In Situ Hexavalent Chromium Reduction Pilot Test Work Plan (1H)

PG&E requested DTSC approval of an in situ pilot study work plan that describes field activities for pilot tests to be conducted to evaluate in situ technologies to reduce hexavalent chromium to trivalent chromium in

groundwater in the Colorado River floodplain adjacent to the compressor station. The results of the pilot test were used to evaluate the effectiveness and persistence of selected in situ reductants under actual site conditions, provide additional information on site conditions necessary to determine the feasibility of in situ reduction of the Cr(VI) plume, and assist with the selection of preferred in situ reductant(s) for possible long-term site management.

Pore Water and Seepage Study Work Plan (1I)

PG&E requested DTSC approval of a pore water and seepage study. The purpose of the study was to assess chromium concentrations in pore water at multiple locations within the zone that has been historically down-gradient of the existing chromium plume observed in the floodplain and historically up-gradient of Bat Cave Wash, during the next seasonal low river stand. In addition, the study assessed whether the geotechnical conditions in shallow sediments below the Colorado River favor chromium reduction.

Installation of Conveyance Piping and Power Supply for Extraction Well PE-1 (1J)

PG&E's Extraction well PE-1 required water conveyance piping and electrical power supply. Extraction Well PE-1 is a component of the Corrective Action Work Plan addressing prevention of contaminated groundwater from entering the waters of the Colorado River.

Interim Measures 1 and 2 Emergency Groundwater Extraction and Management (1K)

PG& E initiated the pumping, transport, and disposal of groundwater from existing groundwater monitoring wells at the MW20 cluster at the compressor station. This immediate action was required to prevent and/or mitigate any possible future impacts to the Colorado River. Interim measures 1 and 2 were needed because sampling activities have indicated levels of Cr(VI) are higher than previously measured and action was needed to avoid further groundwater flow toward the Colorado River.

Interim Measure 3 Emergency Groundwater Extraction and Management (1L)

PG&E proposed operation of a groundwater remediation facility for implementation of IM-3 to address hydraulic control of contaminated groundwater and prevent contaminated groundwater from entering the Colorado River. The design flow of the treatment facility is 135 gallons per minute (gpm) with a maximum capacity of 150 gpm. Three Board Orders (Board Order No. R7-2004-0080, Board Order No. R7-2004-0103, and Board Order No. R7-2004-0100) were approved by the regional water quality control board addressing the remediation facility.

Currently, PG&E is implementing IM-3 at the Topock compressor station. IM-3 consists of groundwater extraction for hydraulic control of the groundwater plume boundaries in the Colorado River floodplain treatment of extracted groundwater and reinjection of treated water. Operation of the current groundwater treatment and injection system began in July 2005. The groundwater pumping, transport and disposal activities are considered an IM pursuant to Section IV.A of the Corrective Action Consent Agreement (CACA) entered into by PG&E and the California Environmental Protection Agency (Cal/EPA), and DTSC.

The purpose of the IM is to maintain hydraulic control of the groundwater plume boundaries until such time a final corrective action is in place at the site. As defined by DTSC, the performance standard for IM-3 is to "establish and maintain a net landward hydraulic gradient, both horizontally and vertically, that ensures that Cr[VI] concentrations at or greater than 20 micrograms per liter (µg/L) in the floodplain are contained for removal and treatment."

Currently, the IM facilities include a groundwater extraction system (four extraction wells TW-2D, TW-3D, TW-2S, and PE-1), conveyance piping, a groundwater treatment plant, and an injection well field for the discharge of the treated groundwater. Of the four extraction wells, two are currently in operation (TW-3D and PE-1). The groundwater treatment system is a continuous, multi-step process that involves reduction of Cr(VI) to the less

soluble trivalent form, Cr(III), precipitation and removal of precipitate solids by clarification and microfiltration, and lowering the naturally occurring total dissolved solids (TDS) using reverse osmosis. Treated groundwater is returned to the aquifer through an injection system consisting of two injection wells, IW-2 and IW-3. The existing groundwater extraction, treatment, and injection systems, collectively, are referred to IM-3.

East Ravine/TCS Hydrogeologic Characterization Program (1M)

DTSC approved a work plan that authorized the drilling wells at locations within East Ravine. Following the drilling and testing of the boreholes, groundwater monitoring wells were constructed in the boreholes and groundwater samples were analyzed. The project provided measurable data with respect to the location of the southeastern boundary of the existing Cr (VI) groundwater plume at the project site. A second phase of work is currently being planned that will include additional wells in East Ravine plus wells within the compressor station.

Arizona Drilling and Hydrogeologic Characterization Program (1N)

The federal agencies and Arizona Department of Environmental Quality (ADEQ) approved a work plan that authorized the drilling of wells at three locations in Arizona, including slant boreholes from the Arizona shoreline of the Colorado River. Following the drilling and testing of the boreholes, eight groundwater monitoring wells were constructed in the boreholes. The project provided measurable data with respect to the location of the eastern boundary of the existing Cr(VI) groundwater plume at the project site, and confirmed that a groundwater divide exists near the Colorado River (i.e., groundwater flows to the west in Arizona).

Pilot Study for well TW-1 on the Compressor Station (1O)

PG&E installed an extraction well near the compressor station to determine hydraulic influence of extraction to the Cr(VI) plume. The pilot study proposed the treatment, and reuse, and disposal of treated water from TW-1, all occurring within the compressor station property.

6.3.2.2 U.S. Bureau of Reclamation

Lower Colorado River Multi-Species Conservation Program (2A)

The Lower Colorado River Multi-Species Conservation Program (MSCP) is a long-term multiagency effort to conserve and work toward the recovery of endangered species, and protect and maintain wildlife habitat on the Lower Colorado River. This project was completed in 2005 and is currently being implemented as a 50-year plan to create more than 8,100 acres of riparian, marsh, and backwater habitat for four listed species and 16 other species native to the Lower Colorado River. The program extends along the Lower Colorado River from Lake Mead to the U.S.-Mexico Southerly International Border and includes the full pool elevations of Lakes Mead, Mohave, and Havasu and the historic floodplain of the river. This program is currently being implemented and includes the reach of the Colorado River that is located just east of the compressor station.

Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (2B)

Starting in 2005, Reclamation developed additional strategies for improving coordinated management of the reservoirs of the Colorado River system. Reclamation initiated a public process to develop and adopt interim operational guidelines that can be used to address the operations of Lake Powell and Lake Mead during drought and low reservoir conditions.

Each year, the Secretary of the Interior is required to declare the Colorado River water supply availability conditions for the Lower Basin States in terms of Normal, Surplus, or Shortage. While regulations and operations criteria have been developed for Normal and Surplus conditions, detailed guidelines for a water supply shortage had not established. The development of these guidelines was spurred by the current multiyear drought,

decreasing system storage, and growing demands for Colorado River water. Reclamation prepared an EIS to analyze and consider tradeoffs between the frequency and magnitude of shortages and to describe potential effects on water shortages in Lake Powell and Lake Mead and on water supplies, power production, recreation and other environmental resources in the Lower Colorado River. The record of decision was signed December 2007.

U.S. Bureau of Reclamation Quarry Operations (2C)

In 2007, Reclamation prepared an environmental assessment/finding of no significant impact to evaluate the use of nine operating quarry sites, the reopening of five previously used quarry sites, and the establishment of two new quarry sites to provide materials for use along the Lower Colorado River. The materials would be used for maintenance and construction of banklines, river control structures, levees, canals, and reservoirs. One of the existing quarry sites evaluated is known as Bat Cave No. 1. This site is an existing and active 40-acre site located less than a mile southwest of the compressor station.

6.3.2.3 U.S. Fish and Wildlife Service

Lower Colorado River National Wildlife Refuges Comprehensive Management Plan (1994-2014) (3A)

The USFWS, in cooperation with Reclamation prepared a comprehensive management plan (CMP) for the four National Wildlife Refuges that are located along the Lower Colorado River. This includes Havasu National Wildlife Refuge, which is located along the Colorado River and is adjacent to the compressor station. This planning effort integrated three perspectives to result in a holistic management approach for the Lower Colorado River refuges over the 20-year planning period. The plan includes a:

- broad perspective for the Area of Ecological Concerns,
- narrower perspective for refuge-related policy issues that affect the four refuges, and
- focused perspective for management-related activities and strategies that affect defined management units and subunits.

Topock Marsh Water Infrastructure Improvement Project on the Havasu National Wildlife Refuge (3B)

The USFWS plans to replace and rehabilitate approximately 63 acres of the HNWR's main delivery system for the Topock Marsh Unit of the Refuge. The project is located within the historic floodplain of the Colorado River, with a small portion on BLM land. Reclamation is acting as a cooperating agency under NEPA for this project. This project would improve the HNWR's capacity to control delivery of water to the Topock Marsh Unit, with environmental benefit to at least 4,000 acres of refuge land. The project consists of the following components: fire break canal, fire break canal water diversion structure, fire break canal terminus water control structure, farm ditch water diversion structure, and Topock inlet canal (internal water control structure).

6.3.2.4 Arizona Department of Transportation

Needle Mountain Rest Area Improvements (Interstate 40) (4A)

The Arizona Department of Transportation (ADOT) has identified a project that is currently programmed for construction as part of ADOT's 5-year construction program (2008–2012). This project consists of improvements to ADOT's existing Needle Mountain Rest Area on Interstate 40 (I-40) at Milepost 3, approximately 3 miles from the California/Arizona state line.

State Route 95 Passing Lanes (4B)

ADOT has programmed a passing lane/climbing lane project on State Route 95 between I-40 and Lake Havasu City. This project would be constructed as part of ADOT's 5-year plan (2008-2012). The lanes would be constructed in the vicinity of Milepost 190.

6.3.2.5 SAN BERNARDINO COUNTY

Moabi Regional Park Improvements (5A)

In October 2008, San Bernardino County approved an expenditure of $588,020 for constructing improvements at Moabi Regional Park north of the compressor station. The improvements will include full utility hookups at the recreational vehicle campsites. The county is also constructing improvements to the existing sewer treatment facility at Moabi Regional Park and replacing existing structures in and around the main entrance including pavement, lane widening, and drainage.

Pirate Cove Resort (5B)

Pirate Cove Resort is a vacation resort that features waterfront cabins, a 300-slip marina, commercial and restaurant development (bar and grill), 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. The Pirate Cove Resort is located within the boundary of Moabi Regional Park at 100 Park Moabi Road, in Needles, California, and was opened to the public in May 2009. There are plans for expansion within the current concession lease that is managed by the BLM; however, the extent of the expansion is unknown at the time of the preparation of this DEIR.

6.3.2.6 CITY OF NEEDLES

Holiday Inn (6A)

The City of Needles has approved a Holiday Inn Express hotel. The Holiday Inn is proposed to be a 46,209 square foot building with three stories and is zoned as C3—Highway Commercial. This hotel building located at the northwest corner of U.S. Highway 95 and Victory Road and is likely to begin construction in spring or summer of 2010.

Solar Project (6B)

A solar energy project is currently in the planning phase. The solar energy project would provide 5 megawatts of power and would cover 80 acres of land. The exact location of the project has not been determined but would likely be located in the northern part of the city.

Social Security Building (6C)

The City of Needles has approved a Department of Social Security building. This office building is 6,596 square feet with one story and is zoned as C1—Neighborhood Commercial. The Social Security building is located at 1502 Bailey Avenue and has been constructed.

6.3.2.7 MOHAVE COUNTY

Topock Marina Improvements (7A)

Topock Marina is a 20-acre facility located along the Colorado River approximately one-half mile north of I-40. The marina owners are considering expanding their facilities to accommodate additional recreational vehicles

spaces. At the present time, no development plans have been submitted to the county, but county staff members are expecting to receive such plans at some point in the future.

Unnamed 80-acre Residential Subdivision (7B)

The county has received a preliminary plan for an 80-acre residential subdivision and wastewater treatment plant to the north of I-40 and approximately 2 miles from the California/Arizona state line. This project is on hold due to economic conditions and issues involving the availability of water.

Sterling (7C)

The Sterling project is a proposed master-planned community located north of I-40 approximately three miles from the California/Arizona state line. This project is approximately 10,000 acres in size. Mohave County approved the project in 1999; however, the project has not yet been implemented. At the present time, other potential uses of the land are under consideration, including using the site for a concentrated solar power generation facility.

6.3.2.8 LAKE HAVASU CITY

Airport Business Park (8A)

The Airport Business Park project is an approximately 80-acre light industrial business park development. The project has been approved by the City of Lake Havasu and the grading and infrastructure have been completed for phase 1 of the proposed project, which consists of approximately 19 acres. The remaining phases will have to be zoned before development activities can commence.

Auto Mall (8B)

The Auto Mall project is an approximately 37-acre commercial and retail auto mall development. The project has been approved by the City of Lake Havasu and two of the twelve parcels associated with the project have been constructed. One parcel houses a Toyota dealership and the other parcel houses two chain restaurants. Once completed, the project will consist of nine auto dealership parcels and three restaurant/retail parcels.

Shopping Mall (8C)

The Shopping Mall project is an approximately 200-acre commercial and retail shopping mall development. The project has been approved by the City of Lake Havasu and the grading and the majority of the project has been constructed. The anchor stores for the shopping mall include JC Penny's, Dillards, and Wal-Mart. All of the smaller commercial shops in the mall have been constructed but some are still vacant. The only portions that still need to be constructed are small out-parcels adjacent to the larger project.

6.3.2.9 U.S. BUREAU OF LAND MANAGEMENT

Cathodic Protection System (9A)

The Southern California Gas Company proposes to install a cathodic protection system, along approximately 235 feet of gas pipeline, to control corrosion of the pipeline. This protection system would be comprised of a 500-foot deep well anode bed that would connect to the pipeline with a buried underground anode wire, which would be connected to a small rectifier for the electrical current from an existing power pole.

6.4 ANALYSIS OF CUMULATIVE IMPACTS

The cumulative scenario under each environmental discipline differs depending upon the potential area of effect. For example, the cumulative conditions for regional air quality account for impacts within the entire Mojave Desert Air Basin (MDAB) because air quality impacts occur on a regional or basin-level scale, while the cumulative impacts for archaeology would be limited to a more local scale for ground-disturbing activities in the vicinity that could be affected by the cumulative projects. The cumulative setting, limitations and analysis for each discipline are discussed as appropriate below.

6.4.1 AESTHETICS

Potential effects to aesthetic conditions are primarily local- and community-level issues. Consideration of cumulative effects would take into account whether any of the effects of the proposed project would be viewed in combination with other projects that could affect or change the visual environment. In consideration of significant visual resources and vistas (I-40, Needles rock, Topock Maze, Chemehuevi Mountains, and the Colorado River) and the cumulative projects that are anticipated in the project area, the following projects are considered part of the cumulative setting: projects at the compressor station (1A, 1B, 1D, 1E, 1L, and 1M) and the projects along the Colorado River in San Bernardino and Mohave counties, which are the Moabi Regional Park Improvements (5A), the Pirate Cove Resort (5B), and the Topock Marina Improvements (7A).

When considering the improvements at the compressor station, the cumulative projects would generally involve activities that are typical at the compressor station from a visual perspective, including ongoing operations and maintenance, improvement and updates to existing facilities, and soils remediation and cleanup. In particular, future projects including major plant refurbishment activities, soil investigation and remediation activities, and work in Debris Ravine (AOC 4) have the potential to be visible. In addition, past projects including construction of the IM-3 Facility, are currently visible. Visibility would depend on the exact locations of the project footprints and the nature of any new structures and supporting infrastructure that may be constructed. However, from a visual and aesthetics perspective, these projects would not change the overall visual character of the project area. Viewers of the project area would likely not be able to discern when these activities were taking place or any visual difference as a result of these projects and activities. Thus, the proposed project would not result in any contribution to a significant visual effect when considering views to the compressor station property. This conclusion applies to views from I-40, to and from Needles rock, and to and from Chemehuevi Mountain. However, implementation of the proposed project would introduce a strong degree of contrast to the existing visual character of the floodplain and result in an impact to pedestrian viewers to and from the Topock Maze (Locus B). Thus, the contribution of those projects identified about would have a cumulative impact on views to and from the Topock Maze Locus B, and is considered potentially significant. **Mitigation Measure AES-1** includes design criteria for to ensure that mature floodplain vegetation is protected and revegetation of disturbed areas occurs to reduce the overall change to the visual character of the view corridor along the Colorado River from the Topock Maze.

With regard to the visual experience from the Colorado River, several projects are proposed along the river that could contribute to a cumulative change in the visual experience of recreational users along the river as well as other viewer groups that might experience this visual resource. These include the Moabi Regional Park Improvements (5A), the Pirate Cove Resort (5B), and the Topock Marina Improvements (7A). The Moabi Park Improvement project would not result in significant changes in views from the river as most of the improvements are internal to the park (e.g., utility hook-ups and campsites). The Pirate Cove Resort is a significant project when considering the views from the river, as it introduces a new resort at the river's edge. The improvements to the Park Moabi Marina are nominal, and would likely include minor improvements to accommodate additional recreational vehicles, but are not expected to significantly change the visual experience of the site from the river. Thus, when considering these projects, the visual experience from the Colorado River would be most affected by the Pirate Cove Resort.

The proposed project could also result in negative aesthetic affects along the Colorado River through the removal of floodplain vegetation, grading operations, and overall alteration of a scenic view corridor. If these effects were to occur, recreational viewers experience of the Colorado River and the associated scenic corridor could be cumulative impacted by the overall change that this and other river development, including the Pirate Cove Resort. **Mitigation Measure AES-2** includes design requirements to ensure that development and alterations along the Colorado River do not significantly affect views from the Colorado River, or the recreational user's visual experience of the river. This mitigation measure would also address any potential contribution to a cumulative visual impact in consideration of this visual resource. With the implementation of **Mitigation Measures AES-1 and AES-2**, the project's potential contribution to cumulative aesthetic impacts would be reduced to a less than significant level.

6.4.2 AIR QUALITY

Cumulative air quality impacts must be considered from different perspectives of scale and type of activity depending on the air pollutant being considered. The following discussion describes impacts associated with short-term construction, long-term operations, and climate change.

6.4.2.1 SHORT-TERM CONSTRUCTION-RELATED IMPACTS

The MDAB is in nonattainment status for ozone, respirable particulate matter with an aerodynamic resistance diameter of 10 micrometers or less (PM_{10}), and fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$). This is a result of past cumulative development in the basin, as well as transport of pollutants from other basins. New projects, including the proposed project, would be required to comply with Mojave Desert Air Quality Management District (MDAQMD) measures that would reduce potential new construction emissions of these pollutants. The MDAQMD has established daily significance thresholds for criteria pollutants and ozone precursors for projects within San Bernardino County. Project-generated, construction- related emissions of fugitive dust could violate or contribute substantially to an existing or projected air quality violation, and/or expose sensitive receptors to substantial pollutant concentrations. In addition, because San Bernardino County is currently designated as a nonattainment area for ozone, PM_{10}, and $PM_{2.5}$, construction-generated emissions could contribute on a cumulative basis to pollutant concentrations that exceed the California ambient air quality standards due to other projects in the county.

Project 1D, future soil investigation and remediation at the compressor station, could involve substantial soil remediation activities including soil excavation and grading. Depending on the nature of the implementation and timing of these activities, these actions could contribute substantially to a violation of the ambient air quality standards. Because the details and exact timing of this project is unknown, it is not yet clear whether these types of impacts could occur. If implementation of the soils remediation projects occurred concurrently or without the implementation of measures to reduce construction-related emissions below the MDAQMD's standard, a significant contribution to air quality impacts may occur. Some of these projects, such as the soil investigation and remediation activities (1D), AOC4 (1E), and the cathodic protection system (9A) involve substantial earthmoving activities that may further impact air quality. While unlikely, if significant activities associated with the proposed project and soil remediation activities occurred concurrently, the proposed project may contribute to this potentially significant cumulative effect. However, the proposed project's contribution to this potential effect would not exceed the established thresholds of the MDAQMD which are established in consideration of potential concurrent projects, the project's contribution to this potential cumulative effect is not considered significant. In addition, implementation of **Mitigation Measure AIR-1** would further reduce construction-related impacts from emissions of PM_{10} associated with the proposed project.

6.4.2.2 LONG-TERM OPERATION-RELATED IMPACTS

Long-term operation of the proposed project would result in regional emissions of reactive organic gases, oxides of nitrogen, PM_{10} and $PM_{2.5}$ from area, stationary, and mobile sources. Long-term operation-related emissions

generated by the project would not exceed the County's significance thresholds for reactive organic gases, oxides of nitrogen, PM_{10} and $PM_{2.5}$ and would not generate substantial operational emissions of toxic air contaminants. Further, the *County of San Bernardino 2007 General Plan* designates the site for public and semipublic uses; air quality attainment plans, which are required to reach attainment of federal and state air quality standards, are based in part on the land use plans for the agencies that are part of the air district. Consequently, the proposed project would not contribute to an increase in regional emissions that conflicts with the budget used for regional air quality planning.

Implementation of the proposed project would not result in significant or unavoidable project-level impacts. Further, it would comply with growth projections in the air quality attainment plan and would be required to implement all feasible measures in the plan aimed at attaining long-term air quality standards. The project's contribution to nonattainment of air quality standards would, therefore, not be considerable. The proposed project would result in a less than significant cumulative air quality impact.

6.4.2.3 CLIMATE CHANGE

No known individual project can generate enough greenhouse gas (GHG) emissions to significantly influence global climate change. The project participates in this potential impact by its incremental contribution, combined with the cumulative contributions of all other sources of GHGs, which, when taken together, cause global climate change impacts. See Section 4.2, Air Quality, for a discussion of the existing physical and regulatory setting related to climate change and GHG emissions.

The following discussion reviews the project's potential generation of GHGs and its incremental contribution to the cumulative effect resulting from emissions of GHGs. A two-tiered approach is used, as follows: (1) a discussion of project-generated GHG emissions and (2) project compliance with applicable state legislation.

In January 2010, the California Attorney General issued a paper for use by local agencies in carrying out their duties under CEQA as they relate to global climate change. Included were examples of various measures that may reduce the GHG emissions of individual projects that result in climate change (California Department of Justice 2010). Statewide GHG emission reduction strategies and measures would result in a substantial decrease in statewide GHG emissions to levels far below current background levels. Of the measures listed, very few apply to construction-generated GHG emissions. To the extent that the measures would be applicable to the proposed project, (e.g., enforce and follow limits idling time for commercial vehicles, including delivery and construction vehicles) the project would comply with those measures. The other measures are not applicable to the proposed project because they are directed at State entities (e.g., California Air Resources Board [ARB]), are operational or planning-level measures (e.g., for land use development projects or general plans), or apply to particular industries.

Project-Generated Greenhouse Gas Emissions

Short-term construction and long-term operation of the proposed project would generate emissions of GHGs. Construction emissions would be associated with vehicle engine exhaust from construction equipment, vendor trips, and employee compute trips. Operational emissions would be associated with area, mobile, and stationary sources. Mobile-source emissions of GHGs would include project-generated vehicle trips associated with maintenance of various components, employees, and deliveries to the project site. The project would also include the operation of stationary sources such as pumps, generators, treatment facilities, and any other emission source that is involved in the remediation process. In addition, increases in stationary-source emissions could occur at off-site utility providers associated with electricity generation and water distribution that would supply the proposed project.

GHG emissions generated by the proposed project would predominantly consist of CO_2. In comparison to criteria air pollutants, such as ozone and PM_{10}, CO_2 emissions persist in the atmosphere for a substantially longer period

of time. While emissions of other GHGs, such as CH_4, are important with respect to global climate change, emission levels of other GHGs are less dependent on the land use and circulation patterns associated with the proposed land use development project than are levels of CO_2.

Operation of the proposed project would add less than 70 vehicle trips per day to the project area (see the traffic analysis prepared for this project). If the total trips, as well as off-site stationary-source GHG emissions are considered, operation of the project would generate total GHG emissions of approximately 608 metric tons CO_2e annually during the lifetime of the project. Construction of the proposed project would generate finite quantities of approximately 2,618 metric tons (MT) of CO_2 in 2011 and 2014 (refer to Table 6-4). Construction would contribute GHG emissions to a lesser extent than operation of the proposed project for which emissions occur annually over the lifetime of the project.

Table 6-4
Summary of Modeled Greenhouse Gas (CO_2e) Emissions

Source	CO_2e Emissions
Direct Construction Emissions	**metric tons[1]**
2011	784
2012	781
2013	745
2014	308
Total Construction-Related Emissions	2,618
Direct and Indirect Operational Emissions	**metric tons/year[1]**
Mobile-Source Emissions	23
Energy Consumption[2]	585
Total Annual Emissions	608

Notes: CO_2e = carbon dioxide equivalent.

[1] Construction, area-source, and mobile-source emissions were modeled using the URBEMIS 2007 (v9.2.4) (Rimpo and Associates 2008) computer model, based on trip generation rates contained in the traffic analysis prepared for the project (Fehr & Peers 2008), proposed land uses identified in the project description, and default model assumptions where detailed information was not available. URBEMIS accounts for emissions from vehicles and natural gas use. URBEMIS output is in units of tons carbon dioxide (CO_2) per year, whereas a standard unit for reporting greenhouse gas (GHG) emissions is in metric tons CO_2e/year. CO_2 emissions were increased by 5% to account for other GHG gases, and tons were converted to metric tons using the factor of 0.91 metric tons per ton.

[2] Indirect emissions associated with stationary sources (increased energy consumption) were calculated using the California Climate Action Registry General Reporting Protocol (version 3.0) and the assumption of 1.6 million kilowatt-hours per year for electrical use.

Notes: The values presented in above do not include the full life cycle of GHG emissions that may occur over the production/transport of materials used during construction of the project, solid waste disposal over the life of the project, or end of life of the materials and processes that would contribute to GHG emissions that occur as an indirect result of the project. Doing so would be speculative and would require analysis beyond the current state of the art in impact assessment and would lead to a false and misleading level of precision in reporting of project-related GHG emissions. Further, indirect emissions associated with in-state energy production, solid waste disposal, and wastewater treatment would be regulated under Assembly Bill (AB) 32 at the source or facility that would handle these processes. The emissions associated with off-site facilities in California would be closely controlled, reported, capped, and traded under AB 32 and California Air Resources Board programs. Therefore, this category of emissions would be consistent with AB 32 requirements.

Refer to Appendix AQ for detailed assumptions and modeling output files.

Source: Data modeled by AECOM in 2010.

Project Compliance with State Legislation

To establish additional context in which to consider the order of magnitude of project-generated construction GHG emissions, it may be noted that facilities (i.e., stationary, continuous sources of GHG emissions) that generate greater than 25,000 MT CO_2e/yr MT CO_2/year are mandated to report their GHG emissions to the ARB pursuant to AB 32. As shown in Table 6-4, the highest annual estimated GHG emissions associated with construction of the proposed project would be approximately 784 MT CO_2/yr. Absent any air quality regulatory agency–adopted threshold for GHG emissions, the proposed project would generate substantially fewer emissions than the 25,000 MT CO_2/year required for mandatory reporting, the 10,000 MT CO_2e/yr MT CO2e/yr limit under AB 32s cap and trade program, the 10,000 MT CO_2e/yr threshold for industrial projects adopted by South Coast Air Quality Management District (SCAQMD), the 3,000 MT CO_2e/yr threshold under consideration by the SCAQMD, and the 1,100 MT CO_2e/yr operational emissions threshold under consideration by the Bay Area Air Quality Management District (BAAQMD) for development projects (BAAQMD 2009). This information is presented for informational purposes only, and it is not the intention of DTSC to adopt 25,000, 10,000, 3,000, or 1,100 MT CO_2e/yr as a numeric threshold. Rather, the intention is to put project-generated GHG emissions in the appropriate statewide context in order to evaluate whether the proposed project's contribution to the global impact of climate change is considered substantial. Because construction-related emissions would be temporary and finite in nature, and below the minimum standard for reporting requirements under AB 32, and below thresholds adopted and being considered by regulating agencies; the proposed project's GHG emissions would not be a considerable contribution to the cumulative global impact.

As shown in Table 6-4 above, emissions from new mobile and stationary sources of GHG's associated with the proposed project would be well below proposed GHG significance thresholds (see above) and are also considered less than significant. Therefore, implementation of the proposed project would not result in a substantial net increase of short-term construction or long-term operation-related GHG emissions from mobile or stationary sources. Thus, project-generated emissions would not result in a cumulatively considerable net increase of GHGs. This cumulative impact would be less than significant.

6.4.3 BIOLOGICAL RESOURCES

The cumulative setting for biological resources consists of the project area and surrounding lands along with drainages that are connected to the project site, including the Colorado River. This setting generally consists of a mix of disturbed and relatively pristine natural landscape with a mix of biological communities consisting predominantly of upland desert interspersed with desert washes.

The projects considered in this cumulative analysis could have varying cumulative effects on biological resources ranging from direct impacts on sensitive species and habitat to beneficial impacts resulting from implementation of conservation measures. The PG&E projects at the compressor station (1A, 1B, 1D, 1E, and 1M), Quarry Operations (2C), Moabi Regional Park Improvements (5A), Pirate Cove Resort (5B), Topock Marina (7A), and the cathodic protection system (9A) would have a contribution to biological impacts within the local cumulative setting. Other projects, such as the Lower Colorado River MSCP (2A), the CMP at HNWR (3A), and Topock Marsh Water Infrastructure Improvement Project (3B) have contributory beneficial effects.

Implementation of the proposed could result in impacts on biological resources. The proposed project would have potentially significant impacts related to development of project facilities in sensitive riparian habitats and waters protected under Section 404 of the Clean Water Act. Potentially significant impacts could also occur to sensitive species including special-status birds. Lastly, the proposed project could have significant impacts related to aquatic species in the Colorado River due to the potential use of freshwater intake. **Mitigation Measures BIO-1, BIO-2a**, **BIO-2b**, **BIO-2c**, **BIO-3a**, **BIO-3b** and **BIO-3c** would reduce these project impacts to less than significant.

The proposed project would contribute incrementally to the cumulative loss of sensitive habitats in the project area from this and other projects, specifically those projects listed above that may impact riparian and wetland areas. Mitigation that has been identified for the proposed project would fully mitigate any loss of habitat (**Mitigation Measures BIO-1, BIO-2a**, **BIO-2b**, and **BIO-2c**,); thus, the project's contribution to cumulative sensitive habitat impacts is compensated for by project mitigation.

Implementation of the project components would have potentially significant impacts on fish and fish habitat. This project would contribute incrementally to the cumulative impacts in the project area from this and other projects that may impact fish and their habitat. The other projects that could contribute incrementally would be the other PG&E projects that would be implemented at the station and other projects such as the Moabi Regional Park and Topock Marina projects that may impact fish and their habitat. Mitigation that has been identified for the proposed project would fully mitigate any loss of fish and fish habitat (**Mitigation Measures BIO-3a** and **BIO-3b**); thus, the project's contribution to cumulative fish and fish habitat impacts is compensated for by project mitigation.

6.4.4 CULTURAL RESOURCES

To analyze the cumulative impacts associated with cultural resources, including unique paleontological resources, a tiered approach is required to adequately characterize these impacts because of the different contextual layers associated with these resources. The setting for this analysis must be viewed from the perspective of the resources that are physically present within the project area (local scale), are associated with the portion of the Topock Cultural Area consisting of the project area (local scale), and within the broader regional geography associated with the Lower Colorado River Valley. These perspectives are discussed below.

During the NACP, tribal representatives stated that the river tribes have cultural concerns for an integrated, inter-related cultural landscape that extends along the Colorado River corridor from Hoover Dam (and perhaps beyond) to the mouth of the river. Within this larger area, tribal representatives stated that there are many areas of particular significance in Native American cultural traditions, of which the Topock Cultural Area is one. Native Americans also have concern for the archaeological sites within this river corridor as they are testament to their ancestors' presence and history and for the regional landscape inclusive of landforms, water bodies (especially the river itself), groundwater, air quality, visual quality, and plants and animals. According to Native American tradition and religious beliefs, the Creator placed the tribes within this area as stewards of all creation. Many impacts have already occurred within the larger area, but Native American cultural representatives have reiterated that it is important to proceed with care, to avoid unnecessary impacts to previously undisturbed areas, and to consider the cumulative impacts projects have within this larger context.

Implementation of the proposed project has the potential to impact known and unknown cultural resources as well as known and unknown unique archeological resources, during construction, operations and maintenance, and decommissioning activities. Potential cultural resource impacts could occur to the Topock Cultural Area, some of the approximately 80 identified cultural resources in the project area, and to as-yet-unidentified resources that may exist in unsurveyed areas or in buried contexts. These impacts are considered significant and unavoidable (Topock Cultural Area) or potentially significant (other identified and as yet undiscovered historical resources). Mitigation would reduce impacts through avoidance, monitoring, and standard treatment options for most cultural resources (**Mitigation Measures CUL-1a, 1b, and 1c and CUL-2**). However, even with the implementation of mitigation such as provision of access to the tribes and use of previously disturbed areas and existing physical improvements, significant impacts to the Topock Cultural Area and other historical resources within the project area are expected to be significant and unavoidable. As such, the proposed project contributes to this significant and unavoidable cumulative impact.

For purposes of this cumulative impact analysis the Topock Cultural Area is considered at the local scale as described above. Project-related impacts on this resource can be reduced through implementation of **Mitigation Measures CUL-1a, 1b, and 1c and CUL-2**, but, as discussed in Section 4.4, cannot be fully mitigated due to the

unique characteristics of this historical resource. The Topock Cultural Area has been subjected to many previous impacts, including the introduction of transportation, energy, and recreational facilities, as well as through construction of the IM-3 Facility and associated ground-disturbing activities undertaken in developing the Final Remedy.

Implementation of the proposed project could also result in impacts on unique paleontological resources that may occur in certain formations within the project area. **Mitigation Measure CUL-3** would reduce these potential impacts to a less-than-significant level through further investigation, monitoring by a qualified paleontologist, and recovery, analysis, and curation of scientifically valuable fossil remains that may be discovered during ground-disturbing activities.

Finally, implementation of the proposed project could also result in impacts on human remains, including possible Native American burials and associated grave goods, which may occur in subsurface contexts within the project area. **Mitigation Measure CUL-4** would reduce these potential impacts, but because of the unique nature of these resources, this would remain a significant impact even after implementation of this mitigation measure.

As described above, there are several other projects that have already been implemented or may occur in the foreseeable future at or near the compressor station that are considered from the perspective of cumulative impacts as it relates to documented prehistoric and historic-era archaeological sites in the project area and surrounding vicinity. More broadly, the Lower Colorado River Valley contains a number of important geoglyphs or other cultural markers that are linked to Native American cultural traditions for tribes located throughout the region. These resources include intaglios, trails, dance paths/circles, dance staging areas, and “avenidas” (wide cleared paths) located throughout the region. Perhaps the most well-known geoglyphs in the region are the Blythe Intaglios, which include an anthropomoprphic and zoomorphic figure. Other intaglios in the Lower Colorado River Valley include the Black Point intaglios and geoglyphs in the Big Maria Mountains. According to certain tribes, the rituals and beliefs surrounding these geoglyph sites are integrated with one another and with the entire river corridor area. The ethnographic information strongly indicates that Yuman religious and cultural beliefs about the creation of the world, the history of Yuman culture, spiritual guidance about proper conduct, and the afterlife incorporate a range of landscape features, geoglyphs, and other cultural markers within this larger area. It has been suggested that the presence of intaglio features along the Colorado River between Pilot Knob and Spirit Mountain (of which the Topock Maze can be included) represents a pilgrimage route followed by Yuman-speakers in prehistory (Earle 2005:38).

Depending on the scope and locations of future projects within this region, the potential exists for cumulative impacts to occur with respect to identified and unidentified historical resources within the proposed project area, , and to alter the broader cultural features within the Lower Colorado River Valley. Some of these projects, such as the soil investigation and remediation activities (1D), AOC4 (1E), and the cathodic protection system (9A) involve substantial earthmoving activities that may further impact nearby known cultural resources at or near the station, as well as undocumented cultural resources that may occur in portions of the project area that have not yet been surveyed, or in buried contexts within the project area.

The recent past and possible future PG&E projects at the compressor station such as the soil investigation and remediation, as well as the continued Quarry Operations (2C), and the continuing use and improvements at the Moabi Regional Park Improvements (5A), Pirate Cove Resort (5B), and Topock Marina (7A) have the potential to: (1) involve ground disturbing activities that would directly and substantially alter significant historical and paleontological resources; (2) bring additional people (e.g., work crews, residents, tourists) into the area that may result in increased rates of vandalism or off highway vehicle use, resulting in ground disturbance; (3) result in other environmental impacts that may further disrupt the Topock Cultural Area ; and (4) results in other environmental impacts that may disrupt the resources within the Lower Colorado River Valley(e.g., visual, noise, air quality).

For example, development projects along the Colorado River (5A, 5B, and 7A) may bring relatively large numbers of new people into the area. Visitors associated with the development along the Colorado River may create ground disturbance or other environmental impacts in the Topock Cultural Area through recreational off-highway vehicle use, off-trail hiking, and loud music. Finally, the recent past and continuing operation of IM-3 (1L) has created an impact on the spiritual and cultural values associated with the Topock Cultural Area, as documented in the Final Settlement Agreement between PG&E and the Fort Mojave Indian Tribe (2006: 5).

While mitigation measures would likely be implemented for the other future projects in the area to reduce impacts on historical and paleontological resources, there are no feasible mitigation strategies that would reduce impacts on the Topock Cultural Area. Therefore, implementation of the proposed project would have significant impacts on this historical resource, and other projects could contribute incrementally to these impacts. The proposed project would result in cumulatively considerable contribution to a cumulative impact on cultural resources. The only method to fully addresses these impacts is total avoidance of any future activity; therefore, no feasible mitigation exists that would reduce this impact below the level of significance. However, significant impacts can be reduced by implementation of the measures described in Section 4.4 of this EIR.

6.4.5 GEOLOGY AND SOILS

Potential effects to geologic and soil conditions are typically considered site specific. Therefore, the cumulative impact setting for geology and soils consists of the project area and immediately adjacent properties. The scope of potential cumulative impacts is limited to the area that is physically affected by the project.

Because of the limited extent of the cumulative setting for this resource topic, the projects listed in Table 6-3 that would be relevant to this analysis are the proposed PG&E activities at the compressor station and on adjacent properties (1A, 1B, 1D, 1E, and 1M) and the cathodic protection system (9A). The other listed projects would not be relevant to this analysis because the activities associated with those projects would not have any connection from a cumulative perspective, with the activities associated with this project.

As indicated in Section 4.5, "Geology and Soils," the site is located in an area considered to be a relatively low intensity ground shaking zone. The potential for seismic activity in this area is considered low because of the project area's substantial distance from active faults. As such, any project components that may be constructed would not be subject to 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 (UBC), including requirements for seismic design, and the policies and implementation measures of the *County of San Bernardino 2007 General Plan* Safety Element. From a cumulative impacts perspective, other projects that would be implemented at the PG&E site or on adjacent properties would be subject to the same level of threat from seismic shaking and would also be required to adhere to UBC building requirements for seismic design and to San Bernardino County policies. Although new facilities and other projects would be constructed in the future in this general area, there would be a very minimal increase in risk to people or property from seismic events because of the low-level of potential threat and established standards and policies that have been implemented to minimize any potential impacts. Any contribution to cumulative impacts related to seismic shaking would not be cumulatively considerable.

A similar logic applies to cumulative impacts in the project region due to liquefaction. With the exception of areas along the banks of the Colorado River, the potential for liquefaction is minimal because of the deep groundwater table. Some facilities for the project and other projects on the above list will be constructed along the river banks where liquefaction has a higher potential to occur. Projects occurring along the riverbanks are relatively small projects (such as Moabi Regional Park) or consist of management plans for public lands that do not involve extensive development activities creating substantial new facilities. Any contribution to cumulative impacts related to liquefaction would not be cumulatively considerable.

Other projects that are likely to occur in the project area (1A, 1B, 1D, 1E, 1M, and 9A), in particular project 1D, and 1E would potential result in substantial earthmoving activity as it relates to soil remediation and investigation activities, and would contribute to a significant cumulative impact to soil erosion in the project area. The proposed project also has the potential to result in increased soil erosion from wind and water during construction activities. The magnitude of this potential impact would be reduced by implementation of **Mitigation Measure GEO-1a**, which would include grading and erosion control plans, a stormwater pollution prevention plan, and consistency with local policies. These are standard requirements for construction sites and would be required for all other projects that would be located in the project area. Although the project may contribute incrementally to cumulative erosion impacts, adherence to standard construction practices and requirements would limit the magnitude of cumulative impacts from this project and other future projects.

Project impacts involving differential compaction of soils and potential alterations of drainage patterns and erosion have been identified. This potential impact would be mitigated to less-than-significant levels through the implementation of **Mitigation Measure GEO-1b**. Considering the other projects that may be implemented at the compressor station, there is the potential for cumulative impacts to occur when the various PG&E projects are considered from a cumulative perspective. However, each of these individual projects would likely require implementation of similar measures and would be required to be in compliance with county standards, thereby reducing the potential for these potential impacts to be significant from a cumulative perspective.

With implementation of project-specific **Mitigation Measures GEO-1a** and **GEO-1b**, the proposed project's contribution to the overall cumulative effect would be reduced. Therefore, cumulative impacts related to differential compaction of soils and potential alterations of drainage patterns and erosion would be less than significant. The project would not cause any impacts related to expansive or unstable soils or subsidence and would therefore not contribute to any cumulative impacts.

6.4.6 HAZARDOUS MATERIALS

To assess cumulative impacts involving hazardous materials, the nature of the potential impacts would limit the cumulative setting to the project site itself and to other projects in the project vicinity. The PG&E projects listed in Table 6-3(1A, 1B, 1D, 1E, and 1M) would be relevant. In addition, other relevant projects for this analysis include Quarry Operations (2C), Moabi Regional Park Improvements (5A), Pirate Cove Resort (5B), Topock Marina (7A), the cathodic protection system (9A), the Lower Colorado River MSCP (2A), and the Lower Colorado River MSCP CMP (3A).

The project impact analysis indicates that chemicals used during the operation and maintenance phase of the proposed project could have the potential of release or spill, which could present safety hazards to workers or the environment. Impacts related to the generation of hazardous materials during construction, and decommissioning of the proposed project would also be potentially significant. Potentially significant impacts involving localized exposure to hazardous materials during activities during construction and decommissioning activities could result in localized hazardous material spills or incidents. All phases of the proposed project could also result in the reasonably foreseeable releases of chemicals associated with excavated or disturbed soils. These impacts are also considered localized, and **Mitigation Measures HAZ-1**, **HAZ-2**, and **HAZ-3** would reduce these impacts to less than significant. All of these impacts are considered localized and would not contribute to other cumulative projects in the region.

Of particular note are the proposed PG&E projects which involve compressor station refurbishment and remediation of soil contamination. If these projects are to occur within a similar time frame as the proposed project, the potential for hazardous materials releases during these activities would increase. However, **Mitigation Measures HAZ-1**, **HAZ-2**, and **HAZ-3**, as well as future site-specific health and safety precautions associated with the other likely projects, would reduce their impacts. Therefore, the proposed project would not have a considerable contribution to significant impacts related to hazardous materials, and impacts would be less than significant.

Some of the other projects considered as part of this cumulative analysis would also have the potential to generate hazardous materials during construction. However, these projects would be required to comply with existing regulations that are designed to limit these kinds of impacts. Other projects on the compressor station and the improvement project at Moabi Regional Park have the potential to expose workers to hazardous materials because of their known presence at these two locations. These projects would require similar mitigation in the form of implementing health and safety plans that have the overall purpose of limiting the potential for exposure. Lastly, during construction activities and potentially during operations and maintenance and decommissioning activities (when applicable), there is also a similar potential for the spill and release of hazardous materials during project implementation.

Although implementation of this project may incrementally contribute to cumulative impacts involving hazardous waste, the contribution would not be cumulatively considerable. Standard mitigation measures and practices required within the context of existing laws and regulations would individually limit these impacts for each project and minimize any potential for significant cumulative impacts.

6.4.7 HYDROLOGY AND WATER QUALITY

Cumulative water resources impacts are assessed both at a local level and a broader watershed/aquifer level. The local-scale cumulative setting is important for assessing some impacts, but because of the nature of water resources, most environmental impacts extend beyond a local level and have the potential to impact a more extensive area. This potentially impacted area can include the portion of a drainage area that is downslope from the project site; for example, a project may generate additional runoff that may contribute to downstream flooding when consider in combination with other projects within the same watershed.

The area around the compressor station is drained by a network of ephemeral washes that eventually flow into the Colorado River to the east of the project area. With respect to evaluating surface water quality and hydrology impacts, the PG&E projects (1A, 1B, 1D, 1E, and 1M), the Quarry Operations (2C), and the cathodic protection system (9A) are relevant to the cumulative analysis because they are located within the same drainage area. Impacts related to water quality from all phases of the proposed project could occur. Best management practices (BMPs) have been identified in **Mitigation Measures HYDRO-1**, **HYDRO-2**, **and HYDRO-3**, which would reduce impacts related to water quality to less than significant. The relevant cumulative projects described previously that would involve construction and operational activities that could have similar water resources impacts. The BMPs described in the impact analysis for this project would likely be similarly required as mitigation for water quality impacts for each of these other respective projects. Although it is possible than two or more of these projects may occur simultaneously, it is likely that these other projects may occur independently of one another and thus avoid the potential for compounding effects from simultaneous construction projects in the same area. For this reason, the proposed project may contribute incrementally to water quality impacts during the construction phase, but this impact is not cumulatively considerable.

6.4.8 LAND USE AND PLANNING

Cumulative land use impacts are generally assessed at both a local and a community scale. Land use compatibility issues are relevant at a local level as they involve the interrelationship between land uses associated with the project and neighboring properties. To assess cumulative impacts associated with plans, policies, or regulations, a community-level perspective is often used; however, for this project, a local-scale assessment would be appropriate. The compressor station site is bounded by HNWR property while PG&E property north of I-40 is bounded by Reclamation's property to the east and south and Moabi Regional Park to the west and north. Cumulative projects from Table 6-3 that are relevant to these properties are used in the cumulative land use impacts assessment.

The PG&E projects listed in Table 6-3 (1A, 1B, 1D, 1E, and 1M) would be relevant. In addition, other relevant projects for this analysis include Quarry Operations (2C), Moabi Regional Park Improvements (5A), Pirate Cove Resort (5B), Topock Marina (7A), the Lower Colorado River MSCP (2A), the HNWR CMP (3A), and Topock Marsh Water Infrastructure Improvement Project (3B). The first four projects on this list consist of modifications, minor expansions, or a continuation of previously existing land uses. The last three projects are plans for management of lands and resources near the Colorado River. Both of these have already been implemented to some degree. Some of the projects at the compressor station (1A, 1B, 1D, 1E, and 1M) consist of operations and maintenance projects that are a continuation of existing operations. Projects related to remediation of soil investigation and remediation (1D) in the project area could have similar effects as the current proposed project, as much of it could be located on property managed by other land owners. Other projects in this area consist of either management plans for public lands and resources or improvements to existing land uses. When these projects are viewed from a cumulative perspective, potential cumulative land use impacts appear to be limited. None of these projects would result in changes to land use or nearby communities such that they would have a cumulative impact to land use.

The other projects that are being evaluated as part of the cumulative land use analysis are not likely to have substantial land use impacts because of the scope and location of the projects. In addition, when the cumulative projects are viewed in combination with the proposed project there are not anticipated land use effects that could be compounded or exacerbated through this combination. For these reasons, the proposed project would not contribute to a significant cumulative land use impact.

6.4.9 NOISE

The assessment of cumulative noise impacts is performed at a local scale. Noise is generated from an activity that is in turn experienced by receptors close to the noise source. In the case of the compressor station, noise from the plant is experienced in the immediate vicinity of the plant. Noise from the compressor station activities comprises a component of the overall noise environment in combination with other noise sources in the area, such as traffic noise from I-40 and train operations on the Burlington Northern and Santa Fe railway line.

From Table 6-3, projects that would be situated in the vicinity of the compressor station are evaluated as part of the cumulative noise analysis. This includes PG&E projects at the station (1A, 1B, 1D, and 1E), Quarry Operations (2C), and the improvements projects at Moabi Regional Park Improvements (5A), Topock Marina (7A), Pirate Cove Resort (5B), and the cathodic protection system (9A). These projects all have the potential to generate noise in the vicinity of the compressor station. However, measures would be in place for these projects to reduce impacts on a project-by-project basis such that noise remains localized and reduced to sensitive receptors.

The noise analysis for the proposed project indicates that significant noise impacts would result from construction, operations and maintenance, and decommissioning. **Mitigation Measures NOISE-1 and NOISE-2** have been identified that would reduce these impacts to a less-than-significant level. In addition, the proposed project would generate 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. **Mitigation Measures NOISE-3** would reduce, but not completely avoid, impacts to this receptor, and impacts would remain significant and unavoidable.

The project site is located in an area that contains multiple noise sources, I-40 and the railroad in particular, that affect sensitive noise receptors in the area. Implementation of the proposed project has the potential to contribute to cumulative noise levels, when combined with the noise generated by other unrelated projects in this area. Projects at the compressor station will likely generate noise during construction, operations and maintenance, and decommissioning activities that may be comparable to the proposed project in magnitude. Depending on the timing for the implementation of these projects and the final form the projects take, these projects may have a significant cumulative noise impact on sensitive receptors in this area, depending on the effectiveness of noise mitigation measures and whether the projects are implemented concurrently. It is possible that the proposed

project, if operating concurrently with other projects, could have a cumulative impact to sensitive noise receptors. However, mitigation measures proposed for the proposed project, as well as any other future activities at the project area related to future PG&E projects, would be reduced to less than significant through the implementation of mitigation measures.

6.4.10 TRANSPORTATION

Cumulative transportation impacts are evaluated from the perspective of the local transportation network and from the broader regional transportation network. The transportation network includes local roads that serve the compressor station, Moabi Regional Park, and adjacent lands; and I-40, a major regional highway that serves northern Arizona and the Mojave Desert region of southern California. These roadways comprise the cumulative setting for the cumulative transportation impacts analysis.

Traffic conditions for the Cumulative Year Horizon (2035) were assessed by applying a 1.7% annual growth rate to existing traffic volumes before adding project traffic to the roadway network. The growth rate was derived from the SCAG regional travel demand forecasting model. There are currently no plans for future roadway improvements along the study roadways or at study intersections, so no changes to the roadway network were assumed in the assessment of cumulative traffic conditions.

Consistent with standard and acceptable analysis of cumulative impacts related to traffic, future traffic scenarios without and with project-related traffic are considered, as described below.

- **Cumulative No Project.** This scenario provides the cumulative baseline for identifying cumulative impacts. The Cumulative No Project traffic volumes are developed by applying a growth factor to existing traffic volumes in the area and correspond to a 25-year planning horizon, or approximately the year 2035.

- **Cumulative (2035) plus Project.** This scenario adds traffic generated with operations and maintenance of the site under each of the project components, described in the "Project Description" chapter, to the Cumulative No Project traffic estimates.

The proposed project would generate additional traffic during the construction, operation and maintenance, and decommissioning phases. Based on the significance criteria described in Section 4.10, the project would result in a significant cumulative impact if the addition of project generated traffic would degrade intersection or roadway segment operations below an acceptable level of service. A significant impact would also occur if the proposed project added any traffic to an intersection or roadway segment projected to operate at an unacceptable level of service under the Cumulative No Project scenario.

As shown in Tables 6-5 and 6-6, all roadway segments and study intersections are projected to operate at an acceptable level of service under the Cumulative No Project scenario. When project-generated traffic is added to the future cumulative condition, as indicated in Tables 6-5 and 6-6, all project area roadway segments and intersections would continue to operate acceptably and at level of service A, during construction, operations and maintenance, and decommissioning phases. Since all roadway segments and intersections would operate at acceptable levels in the future, there would be no cumulative traffic impact. And the proposed project's contribution to future traffic levels is not considered to be considerable. Therefore no significant cumulative traffic impacts are anticipated.

Table 6-5
Cumulative plus Project—Roadway Segment Analysis

Location	Acceptable Volume Threshold[1]	Volume	Acceptable?
Cumulative (No Project) Conditions			
Park Moabi Road north of I-40	7,000 ADT	592	Yes
Park Moabi Road south of I-40	7,000 ADT	65	Yes
Cumulative plus Construction Conditions			
Park Moabi Road north of I-40	7,000 ADT	648	Yes
Park Moabi Road south of I-40	7,000 ADT	85	Yes
Cumulative plus Construction plus O&M Conditions			
Park Moabi Road north of I-40	7,000 ADT	650	Yes
Park Moabi Road south of I-40	7,000 ADT	85	Yes
Cumulative plus O&M plus Decommissioning Conditions			
Park Moabi Road north of I-40	7,000 ADT	680	Yes
Park Moabi Road south of I-40	7,000 ADT	93	Yes
Cumulative plus Decommissioning Conditions			
Park Moabi Road north of I-40	7,000 ADT	792	Yes
Park Moabi Road south of I-40	7,000 ADT	131	Yes

Notes: ADT = average daily traffic; I-40 = Interstate 40; O&M = operation 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 6-6
Cumulative plus Project—Level of Service

Location	Control	Peak Hour	Delay (Seconds)[1]	LOS[3]
Cumulative (Baseline) 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
Cumulative plus Construction 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.	8.7	A
		p.m.	8.6	A
Cumulative plus Construction plus O&M Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	9.0	A
		p.m.	9.3	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.7	A
		p.m.	8.7	A
Cumulative plus O&M plus Decommissioning Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	8.8[2]	A
		p.m.	9.2	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.6	A
		p.m.	8.6	A
Cumulative plus Decommissioning Conditions				
Park Moabi Road and I-40 eastbound on-/off-ramps	SSSC	a.m.	9.2	A
		p.m.	9.3	A
Park Moabi Road and I-40 westbound on-/off-ramps	SSSC	a.m.	8.9	A
		p.m.	8.7	A

Notes: LOS = level of service; SSSC = side-street stop-control intersection; O&M = operation and maintenance

[1] For side-street stop-controlled 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.

[3] LOS A indicates little or no traffic delays (see Table 4.10-2).

Source: Data compiled by Fehr & Peers in 2009

6.4.11 UTILITIES AND SERVICE SYSTEMS

The compressor station currently discharges nonhazardous wastewater (i.e., domestic graywater and sewage) to on-site leach fields. Because of the limited extent of the cumulative setting for this resource topic, the projects that would be relevant are the proposed PG&E activities at the compressor station and on adjacent properties (1A, 1B, 1D, 1E, 1M, and 9A). The construction, operation, and decommissioning of the proposed project facilities would not generate substantial amounts of domestic wastewater (sewage or gray water). In addition, the PG&E activities would similarly not be expected to generate substantial amounts of domestic wastewater. Because these are not wastewater-intensive facilities, cumulative wastewater impacts are not anticipated.

With regard to electricity, operation of the proposed project (primarily energy needed to move water through the remediation system) would require up to 1.6 million kilowatt-hours annually, in combination with the estimated 1.8 million kilowatts that are consumed with the past project IM-3 Facility. The City of Needles currently supplies the IM-3 Facility (1L) with electricity via their electrical distribution system. PG&E is a commercial customer. 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. These impacts would need to be considered in light of anticipated projects that are expected to be served by the City of Needles. Because the extent of demand is not known, impacts related to electrical generation are considered potentially significant. **Mitigation Measure UTIL-1** would reduce this potentially significant impact to a less-than-significant level.

Cumulative impacts involving solid waste disposal must be assessed at a broad regional level because levels of services and changes in those levels affect service areas associated with available landfills in the region in question. As described previously in this DEIR, landfill capacity is be evaluated in terms of the facilities available within a reasonable distance, available total capacity, and maximum daily capacity. Increased cumulative demand for solid waste disposal associated with a project would potentially affect the provision of this service to a region as a whole, and the overall capacity of the disposal systems and facilities within the service areas. The Topock compressor station is a longstanding activity in this unincorporated part of San Bernardino County with an ongoing demand for solid waste disposal along with other communities in this immediate area and in the larger region.

To evaluate cumulative impacts on solid waste disposal, the impacts associated with this project must be considered within the context of the regional growth trends presented previously in this section. A regional perspective is required for a couple of reasons. Of the landfills described in the solid waste disposal impact analysis, two of the facilities are anticipated to be closed in 3 to 4 years from the present time and the closest landfill has unknown capacity. Thus, a broader assessment of available facilities a greater distance from the compressor station and their respective capacities is necessary.

As shown in Table 6-2, substantial population growth is expected in the project region during the next 20 years. The population growth in San Bernardino County is expected to be approximately 36% and the rate of growth in Mohave County would be even higher at 49%. These high rates of growth will increase the demand for public services and utilities in the two-county area and have the potential to accelerate the rate at which landfill capacity is consumed.

Implementation of the project components will contribute to the solid waste stream for the landfills in this region. The maximum expected contribution to the waste stream (from decommissioning of the proposed project) would comprise about 5% of the maximum daily capacity of the smallest landfill that may potentially be used (Barstow

Sanitary Landfill). Based on this estimate, implementation of this project will contribute incrementally to the cumulative demand for solid waste disposal capacity. However, given the magnitude of this contribution compared to available future capacity, this would not be cumulatively considerable.

6.4.12 WATER SUPPLY

By virtue of its geographic location, water supply issues associated with the compressor station occur within a defined water setting associated with the Lower Colorado River in general and the Lower Colorado River Water Supply Project, specifically. The lack of available or feasibly obtainable water resources from outside the project area limits the analysis accordingly.

The Colorado River system is currently experiencing a multiyear drought and is facing increasing demands in managing the river for water supplies, power generation, and environmental protection. The effects of climate change will likely exacerbate the major challenges facing the river system. Stakeholders are actively seeking ways to address these challenges and Reclamation has developed interim guidelines for shortages and coordinated operation of reservoirs. Nonetheless, there will likely be a significant adverse cumulative effect on Colorado River water supply as a result of past, current, and future projects associated with those in Table 6-3 as well as overall growth projections outlined in Table 6-2, without consideration of the proposed project.

Implementation of the proposed project would require relatively modest amounts of water during the construction and decommissioning phases, and a negligible amount of water during operations. As a result of the decommissioning of the IM-3 Facility (1L), the project would result in a net reduction in water use compared to existing conditions. All of this water use is well within PG&E's existing (Lower Colorado River Water Supply Project) contracted entitlement of 422 acre-feet annually. Because the project does not require substantial amounts of water and would not generate a demand for water that exceeds existing entitlements, the project does not make a considerable contribution to cumulative impacts on water supply. 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 how the extraction wells are sited, existing nearby supply wells could be adversely affected. **Mitigation Measure WATER-1** would require a hydrologic analysis 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. With implementation of **Mitigation Measure WATER-1**, the project's potential contribution to cumulative localized effects on the groundwater would be reduced to a less–than-significant level.

7 ALTERNATIVE BASELINE ANALYSIS PURSUANT TO THE SETTLEMENT AGREEMENT

7.1 INTRODUCTION

This chapter provides the analysis required by the stipulation and settlement agreement entered into on December 18, 2006, in *Fort Mojave Indian Tribe v. Department of Toxic Substances Control et al.* (Superior Court of the State of California, Sacramento County [Case No. 05CS00437]), referred to in this chapter as the "Settlement Agreement" (see Appendix SA-1). The Settlement Agreement resulted from a writ of mandate and complaint filed by the Fort Mojave Indian Tribe (FMIT) that challenged, among other things, the legal basis for the DTSC's authorization to construct IM-3 (including the treatment plant, related wells, and other facilities that compose the IM-3 Facility). While not admitting to the material allegations of the suit, DTSC agreed to the Settlement Agreement to resolve all issues between the parties in good faith and to avoid further litigation. Generally, the Settlement Agreement includes the following terms:

- Before the final cleanup remedy is finalized, if PG&E proposes alternative locations for the IM-3 Facility, DTSC is required to promptly evaluate the proposal(s) in accordance with applicable laws, regulations, and requirements. If such a proposal is found by DTSC, in its discretion, to comply with applicable laws and regulations, would effectively remediate the contamination from the Topock site, within the confines of the law, and is consistent with protection of public health and safety and the environment, DTSC would authorize PG&E to move the IM-3 Facility as expeditiously as practicable.

- DTSC must use its best efforts to provide an expedited time frame for a decision on a final remedy for the Topock site, to the maximum extent possible under the Hazardous Waste Control Law and CEQA.

- DTSC is to move forward with the CEQA studies on the proposed final remedy for the Topock site according to a process that will recognize the FMIT's spiritual and cultural interests, DTSC will work to establish a communication process with FMIT (which is further detailed in the Settlement Agreement) to discuss and consult on the remedy (see Appendix SA-1 pages 5–6).

If the proposed final remedy involves locating or retaining any equipment or installation on the IM-3 site, DTSC is required, in exercising its discretion regarding any such equipment or installation, to evaluate significant environmental effects on cultural and biological resources on the site based on the environmental setting (e.g., conditions) at the site as of January 2004 (before development of the IM-3 Facility). Specifically, Attachment A, Section C of the Settlement Agreement includes the following requirement:

> DTSC will immediately initiate CEQA studies on the proposed final remedy for the Topock Site according to a process that will recognize the FMIT's interests. In the event that the proposed final remedy for the Topock Site includes locating or retaining any equipment or installations on the IM-3 Site, DTSC will, in exercising its discretion regarding any such equipment or installation, and in compliance with applicable laws and regulations, including but not limited to CEQA, evaluate the significant environmental effects on cultural and biological resources on the IM-3 Site based upon the environmental setting as of January 2004, to the maximum extent permitted by CEQA.

This chapter specifically considers the potentially significant environmental impacts on biological and cultural resources of locating or retaining any equipment or installation on the IM-3 site as part of the potential final remedies, consistent with the Settlement Agreement. The IM-3 site is defined as the parcel owned by FMIT for which PG&E has an exclusive for remediation-related purposes and identified as San Bernardino County Assessor's Parcel Number 650-151-06 on which the IM-3 site is currently located (see Exhibit 7-1).

As described in Chapter 3, the final design and exact location of proposed facilities is not known at this time. However, the project area boundary for both remediation facilities and monitoring wells does include the location of the IM-3 site. Therefore, it can be assumed that infrastructure associated with the proposed project could be located at the location of the IM-3 site. The project facilities that could occur within the IM-3 site are limited to freshwater injection wells, injection wells for carbon-amended water, monitoring wells, associated utility and pipeline trenches and reductant storage facilities and photovoltaic or electric generator stations. In addition, as part of the proposed project, IM-3 would be decommissioned when it is determined by DTSC and the U.S. Department of the Interior that the facility is no longer needed.. More detail on the physical attributes of these facilities and the proposed construction and decommissioning activities is provided in Chapter 3.

Generally, under CEQA, the significance of the potential impacts of a project should be compared to "existing physical conditions" of the environment (CEQA Guidelines, Sections 15125[a] and 15125[e]). (See *Communities for a Better Environment v. South Coast Air Quality Management District,* California Supreme Court Case No. S161190 (March 15, 2010).) In reviewing an agency's exercise of "discretion to deviate from the time-of-review baseline," courts defer to the agency's decision if it is supported by substantial evidence. (See *Fat v. County of Sacramento* [2002] 97 Cal. App. 4th 1270, 1278, which states that the existing environment at the time an action is commenced can be used as the baseline [or setting] for determining whether an EIR is required, even when unauthorized development had occurred previously on the same site.)

Based on a review of the Settlement Agreement, relevant case law, and relevant sections of the CEQA statute and CEQA Guidelines, DTSC determined that the requirements of the Settlement Agreement should be addressed in a stand-alone chapter of the EIR—this chapter. This approach allows the environmental analysis provided in Chapter 4 to establish a consistent approach to the existing conditions baseline generally required by CEQA, with this chapter providing the additional information stipulated in the Settlement Agreement.

The analysis contained in this chapter is at an equal level of detail when compared to the biology and cultural resource impact analyses contained in Chapter 4. To avoid repetition, detailed information that is provided in Chapter 4 and remains unchanged for the purposes of this analysis is cross-referenced, rather than repeated herein.

Table 7-1 provides a summary of the findings of this chapter, which are described in more detail in Sections 7.2 and 7.3. In addition, the Executive Summary of this EIR contains a summary of how the impacts and mitigation measure for the proposed project would be different if DTSC adopted mitigation measures based on a 2004 baseline.

7.2 BIOLOGICAL RESOURCES ANALYSIS

Using January 2004 as the baseline for environmental analysis, this section considers the effects on biological resources that would result from implementation of the proposed project. The project facilities that could occur within the IM-3 site are limited to freshwater injection wells, injection wells for carbon-amended water, monitoring wells, and associated utility and pipeline trenches. In addition, as part of the proposed project, the existing IM-3 treatment plant would be decommissioned.

7.2.1 JANUARY 2004 SETTING

Little documentation exists regarding biological conditions at the IM-3 site in January 2004; however, a baseline study occurred in August 2004 in support of implementation of IM-3 (before construction of IM-3). In September 2004, the biological impacts from implementation of IM-3 were considered in *Final Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California,* prepared for PG&E by CH2M HILL (PG&E 2004a). In addition, aerial photos taken before and after construction of the IM-3 facilities were examined as part of the analysis conducted for this EIR to qualitatively assess the site setting.

Source: Provided by CH2M Hill in 2007

IM-3 Site and Surrounding Parcels **Exhibit 7-1**

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
Biological Resources			
Impact BIO-1: Substantial Adverse Effects on Waters of the United States and 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 removal of riparian vegetation along the Colorado River. This impact is **potentially significant**.	**Biological Resources Mitigation Measure BIO-1**: 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 , or the substantive equivalent per CERCLA Section 121(e)(1), shall be completed, or the substantive equivalent per CERCLA Section 121(e)(1). In either event, and 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, if applicable, shall be submitted to USACE for verification as part of the formal Section 404 wetland delineation process and to DTSC. If applicable, 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. Alternately, the substantive equivalent of the Section 404 permitting process shall be complied with by ensuring that the acreage of jurisdictional wetland affected shall 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 agreeable to USACE, or, alternately, consistent with USACE methods, and consistent with the purpose and intent of applicable	With a January 2004 baseline, this impact and recommended mitigation measure would remain unchanged. Waters of the United States and riparian habitats have the potential to occur in Bat Cave wash, which is partially located within the IM-3 site. Specifically, the Mojave wash habitat type is a desert riparian vegetation that is located within Bat Cave wash. These extent (e.g., acreage) of potential impacts would not differ when comparing an analysis using a 2004 baseline to an analysis using the baseline at the time the NOP was issued (May 2008) because the construction of the IM-3 Facility did not affect these habitats.

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		county and agency policies and codes. Minimization and compensation measures adopted through any applicable the 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 , or the substantive equivalent per CERCLA Section 121(e)(1),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, or substantively consistent with DFG methods, 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	

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		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..	
Impact BIO-2: Adverse Effects on Sensitive Species	Implementation of the proposed project could result in impacts to avian and terrestrial species, either directly or through habitat modifications. Specifically, the implementation of the proposed project would have potential impacts	**Biological Resources Mitigation Measure BIO-2a**: 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, through coordination with the biologist, that the footprint of project element and construction zones, staging areas, and access routes are	With a January 2004 baseline, this impact and recommended mitigation measure would remain unchanged. Impacts to Bat Cave wash and associated Mojave wash habitat could affect sensitive riparian habitats and associated suitable habitat for sensitive bird species. Because sensitive habitats could be

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
	to special-status birds and their habitat, as well as the desert tortoise. This impact is **potentially significant**.	designed to avoid direct or indirect effects 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 from March 15 through September 30. Preconstruction breeding surveys shall be conducted during the general nesting period, which encompasses the period from March 15 to 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 implementation of the project is required during the nesting season, focused surveys for active nests of special-status birds shall be conducted prior to initiating such activities. A qualified biologist shall conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and 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 the substantive policies of USFWS, including those set out in USFWS protocols. 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 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).	affected, impacts on other special-status bird species (e.g., crissal thrasher [*Toxostoma bendirei*]) could occur; therefore, these impacts would be potentially significant under the 2004 baseline scenario. These potential impacts would not differ when comparing an analysis using a 2004 baseline to an analysis using the baseline at the time the NOP was issued (May 2008) because the construction of the IM-3 Facility did not affect these habitats. It should be noted that habitat for several of the bird species addressed in Chapter 4 are not present on the IM-3 site (i.e., southwestern willow flycatcher [*Empidonax trailii extimus*], and Yuma clapper rail [*Rallus longirostris yumanensis*]).

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		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, requiring an on-site biological monitor, and others shall be included in the design plan and implemented to the extent necessary to avoid significant impacts to sensitive bird species. **Biological Resources Mitigation Measure BIO-2b**: Disturbance of Desert Tortoise and Loss of Habitat. In areas where impacts to potential desert tortoise habitat are unavoidable, measures outlined in the PBA and in the USFWS letter concurring with the PBA, shall be implemented, as described below. To the extent feasible and practicable, 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 and practicable. In areas where impacts to potential desert tortoise habitat are unavoidable, measures outlined in the PBA and in the USFWS letter concurring with the PBA, shall be implemented. These measures include the presence of a USFWS-authorized biologist onsite 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 substantive requirements of USFWS protocols.	

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation 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. **Biological Resources Mitigation Measure BIO-2c**: Impacts on Special-Status Species and Habitats During 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 a no-net-loss of habitat functions and values existing prior to 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 a no-net-loss of habitat values and functions, and an adaptive management plan.	
Impact BIO-3: Impacts to Aquatic Species and Habitat.	If selected as part of the final remedy, construction of the freshwater intake structure element of the proposed project could preclude fish from 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	**Biological Resources Mitigation Measure BIO-3a**: 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, installation of the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. PG&E and their 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 capture and return of those fish to suitable habitat within the river. The fish rescue plan shall identify and describe the following items:	With a January 2004 baseline, this impact and recommended mitigation measure would remain unchanged. The location of the impact is outside of the IM-3.

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
	contaminants, and standing during construction activities could also impact fish habitat and movement in the Colorado River. These impacts would be **potentially significant**.	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. **Biological Resources Mitigation Measure BIO-3b**: 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	

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		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 impacted 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 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. **Biological Resources Mitigation Measure BIO-3c**: 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	

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		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.	
Cultural Resources			
Impact CUL-1: Cause Substantial Adverse Change in the Significance of a Historical Resource as Defined in CEQA Guidelines Section 15064.5.	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	**Cultural Resources Mitigation Measure CUL-1a, CUL-1b, and CUL-1c**: • The following actions will lessen, although not to a less than significant level, impacts on the Topock Cultural Area and other identified cultural resources: 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	With a January 2004 baseline, this impact and recommended mitigation measures would remain unchanged. Because of the avoidance, impact minimization, site monitoring program, and tribal consultation procedures that have been in place, the baseline condition of the unevaluated cultural sites has not changed substantially. The potential for the loss or damage of known cultural resources sites would remain, including impacts to the Topock Cultural Area. Sixty-four archaeological resources (sites and isolated finds) identified in the "Cultural Resources" section are within the boundaries of the IM-3 site and may be affected by facilities associated with the proposed project, regardless of the date of the baseline. In January 2004, a protective cap was placed on a portion of site CA-SBR-2910(remnant segments of Route 66) as a mitigation measure for the IM-3 Facility to protect the site from project-related truck traffic. Presuming that the cap did not exist, additional measures would need to be implemented to protect site CA-SBR-2910H.

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
	project would indirectly affect the Topock Maze and adversely affect the Topock Cultural Area. Further, 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. 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	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. • 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. • 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	These measures would involve either implementing mitigation similar to the cap, or rerouting site access and other project facilities to avoid these CPHR-eligible sites. Under the proposed project, alternative access routes would likely be deemed infeasible because these new routes would result in additional grading, which would have the potential to disturb additional culturally significant sites in the IM-3 site area. For these reasons, a mitigation method similar to the cap implemented in January 2004 would likely be determined to be the most environmentally sensitive solution for CA-SBR-2910H, thereby limited new grading and providing some protection to present cultural resources.

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
	the Topock Cultural Area 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**. 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	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	

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
	Depression and post-war 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	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. • Mitigation measures shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.	

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
	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**. 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		

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
	impact could result in **potentially significant** impacts on currently undocumented historical resources.		
Impact CUL-2: Cause a substantial adverse change in the significance of a unique archaeological resource.	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**.	**Cultural Resources Mitigation Measure CUL-2**: 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 reduce the potential for impacts on unique archaeological resources: • 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	With a January 2004 baseline, this impact and recommended mitigation measure would remain unchanged. Similar to the discussion above for historical resources, 64 documented resources, which may qualify as unique archaeological resources, are present within the boundaries of the IM-3 site. Because of the avoidance procedures that have been in place, the baseline condition of these potential unique archaeological resources has not changed substantially. The potential for the loss or damage to the documented sixty-four archaeological resources (sites and isolated finds) identified in the "Cultural Resources" section are within the boundaries of the IM-3 site and may be affected by facilities associated with the proposed project, regardless of the date of the baseline.

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		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	

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		resources. The cultural resources consultant shall invite Native American tribes to participate in this training. • To the extent feasible, these actions shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.	
Impact CUL-4: Disturbance of human remains, including those interred outside of formal cemeteries.	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**.	**Cultural Resources Mitigation Measure CUL-4**: 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.	With a January 2004 baseline, this impact and recommended mitigation measure would remain unchanged. Undiscovered Native American burials have the potential to be discovered at the IM-3 site regardless of the date of the baseline.

Table 7-1
Comparison of Impacts and Mitigation Conclusions: 2008 versus 2004 Baseline

2008 Baseline Analysis (Summary of analysis in the "Biological Resources" and "Cultural Resources" section of this EIR)			2004 Baseline Analysis
Area of Significant Impact	Description of Potential Impact	Mitigation Measures	
		• 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. • This mitigation measure shall be implemented in a manner that is consistent with mitigation required through the federal CERCLA process.	

The greatest disturbance since January 2004 appears to be the short-term disturbance to the creosote scrub habitat, most likely occurring during the construction of injection wells. Approximately 6 acres of creosote scrub habitat were disturbed by the previous construction at the IM-3 site. Creosote scrub habitat is regionally abundant; additional detail on this habitat is provided in Section 4.3, "Biological Resources," of this EIR. The pipeline from the extraction wells located in the area of the MW-20 bench to the treatment plant was constructed with IM-3 and crosses Bat Cave Wash through Mojave wash habitat. This habitat does not appear to have been affected during construction of the pipeline because the pipeline was placed along the edge of the road. The areas disturbed for IM-3 do not contain suitable habitat for the special-status species, with the exception of habitat for the desert tortoise. Desert tortoises do not appear to currently utilize the site, and have not done so within the recent past. A full list of the special-status species that have the potential to occur within the project area is provided in Table 4.3-3 and a figure showing the known locations of special status wildlife is provided in Exhibit 4.3-2.

7.2.2 IMPACT ANALYSIS

The project facilities that could occur within the IM-3 site are limited to freshwater injection wells, injection wells for carbon-amended water, monitoring wells, and associated utility and pipeline trenches. These features would require grading, drilling, trenching, and other earthmoving activities that would require removal of upland habitat. In addition, as part of the proposed project, IM-3 would be decommissioned. More detail on the physical attributes of these facilities and the proposed construction and decommissioning activities is provided in Chapter 3. The only sensitive habitat that would have the potential to be affected by these facilities when considering the 2004 baseline are the sensitive habitats such as Bat Cave Wash and very limited impacts to creosote scrub and Mojave wash habitats.

Impacts on creosote scrub habitat could occur as a result of the installation of new wells and associated infrastructure, as well as the decommissioning of IM-3 (when considering the 2004 baseline, which assumes that the existing IM-3 is not present). Significant impacts to terrestrial species would not occur because of the minimal acreage affected in the upland habitat (e.g., desert tortoise [*Gophers agassizii*] habitat) and its marginal quality. As with consideration under the May 2008 baseline (the baseline at the time the notice of preparation was issued), impacts to desert tortoise would be potentially significant because there is the slight chance that a desert tortoise could enter the project area, thereby be directly affected by the implementation of the project (CH2M Hill 2007: 5-11 through 5-12, included in Appendix BIO of this EIR). Decommissioning of the IM-3 site and loss of marginal desert tortoise habitat but these impacts would be relatively minor (although the number of acres would be greater when considering a 2004 baseline as compared to a May 2008 baseline). However, even in consideration of the larger amount of acres affected when considering a 2004 baseline (as compared to May 2008), these impacts would not be considered significant since the habitat area is regionally abundant and is not known to supporting the desert tortoise.

Impacts to Bat Cave wash and associated Mojave wash habitat could affect sensitive riparian habitats and associated suitable habitat for sensitive bird species. Because sensitive habitats could be affected, impacts on other special-status bird species (e.g., crissal thrasher [*Toxostoma bendirei*]) could occur; therefore, these impacts would be potentially significant under the 2004 baseline scenario. These potential impacts would not differ when comparing an analysis using a 2004 baseline to an analysis using the baseline at the time the NOP was issued (May 2008) because the construction of the IM-3 Facility did not affect these habitats. It should be noted that habitat for several of the bird species addressed in Chapter 4 are not present on the IM-3 site (i.e., southwestern willow flycatcher [*Empidonax trailii extimus*], and Yuma clapper rail [*Rallus longirostris yumanensis*]).

For the reasons described in this section, the impacts and mitigation measures required for the project would be the same as those identified in Section 4.3, "Biological Resources," of this EIR, regardless of which baseline condition is considered.

7.3 CULTURAL RESOURCES ANALYSIS

Using January 2004 as the baseline for environmental analysis, this section considers the impacts on cultural resources that would result from implementation of the proposed project. The project facilities that could occur within the IM-3 site are limited to freshwater injection wells, injection wells for carbon-amended water, monitoring wells, and associated utility and pipeline trenches. In addition, as part of the proposed project, the existing IM-3 treatment plant would be decommissioned.

7.3.1 JANUARY 2004 SETTING

In addressing the January 2004 setting it is important to note that in the project area, natural factors tend to affect cultural resources slowly. The amount of change caused by natural factors since January 2004 is not considered substantial. Therefore, this analysis focuses primarily on human-induced actions that could have changed the baseline conditions of cultural resources between 2004 and issuance of the NOP. For cultural resources, the January 2004 setting can be described on the basis of the following information sources, among others:

- Between May and July 2004, an intensive cultural resources survey was conducted by CH2M Hill. This survey occurred before construction of the IM-3 Facility was initiated (CH2M Hill 2004). This survey is the best available information for conditions in areas that were subsequently disturbed by the IM-3 Facility.

- Between September and December 2004, an intensive cultural resources survey of 1,815 acres was conducted by Applied Earthworks (Applied Earthworks 2007) after construction of the IM-3 Facility. This survey is the most detailed investigation of the IM-3 site, but does not provide direct observation of cultural resource areas that were affected by the construction of the IM-3 Facility.

- Cultural resources information was provided by Native American tribal representatives during the preparation of this EIR.

- Aerial photographs taken prior to the construction of IM-3 were reviewed during preparation of this EIR. Reviewing and comparing these photos to more recent photos revealed that although the overall integrity of the IM-3 parcel has been degraded somewhat, the vast majority of the area remains very much as it appeared in the 2004 aerial photograph.

- Information was supplied by PG&E regarding ground-disturbing activities that occurred between January 2004 and the construction of the IM-3 Facility. This information makes it possible to account for any changes to the condition or integrity of cultural resources that occurred between January 2004 and the May–July 2004 CH2M Hill survey.

As discussed in the "Cultural Resources" section of this EIR, 193 known prehistoric and historic resources exist within previously investigated 1,815-acre project study area. A subset of these (56 sites and 8 isolated finds) are located specifically within the IM-3 site. In addition, unknown/buried resources could be discovered in this area in the future. Finally, the Topock Cultural Area (as described in Section 4.4 "Cultural Resources") encompasses and surrounds the parcel.

7.3.2 IMPACT ANALYSIS

Throughout the construction and operation of the IM-3 Facility, PG&E maintained a policy of avoiding direct impacts on cultural resources. Nonetheless, the conditions of several cultural resources has changed since January 2004 as a result of facility construction and the operations of the IM-3 treatment plant and associated facilities (e.g., pipelines, monitoring wells). Based on the available data, as previously summarized, the following conditions that have changed since January 2004 can be identified:

- **CA-SBR-2910H (former location of U.S. Route 66)—**This site is eligible for the National Register of Historic Places (NRHP) (CH2M Hill 2004: 7-3) and hence is eligible for the California Register of Historical Resources (CRHR). A protective cap was placed on a portion of this site as a mitigation measure for the IM-3 Facility to protect the site from project-related truck traffic. Pipelines associated with the IM-3 Facility have been placed along the alignment of site CA-SBR-2910H, but they have been placed aboveground, and no ground-disturbing activities associated with these pipelines have occurred. These facilities have affected the historic setting of this cultural resource. The existing facilities at the IM-3 site also change the resource's historic setting. Although these changes negatively affected this resource after January 2004, CA-SBR-2910H remains a significant resource under CEQA.

- **CA-SBR-11704H—**This is a historic-period gravel-processing and refuse-disposal site that was evaluated as not eligible for the NRHP (CH2M Hill 2004: 7-3). Part of the site was affected by a staging area used during construction of the IM-3 Facility. Three monitoring wells have also been installed within the boundary of this site. The information provided in the CH2M Hill 2004 report is sufficient for purposes of CEQA evaluation, and it is clear that this site did not qualify as a significant resource under CEQA in January 2004. No further discussion of site CA-SBR-11704H is necessary because the site does not qualify as a historical resource or unique archaeological resource.

- **CA-SBR-11697H—**This site is eligible for the NRHP (CH2M Hill 2004: 7-3) and hence is eligible for the CRHR. This is a historic-period refuse scatter with 10 rock piles. The piles are roughly uniform in size and have a cairn-like appearance. The scatter is of historic-era refuse from 1920s to the 1940s, and is located across the center of the mesa top near the piles. A small tin-can dump is also present at the site, and integrity appeared to be retained. Three observation wells have been placed close to the site (with one located within the site boundary). Despite this change to the site that occurred after January 2004, site CA-SBR-11697H remains a significant resource under CEQA.

- **CA-SBR-219, Loci A, B, and C (Topock Maze)—Locus A** of this site is on the NRHP as an archeological resource and is a historical resource under CEQA, and Loci B and C, which have been determined eligible for the NRHP, are also determined significant for the purposes of CEQA by DTSC. As documented by CH2M Hill, the IM-3 Facility introduced out-of-character visual impacts to Locus B and Locus C of this resource. Despite the negative effects that have occurred since January 2004, this site, including Locus B and Locus C, remains a significant resource under CEQA, and Native American representatives continue to express concerns about its significance and historic setting. Loci B and C are located partially within the IM-3 site, while Locus A is located outside these site boundaries.

- **Topock Cultural Area—**Representatives of multiple Native American tribes, including the FMIT, the Quechan Tribe, the Hualapai Tribe, and the Cocopah Tribe, have expressed concerns about the cleanup and testing activities that have occurred at Topock since January 2004 affecting this resource. It is beyond the scope of this EIR, however, to define the boundaries of the Topock Cultural Area for purposes of the CRHP or NRHP, or to address areas that are not affected by the proposed project. According to many tribal representatives contacted as part of this project (and supported by evidence in the historical and ethnographic record), what is considered the Topock Cultural Area in this document is deeply tied with the spiritual and religious practices of the Mojave. As mentioned in Section 4.4, 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. Accordingly, the historic resource consisting of the project area and the Topock Maze is referred to the EIR as the Topock Cultural Area. According to some tribal representatives, the area surrounding the Topock Maze feature is considered part of a whole, with no differentiation seen between the sacred nature of the Topock Maze geoglyph and the surrounding landscape in association with this sacred site. According to information gathered through the NACP, the Topock Cultural Area is spiritually tied to and interconnected with other important locations in the Mojave traditional territory, including Spirit Mountain, Boundary Cone, and the

Needles Mountains. To affect one area, according to the Mojave worldview expressed during the NACP, is to affect them all.

A comparative summary of the cultural resources impacts identified and the mitigation measures necessary under both baseline scenarios (NOP baseline and 2004 baseline) is provided in Table 7-1. This table includes all of the cultural resources impacts and mitigation measures identified in Section 4.4 "Cultural Resources," which uses the time of NOP issuance as the baseline for impact analysis, and a column considering what changes, if any, would be necessary to these identified impacts and mitigation measures when using the 2004 baseline. Please note that the impact and mitigation to paleontological resources (CUL-3) presented in Section 4.4 of this EIR is not included in this summary table.[1]

With a January 2004 baseline, impacts and recommended mitigation measures would be generally identical to those identified using the 2008 baseline. Sixty-four of the 193 archaeological resources (sites and isolated finds) identified in Section 4.4 "Cultural Resources" are within the boundaries of the IM-3 site. The potential would remain for loss or damage of known cultural resources sites associated with construction and operations/maintenance activities. In addition, undiscovered cultural resources or Native American burials could be discovered. These resources would have the potential to be affected by any proposed project facilities within the IM-3 site, regardless of the date of the baseline.

Impacts to the historical resources, including the Topock Cultural Area, unique archaeological resources, and Native American burials, as well as the recommended mitigation measures for those impacts, would remain unchanged. The impact and mitigation measures (CUL-1a, -1b, and -1c, CUL-2, and CUL-4) regarding potential loss or damage to historical resources, unique archaeological resources, and Native American burials would remain applicable. In January 2004, a protective cap was placed on a portion of site CA-SBR-2910H as a mitigation measure for the IM-3 Facility to protect the site from project-related truck traffic. Presuming that the cap did not exist, additional measures would need to be implemented to protect site CA-SBR-2910H. These measures would involve either implementing mitigation similar to the cap, or rerouting site access and other project facilities to avoid these CRHR-eligible sites. Under the proposed project, alternative access routes would likely be deemed infeasible because these new routes would result in additional grading, which would have the potential to disturb additional culturally significant sites in the IM-3 site area. These other culturally significant sites may include historical resources associated with Route 66 and portions of the National Old Trails Road, or prehistoric sites including Loci B and C of the Topock Maze. For these reasons, a mitigation method similar to the cap implemented in January 2004 would likely be determined to be the most environmentally sensitive solution for CA-SBR-2910H, thereby limiting new grading and providing some protection to present cultural resources. However, regardless of the timing of the baseline, this approach would negatively affect recorded site CA-SBR-2910H by introducing a significant and unavoidable change to the resource.

The effects of decommissioning under either baseline scenario would be similar to those of construction activities, with a potential for the loss or damage of known cultural resources sites near decommissioning activities. Information gathered as part of this EIR through the NACP and other sources suggests that some tribal stakeholders would consider the decommissioning activities associated with the proposed project would create a temporary, adverse change to the Topock Cultural Area, but that ultimate removal of all proposed project facilities would serve to largely restore the sanctity of the area.

[1] The Settlement Agreement requires an analysis of biological and cultural resources. Despite the fact that CEQA considers paleontology as part of a cultural resource analysis for the purposes of environmental documentation, paleontological resources are geologic in nature and are not cultural resources.

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8 ALTERNATIVES TO THE PROPOSED PROJECT

8.1 INTRODUCTION

The proposed project has been described and analyzed in the previous chapters of this EIR with an emphasis on potentially significant environmental impacts and recommended mitigation measures to reduce those impacts. According to the CEQA Guidelines, an EIR must also "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives" (CEQA Guidelines, Section 15126.6[a]). The discussion of alternatives must include sufficient information about each alternative to allow "meaningful evaluation, analysis, and comparison with the proposed project" (Section 15126.6[d]). CEQA does not prescribe fixed rules governing the type of alternatives to a project that should be analyzed, and the nature of alternatives varies depending on the context of the project being analyzed. As expressed by the California Supreme Court: "CEQA establishes no categorical legal imperative as to the scope of alternatives to be analyzed in an EIR. Each case must be evaluated on its facts, which in turn must be reviewed in light of the statutory purpose" (*Goleta*: 566). Ultimately, as specified in the CEQA Guidelines, the nature and scope of the alternatives to be discussed in an EIR are governed by the rule of reason, and an EIR must "set forth only those alternatives necessary to permit a reasoned choice" (Section 15126.6[f]).

The following discussion is intended to inform the public and decision makers about the potentially feasible project alternatives that could be developed and the positive and negative aspects of those alternatives when compared to the proposed project. As described in Section 3.2 in Chapter 3, "Project Description," past activities at the compressor station have resulted in contamination of groundwater with chemicals of potential concern (COPCs) including total chromium [Cr(T)], Cr(VI), molybdenum (Mo), selenium (Se), and nitrate. Remediation of contamination is necessary to protect the health of humans and the environment.

The remedial action objectives (RAOs) of this project are intended to provide a general description of the cleanup objectives and to provide the basis for the development of site-specific remediation goals. The RAOs specify the contaminants of concern, the exposure routes and receptors, and acceptable contaminant concentrations for each exposure pathway. Protective measures can be achieved by limiting or eliminating the exposure pathway, reducing or eliminating chemical concentrations, or both.

This chapter also briefly describes the rationale for selecting the alternatives to be discussed, identifies any alternatives that were considered by DTSC but rejected as infeasible because they did not meet the standards of the applicable or relevant and appropriate requirements or because they would cause environmental consequences that are greater than the options presented for the proposed project. This chapter briefly explains the reasons underlying DTSC's determination.

The specific alternative of "no project" is also identified and evaluated along with any potentially significant adverse impacts on the physical environment associated with that alternative as required by CEQA. The purpose of describing and analyzing a no project alternative is to allow DTSC to compare the impacts of approving the proposed project with the impacts of not approving the proposed project in a manner consistent with the CEQA Guidelines, Section 15126.6(e). Finally, from among the alternatives identified in this chapter, the environmentally superior alternative has been selected.

8.2 RATIONALE FOR SELECTION OF ALTERNATIVES

The rationale for DTSC's consideration of these alternatives is based on DTSC's review and participation in the Final CMS/FS process, which provided an exhaustive consideration of all potential options and technologies for remediation of the contaminated groundwater plume while meeting the RAOs and other requirements, including the applicable statutory requirements of RCRA/CERCLA and the associated Corrective Action Consent and

Administrative Consent Agreements for Topock. Section 21154 of the California Public Resources Code prescribes that "[w]henever any state agency, board, or commission issues an order which requires a local agency to carry out a project which may have a significant effect on the environment, any [EIR] which the local agency may prepare *shall be limited to consideration of those factors and alternatives which will not conflict with such order*" [emphasis added]. The reasoning behind DTSC's selection of alternatives is consistent with this mandate to local agencies, in that DTSC's decision whether to pursue the proposed project and the selection of alternatives must not conflict with the applicable provisions of RCRA/CERCLA and the Consent Agreements issued for the Topock site.

As such, the range of alternatives considered in this chapter is based on seven feasible remediation alternatives to the proposed project (Alternative E—In Situ Treatment with Freshwater Flushing) that fell within the parameters of the RAOs for the project identified in the Final CMS/FS (CH2M Hill 2009, included in Appendix CMS of this EIR). These alternatives include:

- **Alternative B—Monitored Natural Attenuation**
- **Alternative C—High Volume In Situ Treatment**
- **Alternative D—Sequential In Situ Treatment**
- **Alternative F—Pump and Treat**
- **Alternative G—Combined Floodplain In Situ/Pump and Treat**
- **Alternative H—Combined Upland In Situ/Pump and Treat**
- **Alternative I—No Project Alternative/Continued Operation of Interim Measure**

(Alternative I is identified as the "no project alternative" because it represents the existing site conditions. See the explanation in Section 8.3.7 of this chapter.)

8.3 ELEMENTS COMMON TO ALL ACTIVE PROJECT ALTERNATIVES

Of the seven alternatives, six are considered active remediation. Alternative B would rely on natural attenuation processes, but also includes groundwater monitoring and institutional controls. Alternatives C, D, F, G, H, and I (known as active remediation alternatives) include some combination of the following remedial elements:

- in situ treatment,
- ex situ treatment,
- monitoring,
- removal,
- disposal,
- institutional controls, and
- natural attenuation.

The combination of remedial elements would result in differing lengths of the operation and maintenance phase because of the variation in the duration of time to achieve the cleanup goals of regional background concentration of 32 micrograms per liter (µg/l) of Cr(VI).The following elements would be included in each remediation alternative to differing degrees, as noted below. All of these elements are also common to the proposed project and are described in Chapter 3, "Project Description," in more detail.

8.3.1 CONSTRUCTION ACTIVITIES

Construction for each of the alternatives would be similar to those construction activities described in Chapter 3 for the proposed project, to varying degrees of intensity and duration as described below for each alterative. Construction would be required for the installation of wells, utilities, pipelines, and other associated facilities required for each alternative. The length of time required for construction depends on a number of factors, including the number of wells, pipelines, and other infrastructure associated with each alternative; the geologic conditions encountered during well installation; the time required for regulatory and landowner approvals; and the availability of construction labor and materials at the time of construction. Construction would be limited to daylight hours to minimize the need for lighting and conserve energy to the extent practical; however, some nighttime construction efforts may be required. In general, construction activities would include the mobilization

of equipment, supplies, and workers to and from the project area. Construction workers would be present on-site each day throughout the duration of construction. Heavy equipment would likely include drill rigs to install remediation wells; trucks and excavators or backhoes to lay the pipeline network; and cranes to erect a treatment plant (in the case of Alternatives F, G, and H) and to place control sheds and reductant storage tanks. Trucks would be necessary for making deliveries and hauling waste from the site. Alternative I would use the existing IM facilities and would not involve constructing new remediation facilities; however, construction activities would occur from time to time over the operational period to replace wells or other structures that may become worn, clogged, or damaged.

Potable water for use during construction activity (e.g., for well installation and dust suppression) would be distributed throughout the project area from the existing water tanks at the compressor station to other locations in the project area for use during drilling. Tanks, bins, or tanker trucks would likely be used to contain excess water and drill cuttings at the drill site and at designated staging areas. Staging areas would most typically be located in areas that are already developed or disturbed, such as within the fenced and developed areas at the compressor station. However, staging could also be located anywhere within the project area that is defined within each of the exhibits shown for the alternatives.

8.3.2 GROUNDWATER MONITORING NETWORK

With the exception of Alternative I, each of the alternatives would enhance the existing groundwater monitoring network with additional groundwater monitoring wells. The maximum number of wells reflects newly installed wells associated with each alternative. Replacement of wells would occur during operation of the alternatives. More than 90% of the wells are assumed to be located in the upland areas, with no more than a few percent in floodplain or bedrock areas (PG&E 2010).

In addition to the newly installed wells to enhance the existing network, monitoring wells would be replaced during the operation of all the alternatives, including Alternative I.

Each of the alternatives (including Alternative I) would include a monitoring program of routine sampling, analysis, and reporting, which would occur until the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met. Long-term monitoring would also occur following completion of the active treatment.

8.3.3 WATER CONVEYANCE, UTILITIES, AND ROADWAYS

Locations of utilities (electrical and communication lines) and water conveyance structures would depend on the ultimate placement of monitoring and treatment facilities. Depending upon required service life, security, and access, landowner requirements, type of pipeline, and environmental constraints (e.g., subsurface geologic features or cultural resources), pipelines could be installed aboveground or belowground. Alternatives C, D, F, G, and H include constructing new pipelines to convey water between locations such as between wells or to/from an ex situ treatment plant. Utilities and water conveyance pipelines would likely be constructed using standard construction methods, and may need to be constructed beneath or around existing structures such as Interstate 40, railroad tracks, and/or existing pipelines. Piping and utility lines would need to be repaired and replaced as needed during the operation and maintenance period of each alternative. Refer to each alternative discussion below for the proposed pipeline and utility line lengths.

Trenches would be used to place subsurface infrastructure for protection from vandalism and adverse effect from heat. Trenches would be excavated with heavy equipment such as backhoes or excavators to depths of 3 to 4 feet. The top of the trench would be restored to match the surrounding area, whether it is pavement or soil (CH2M Hill 2009: Appendix D, included in Appendix CMS of this EIR).

Depending on the location of extraction, treatment, and injection facilities of Alternatives C, D, F, G, and H, additional access routes could be constructed, or existing roads improved to support the level of activities

proposed. Locations of new or improved roads would be within boundaries of the project area defined for each alternative described below, and would be designed to minimize grading, disturbance of sensitive resources and existing structures, and maximize the use of existing roads. Typical road design and construction involves topographic surveying, grading, installing surface drainage systems (culverts, gutters, and riprap for slope protection) and constructing retaining walls. It is assumed that the roads would be maintained through the operation and maintenance period for each specific alternative, as necessary. Some roads may be paved with asphalt, some may be paved with gravel, and some may be unpaved, depending on the location and purpose. The roads would be constructed as needed for construction, operation, and maintenance of remedial and/or monitoring facilities in a currently inaccessible location, which may range from a few years (for injection wells) to decades (for an aboveground treatment structure). Following determination that the remedial or monitoring structure is no longer needed, the road would be closed and restored to preproject conditions. As such, no permanent roads are proposed under any of the alternatives. Refer to each alternative discussion for the proposed roadway lengths.

8.3.4 OPTIMIZATION OF ALTERNATIVES

Optimization of Alternatives C, D, F, G, and H would occur throughout the design, construction, and operational phases of implementation. Changes to the number, location, and configuration of the extraction, treatment, and injection systems, and/or changes to the type, method, and configuration of the treatment delivery systems, as approved by appropriate agencies, may occur to enhance performance of the remedy to attain the cleanup goals, and to respond to site conditions and performance issues.

8.3.5 DECOMMISSIONING OF FACILITIES

Following determination that the cleanup goals for Cr(VI) that are defined in the remedial action objectives (32 µg/l) have been met, the facilities under each alternative (e.g., extraction wells, injection wells, treatment plant, and piping) would be decommissioned. Groundwater monitoring wells throughout the site would be decommissioned following the determination that additional information from the wells would not be needed to evaluate attainment of the cleanup goals. After deconstruction and decommissioning of the facilities, the areas would be restored using decompaction and grading techniques designed to decrease erosion and accelerate revegetation of native species or as directed by the land manager.

8.3.6 INSTITUTIONAL CONTROLS

Institutional controls are nonengineering mechanisms, such as legal or contractual restrictions on property use, which are used to help minimize the potential for human exposure to contamination and/or protect the integrity of a remedy. Institutional controls work by limiting land or resource use and/or by providing information that helps modify or guide human behavior at a site. Under each alternative, an institutional control would be maintained during the remediation period to restrict use of groundwater in the plume area until the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, thereby eliminating the pathway for human health risk from direct exposure to groundwater. The area subject to the institutional control would include areas affected by the plume to prevent the consumption of contaminated water a result of pumping from hypothetical future local water supply wells. Maintenance of institutional controls would occur for all alternatives and would not require any physical disturbance in the project area.

8.4 DESCRIPTION OF ALTERNATIVES TO THE PROPOSED PROJECT

This section provides tables summarizing the basic components and operational demands for each alternative. This section also provides conceptual descriptions of the specific elements that vary among the alternatives. Table 8-1 provides a summary of the key characteristics between the conceptual design and construction of facilities, as well as the key operational elements for each alternative. Table 8-2 provides a comparison of

construction-related differences between each alternative. The detailed discussion for each alternative follows Tables 8-1 and 8-2.

8.4.1 ALTERNATIVE B—MONITORED NATURAL ATTENUATION

Under Alternative B, no active treatment to reduce Cr(VI) concentrations in groundwater would occur. This alternative would rely only on the naturally reducing conditions in shallow floodplain areas of the site to remove Cr(VI) from groundwater. These reducing conditions are derived from naturally occurring organic carbon in the fluvial deposits associated with the Colorado River. Wherever the natural reducing capacity of the fluvial material is present, Cr(VI) is converted to its stable and less toxic form of trivalent chromium [Cr(III)], which is essentially immobile. The reducing conditions in the fluvial sediments provide a natural geochemical zone that limits or prevents the movement of Cr(VI) through the fluvial sediments adjacent to and beneath the Colorado River. Under Alternative B, up to 60 additional monitoring wells could be installed (not including replacement wells), and institutional controls would be included to minimize the potential for human exposure to contamination. In addition, during the operation and maintenance phase, wells could be replaced if necessary. Exhibit 8-1 shows the area in which the monitoring wells could be installed under Alternative B.

Because no active treatment processes are included in Alternative B, no remediation wells or associated facilities (i.e., pipelines, roads, or utility connections) would be implemented. The IM-3 Facility would be decommissioned when the lead agency is confident that the contaminated groundwater plume is contained and that the monitored natural attenuation is reducing the concentration of the plume at all locations within the plume, which could be for an extended period of time. Once the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, the monitoring wells would be decommissioned. Because of the lack of remediation facilities, Alternative B would have substantially less initial ground disturbance and construction activity than any of the other project alternatives or the proposed project, but during the entire life of this alternative (operation and maintenance phase), it would have the longest period of continuous disturbing activities. Exhibit 8-1 illustrates the area in which groundwater monitoring wells could be implemented for Alternative B (PG&E 2010). It is estimated that the monitored natural attenuation process would occur for an estimated 540 years, but could occur for as long as 2,200 years.

Alternative B would generally meet most project objectives in that institutional controls would prevent ingestion of groundwater as a potable water source and the natural processes would reduce the mass of Cr(T) and Cr(VI) in the groundwater. This alternative would not comply with State Water Resources Control Board Resolution 92-49, however, which states that the regional water quality control boards shall "Concur with any investigative and cleanup and abatement proposal which the discharger demonstrates and the Regional Water Board finds to have a substantial likelihood to achieve compliance *within a reasonable timeframe*…" (emphasis added). Because Alternative B would not occur within a reasonable time frame (as defined in the applicable or relevant and appropriate requirements [ARARs]), the project objective of reducing the mass of Cr(T) and Cr(VI) in groundwater at the project area to comply with the ARARs would not be met. Also, ongoing monitoring would be needed to assure continued protection of the river over the long duration of this remedy. Because of the slow movement of groundwater at the site, many centuries would pass before the Cr(VI) concentrations everywhere in the plume reached cleanup goals. During this long period of time, changes in groundwater flow directions or geochemical conditions in the reducing zone around the river could occur, which leads to uncertainty in the long-term protectiveness of this alternative. In addition, further studies to assess the effectiveness of long-term natural attenuation in the East Ravine would continue during remedial design.

8.4.1.1 OPERATIONS AND MAINTENANCE

Operation and maintenance of this alternative would occur during the entire period in which cleanup activities would be ongoing, and until the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met. Depending on the performance of the alternative, it is estimated that the operation and maintenance phase

(total time for cleanup of the plume to background levels of Cr(VI) for Alternative B) would range from 220 years to 2,200 years; however, best estimates suggest that this time could be 540 years (CH2M Hill 2009:24, included in Appendix CMS of this EIR). This time to attain cleanup goals and project objectives is the longest of the alternatives considered in this DEIR. The actual cleanup time would be dependent on the flushing efficiency of the aquifer and transport of Cr(VI) from all parts of the plume under natural hydraulic gradients to the natural reductive conditions in the floodplain. These factors are subject to considerable uncertainty. Under this alternative, the IM-3 Facility would be decommissioned as described in the project description in Chapter 3, "Project Description."

Operation would be primarily associated with the maintenance of monitoring wells and the regular sampling and testing that would be required. Replacement of wells may be necessary during the entire duration of the operation and maintenance phase (estimated at 540 years), which could involve some construction activity. During operation, an estimated 80 tons of carbon dioxide could be generated per year, and a small amount of energy would be required for sampling pumps and vehicle use. Extraction of groundwater would be limited to purge water generated during monitoring well sampling. Operation and maintenance of Alternative B would include three site managers 5 days per week, and an average of seven workers on-site for 4 weeks per year for sampling and maintaining the monitoring well network. Operation would also include four workers on-site for 2 weeks for sampling of the Colorado River, requiring two boats per effort. Additional trips that would be required throughout the duration of operation and maintenance include:

- 10 delivery trucks or sampling vehicles per monitoring event and
- three passenger vehicles (15 trips per week) for site management.

8.4.1.2 CONSTRUCTION ACTIVITIES

The general project construction activities described above and in Chapter 3, "Project Description," for monitoring well installation would occur, though to a much lesser extent initially because the alternative is limited to the installation of up to 60 new monitoring wells and no other infrastructure would be built. Over the life of the alternative, this reduced level of construction activities continue for a much longer period of time, with ongoing replacement of monitoring wells taking place over a 540 to 2,200 year time frame. For the construction of the 60 new monitoring wells, a maximum of 160 cubic yards of soil could be disturbed during well installation and estimated water use during construction could be 0.2 acre-foot (PG&E 2010).

8.4.2 ALTERNATIVE C—HIGH VOLUME IN SITU TREATMENT

Alternative C would involve active in situ groundwater treatment by distributing an organic carbon substrate across the entire plume through high-volume pumping using wells installed primarily in previously disturbed areas. Although this alternative has been designed to minimize the number of wells outside previously disturbed areas, it still requires a substantial number of wells because of the limited distance that carbon substrates can travel in the aquifer before they are fully metabolized by microbes in the soil. Under Alternative C, up to 310 new wells could be installed, of which 240 would be remediation wells (including extraction, injection and in situ reactive zone [IRZ] wells) and 70 would be monitoring wells. Of the 240 remediation wells, an estimated 50% would be upland remediation wells, 40% would be floodplain remediation wells, and 10% would be bedrock remediation wells (PG&E 2010, CH2M Hill 2009:Table D-19B, included in Appendix CMS of this EIR). This alternative contains a larger amount of remediation wells and infrastructure, and therefore would have greater associated ground disturbance in both upland and floodplain areas, than the other project alternatives and the proposed project. Alternative C is carried forward for consideration in the alternatives analysis because it meets all of the objectives stated for the proposed project. Exhibit 8-1 shows the project site in which monitoring wells would be located (note that the area where monitoring wells could be located is the same under Alternatives B, C, F, and G, and under the proposed project as shown in Exhibit 3-5). Exhibit 8-2 presents a conceptual illustration of the potential layout of remediation facilities for Alternative C.

Table 8-1
Summary of Design and Operation Features for Project Alternatives

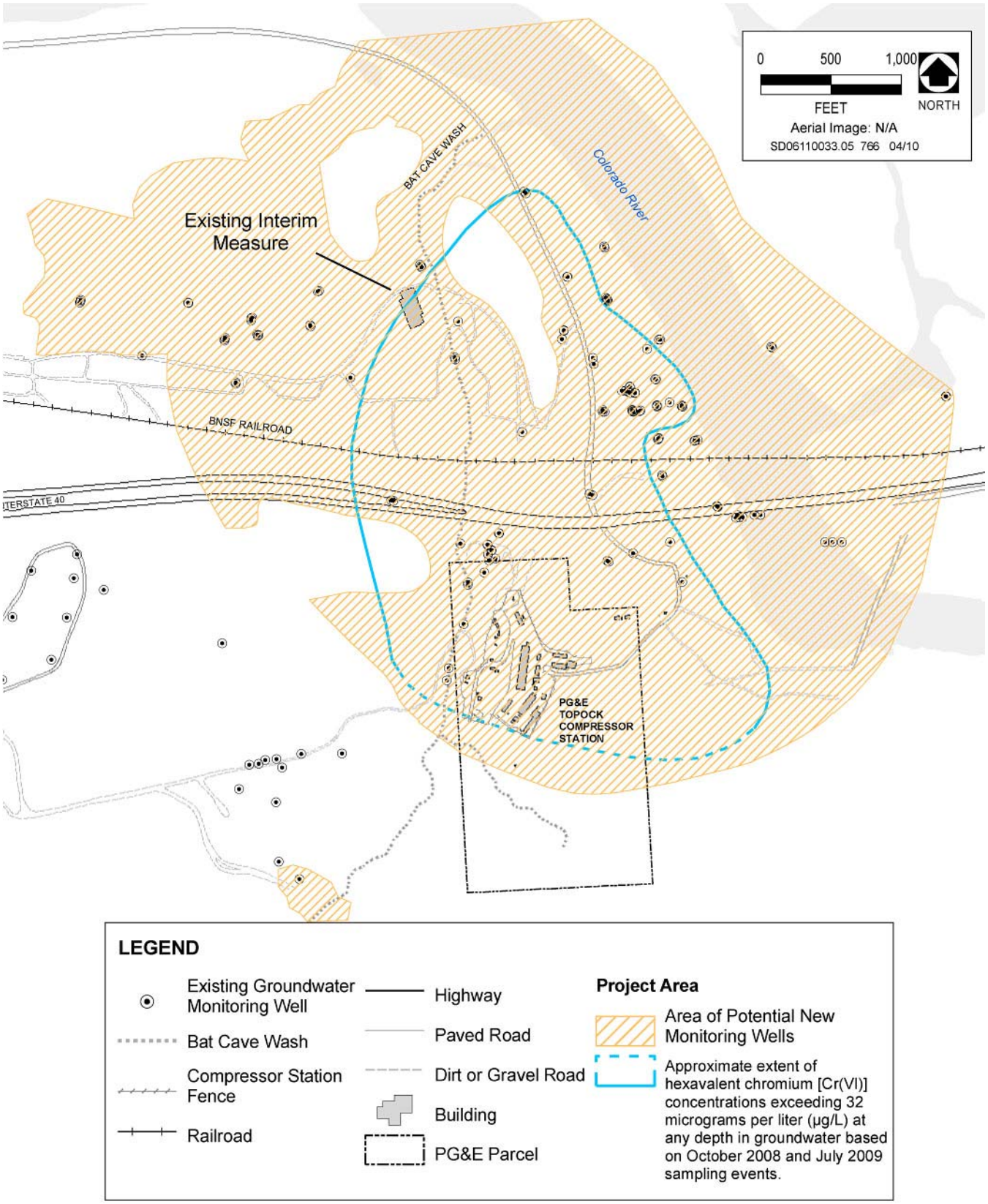
Alternative	Project Components and Operational Demand											
	Number of Monitoring Wells	Number of Remediation Wells (a)	Total Number of Wells (a)	Treatment Plant (square feet) (a)	Pipeline Length (linear feet) (b)	Electrical and Communication Length (linear feet) (c)	Roads (linear feet)	Energy Use (kWh/year)	Waste Generation (tons/year)	Truck Trips (per year) (d)	CO_2 Emissions (tons/year)	Estimated Operation & Maintenance Phase (f)
Proposed Project												
E—In Situ with Freshwater Flushing	60	110	170	0	50,000	50,000	6,000	1.6 million	Minimal	40	1,000	29 years
Alternatives to the Proposed Project												
B—Monitored Natural Attenuation	60	0	60	0	0	0	0	Minimal	Minimal	0	80	540 years
C—High Volume In Situ Treatment	70	240	310	0	40,000	60,000	16,000	2.6 million	Minimal	200	1,600	18 years
D—Sequential In Situ Treatment	80	200	280	0	60,000	110,000	16,000	0.8 million	Minimal	100	600	15 years
F—Pump and Treat	50	70	120	190,000	40,000	30,000	6,000	11million	6,200	360	6,200	37 years
G—Combined Floodplain In Situ/Pump and Treat	60	140	200	190,000	40,000	40,000	12,000	11 million	6,200	400	6,400	22 years
H—Combined Upland In Situ/Pump and Treat	70	140	210	120,000	50,000	50,000	12,000	7.6 million	1,300	300	4,400	18 years
I—No Project/Continued Operation of Interim Measure (IM-3)	0	0	0	0	0	0	0	1.8 million	0 **(e)**	220	1,300	240

Notes: CO_2 = carbon dioxide; kWh = kilowatt-hours
(a) These estimates include only new wells and do not include replacement wells. Cluster or co-located wells are counted individually for the purpose of this table.
(b) These estimates only include a new treatment plant for ex situ treatment of Cr(VI).
(c) These estimates include initial construction only.
(d) These estimates include primary treatment elements of alternatives, and do not include activities such as construction, maintenance, or monitoring.
(e) These estimates do not include brine waste
(f) Duration of operation and maintenance estimate is based on the approximate time to clean up the contaminated groundwater plume to background concentrations of 32 micrograms per liter of Cr(VI), on information contained within the Final CMS/FS. In addition to this estimate, 10 years of additional monitoring would be required for all alternatives.
Sources: CH2M Hill 2009, included in Appendix CMS of this EIR; PG&E 2010

Table 8-2
Initial Construction Activities by Alternative[1]

Alternative	Construction Duration[2] (years)	Estimated Soil Disturbance (cubic yards)	Water Use (acre-feet)
Proposed Project			
E—In Situ with Freshwater Flushing	4	13,400	9.2
Alternatives to the Proposed Project			
B—Monitored Natural Attenuation	1	160	0.2
C—High Volume In Situ Treatment	3	13,500	19.9
D—Sequential In Situ Treatment	3	11,800	20.2
F—Pump and Treat	2	22,500	8.0
G—Combined Floodplain In Situ/Pump and Treat	3	25,400	20.4
H—Combined Upland In Situ/Pump and Treat	3	19,900	15.9
I—No Project/Continued Operation of Interim Measure (IM-3)	No new construction is required	0	0

[1] Does not include construction activities required throughout the operation and maintenance phase for replacement of remedial or monitoring structures
[2] The estimated duration of construction for alternatives represents the duration of construction for the remediation facilities. In addition to the duration presentation, 1 year would be required for decommissioning of IM-3.
Sources: CH2M Hill 2009, included in Appendix CMS of this EIR; PG&E 2010



Source: Data provided by CH2M Hill and PG&E and compiled by AECOM

Area of Potential Monitoring Wells (Alternatives B, C, F, G) **Exhibit 8-1**

Alternative C would locate injection wells within the center of the plume and extraction wells at the plume margin. An organic carbon substrate would be injected to create geochemically reduced conditions and convert the harmful and soluble Cr(VI) to the insoluble form of chromium, Cr(III). Since the reduced chromium would be deposited in the soil formation instead of being dissolved in groundwater, Cr(VI) would be removed from groundwater. Under Alternative C, groundwater would be extracted along National Trails Highway and along the western margin of the plume, amended with a carbon substrate, and distributed into the injection wells within the center of the plume. The extraction/injection well lines would form a recirculation system to induce a hydraulic gradient to distribute the carbon substrate throughout the plume. Implementation of this alternative would consist of two phases: floodplain cleanup and interior plume cleanup. Exhibit 8-2 illustrates the conceptual remedial approach for the two phases of Alternative C. Alternative C is carried forward for consideration in the alternatives analysis because it meets all of the objectives stated for the proposed project.

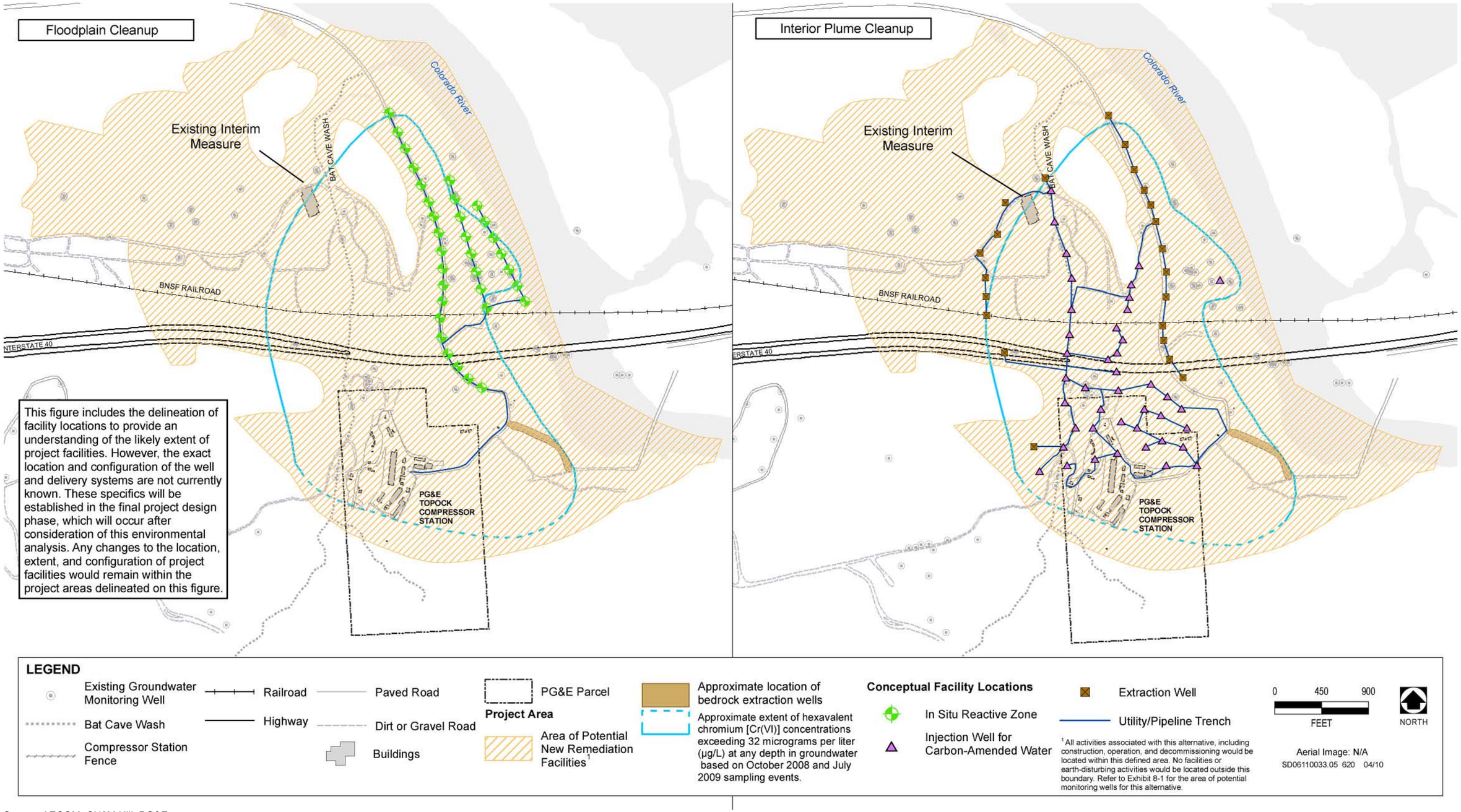
8.4.2.1 FLOODPLAIN CLEANUP

Phase 1 involves construction of an IRZ zone or lines (a line of wells within the in situ reactive zone) across the width of the plume along National Trails Highway and construction of IRZ zone between National Trails Highway and the Colorado River (see the left pane of Exhibit 8-2). Organic carbon would be injected in the IRZ lines to treat the existing Cr(VI) in the alluvial zone of the floodplain aquifer. The IRZ zone along National Trails Highway would be constructed using a series of wells that could be used either as injection or extraction wells to circulate groundwater and to distribute the organic carbon substrate. The floodplain IRZ zone could be constructed using arrays of injection and extraction wells, or they could be constructed with injection wells only. The final design may be adjusted based on stakeholder and engineering considerations and the exact conditions present in the floodplain at the time of final remedy design. Phase 1 would operate until cleanup goals within the plume east of National Trails Highway were attained. The purpose of Phase 1 is to provide a robust, wide barrier to convert Cr(VI) to Cr(III) in the area of the site nearest the Colorado River. The current monitoring well network in the floodplain and the additional Phase 1 monitoring wells would provide an extensive monitoring network to measure chromium concentrations and adjust the active interior plume cleanup following completion of Phase 1.

8.4.2.2 INTERIOR PLUME CLEANUP

Phase 2 involves construction of extraction wells around the perimeter of the plume and injection wells through the interior of the plume (see the right pane of Exhibit 8-2). Water would be pumped from the extraction wells, organic carbon added, and the amended water injected into the core of the plume. The organic carbon in the injected water would create geochemically reduced conditions in the aquifer to remove the Cr(VI) from groundwater. The assumed total pumping/injection rate under this alternative would be approximately 2,000 gallons per minute (gpm). The actual pumping rate would not be expected to be steady-state throughout the operation and maintenance phase, but would be adjusted to respond to site conditions and to optimize performance of the remedy.

Depending on the results of hydraulic testing of the injection and extraction wells, this phase of the alternative would be implemented in stages so that not all the wells were pumping at once. This staged implementation could allow for maximization of the injection rate at each injection well to improve the distribution of the organic carbon. Because of the relatively large distance between the injection and extraction wells, it is anticipated that there would be areas of the plume where organic carbon is not able to reach. Alternative C provides for continued operation of the pumping and injection systems to flush the remaining Cr(VI) from those portions of the aquifer not adequately treated by in situ methods. During this flushing period, carbon would continue to be added only at levels sufficient to treat the water being injected as part of aquifer flushing. After the initial distribution of carbon has been achieved, there would be no need to continue to distribute the carbon across large areas of the aquifer because the water drawn from the perimeter would be treated and injected, while the water from the central portion of the plume would also be treated as it flows through the reduced zone generated from the initial high concentration injection of carbon around the injection wells.



Source: AECOM, CH2M Hill, PG&E

Conceptual Remedial Approach, Alternative C—High Volume In Situ Treatment **Exhibit 8-2**

8.4.2.3 WATER CONVEYANCE, UTILITIES, AND ROADWAYS

Alternative C could include up to 40,000 feet of water conveyance facilities and pipelines, and up to 60,000 feet of utility lines (electrical and signal communications). In addition, Alternative C could include up to 16,000 feet of new and/or improved roadways. These proposed lengths include initial construction only and do not include any needed repair or replacement during the operations and maintenance period of the alternative (CH2M Hill 2009:Appendix D, included in Appendix CMS of this EIR).

8.4.2.4 OPERATION AND MAINTENANCE

Operation and maintenance activities for Alternative C would include periodic well maintenance, groundwater sample collection and analysis, refinement of the injection/recirculation systems, management of the substrates, equipment inspections, and periodic replacement of wells and other structures that become clogged or damaged. During the operation and maintenance phase replacement of wells may be necessary, which could involve some construction activity.

Depending on the performance of the alternative, it is estimated that the operation and maintenance phase (total time for cleanup of the plume to background levels of Cr(VI) for Alternative C) would range from 10 years to 60 years; however, best estimates suggest that this time could be 18 years (CH2M Hill 2009, included in Appendix CMS of this EIR). In addition, after cleanup goals are attained, an additional 10 years of monitoring is expected to occur.

An estimated 1,600 tons of carbon dioxide could be generated per year for vehicles and power, and an estimated 2.6 million kilowatt-hours per year could be consumed to operate pumps and other equipment. An estimated 2 billion gallons of water per year could be pumped and reinjected (with no net water use) under Alternative C. Operation and maintenance of Alternative C would include one on-site operator 7 days per week, an additional on-site operator 4 days per week, and three on-site managers 5 days per week. It would also include seven workers on-site for 4 weeks per year for sampling and maintaining the monitoring well network (PG&E 2010). Additional trips that would be required throughout the duration of operation and maintenance include:

- 100 vehicles per year for regular maintenance,
- up to 10 additional vehicles per year for nonroutine maintenance,
- 200 tanker trucks per year to deliver treatment chemicals,
- one pump rig for 1 to 4 months per year for well maintenance,
- 10 delivery trucks or sampling vehicles per monitoring event, and
- three passenger vehicles (15 trips per week) for site management.

8.4.2.5 CONSTRUCTION ACTIVITIES

Construction activities for Alternative C could include installation of up to 310 new monitoring and remediation wells and associated facilities (e.g., utilities, pipelines, roads, reagent tanks) that would be similar to those described for the proposed project. The general project construction activities described above and in Chapter 3, "Project Description," would occur, though to a greater intensity because of the increased number of wells and infrastructure that would be required. Construction of Alternative C would extend for up to 4 years—3 years for construction of the in situ facilities and an additional 1 year for decommissioning of the IM-3 facility. A maximum of 13,500 cubic yards of soil could be disturbed during construction. Estimated water use during construction could be 19.9 acre-feet (PG&E 2010). Some construction activity would occur during the estimated 18-year operation and maintenance phase, if replacement of wells is necessary.

8.4.3 ALTERNATIVE D—SEQUENTIAL IN SITU TREATMENT

Under Alternative D, treatment of Cr(VI) would occur by injecting an organic carbon substrate throughout the plume to create geochemically reduced conditions to convert Cr(VI) to insoluble Cr(III). Because the reduced chromium would be deposited in the soil formation instead of groundwater, Cr(VI) would be removed from groundwater. Approximately 10 treatment zones consisting of lines of injection and extraction wells would be constructed and operated in phases to distribute an organic carbon substrate over the entire plume. Wells would be switched from extraction to injection as the implementation progressed through different phases of treatment. Lines of wells would be constructed with piping and power to allow each line to be operated in either an injection or extraction mode. Water would be pumped from one line of wells and injected into the adjacent line of wells. Carbon substrate would be added to extracted water prior to injection. The carbon would be distributed throughout the aquifer in the area between the active injection and extraction well lines.

Under Alternative D up to 280 new wells could be installed, of which 200 would be remediation wells (including extraction, injection and IRZ wells) and 80 would be monitoring wells. Of the 200 remediation wells, an estimated 70% would be upland remediation wells, 10% would be floodplain remediation wells, and 20% would be bedrock remediation wells (PG&E 2010, CH2M Hill 2009:Table D-19B, included in Appendix CMS of this EIR). Exhibits 8-3 and 8-4 show the area of potential monitoring wells and remediation wells, respectively, for Alternative D. The area of potential disturbance for Alternative D covers the largest of all alternatives.

The floodplain would be treated in the initial phase by pumping from wells near the Colorado River and injecting into wells near National Trails Highway. Once carbon distribution is complete and Cr(VI) is below cleanup goals in the floodplain, the series of wells along National Trails Highway would be converted to extraction wells and injection would be moved to the adjacent series of wells west of National Trails Highway. This “leapfrog” pattern of moving the injection and extraction after each segment of the plume was treated would be repeated throughout all the lines of wells until the entire plume had been treated. Exhibit 8-4 illustrates the conceptual remedial approach for Alternative D (PG&E 2010).

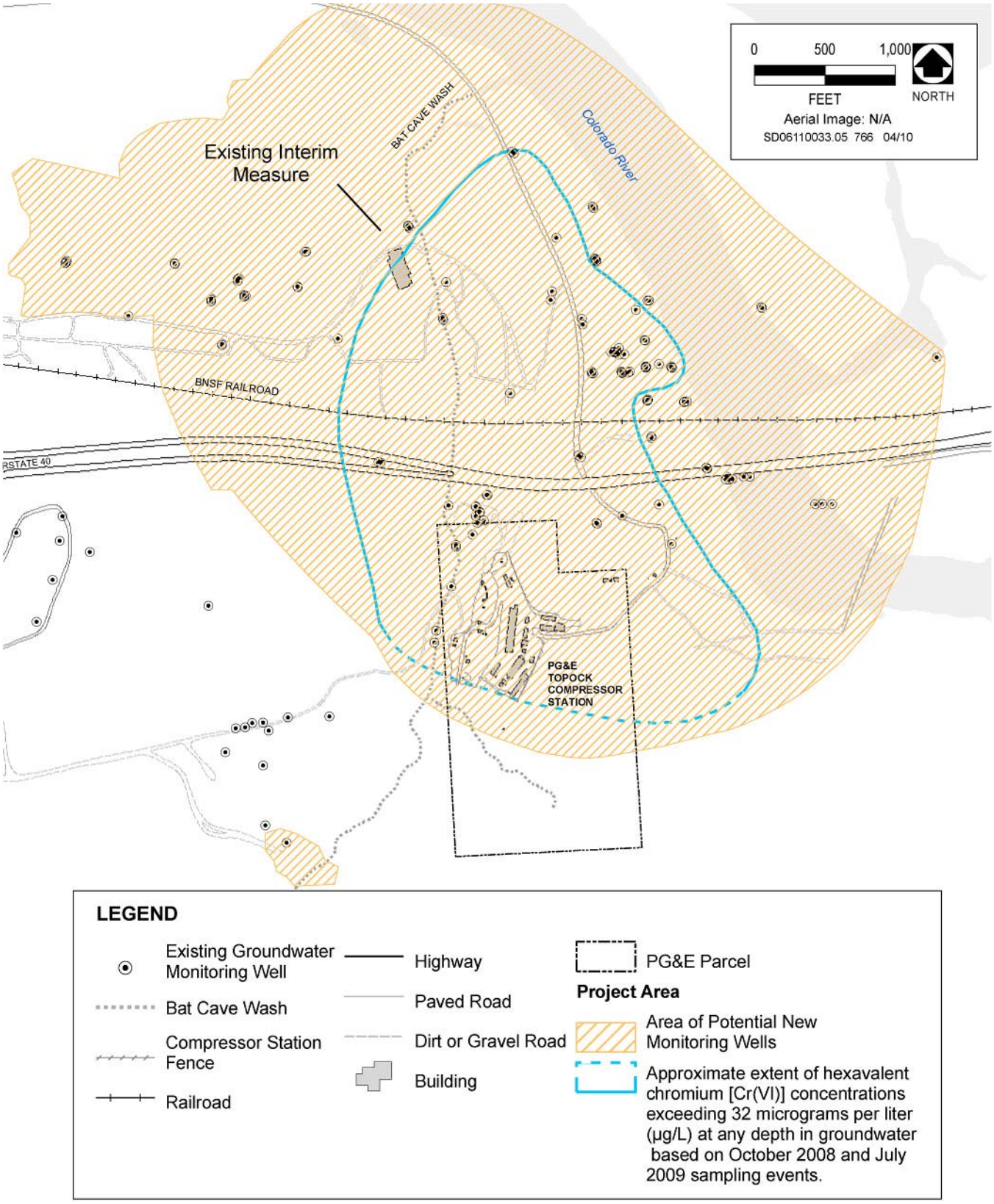
8.4.3.1 WATER CONVEYANCE, UTILITIES, AND ROADWAYS

Alternative D could include up to 60,000 feet of water conveyance facilities and pipelines, and up to 110,000 feet of utility lines (electrical and signal communications). In addition, Alternative D could include up to 16,000 feet of new and/or improved roadways. These proposed lengths include initial construction only and do not include any needed repair or replacement during the operations and maintenance period of the alternative (CH2M Hill 2009: Appendix D, included in Appendix CMS of this EIR).

8.4.3.2 OPERATION AND MAINTENANCE

Operation and maintenance activities for the in situ systems would include periodic well maintenance, groundwater sample collection and analysis, refinement of the injection/recirculation systems, management of the substrates, equipment inspections, and replacement of wells and other structures that become clogged or damaged. During the operation and maintenance phase replacement of wells may be necessary, which could involve some construction activity.

Depending on the performance of the alternative, it is estimated that the operation and maintenance phase (total time for cleanup of the plume to background levels of Cr(VI) for Alternative D) would range from 10 years to 20 years; however, best estimates suggest that this time could be 15 years (CH2M Hill 2009, included in Appendix CMS of this EIR). Alternative D has the fastest predicted cleanup time of all alternatives and therefore the shortest operation and maintenance phase. Thus, while this alternative has increased impacts in many respects due to the increased area of potential disturbance, this alternative also reduces the time duration of many overall impacts because it has the shortest operational maintenance phase. The time for this alternative could be adjusted by modifying the number and location of wells and/or by modifying the flow rates. Operating more than one



Source: AECOM, CH2M Hill, PG&E

Area of Potential Monitoring Wells for Alternative D—Sequential In Situ Treatment **Exhibit 8-3**

phase at a time would reduce the time to distribute organic carbon for this alternative. In addition, once the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, an additional 10 years of monitoring would occur.

An estimated 600 tons of carbon dioxide could be generated per year for vehicles and power, and an estimated 800,000 kilowatt-hours per year could be consumed for electric pumps and other facilities. An estimated 600 million gallons of water per year could be pumped and reinjected (with no net water use) under Alternative D. This would include one on-site operator 5 days per week, an additional on-site operator 3 days per week, and three on-site managers 5 days per week. It would also include seven workers on-site for 4 weeks per year for sampling and maintaining the monitoring well network (PG&E 2010). Additional trips that would be required throughout the duration of operation and maintenance include:

- 100 vehicles per year for regular maintenance,
- up to 10 additional vehicles per year for nonroutine maintenance,
- 100 tanker trucks per year to deliver treatment chemicals,
- one pump rig for 1 to 4 months per year for well maintenance,
- 10 delivery trucks or sampling vehicles per monitoring event, and
- three passenger vehicles (15 trips per week) for site management.

8.4.3.3 CONSTRUCTION ACTIVITIES

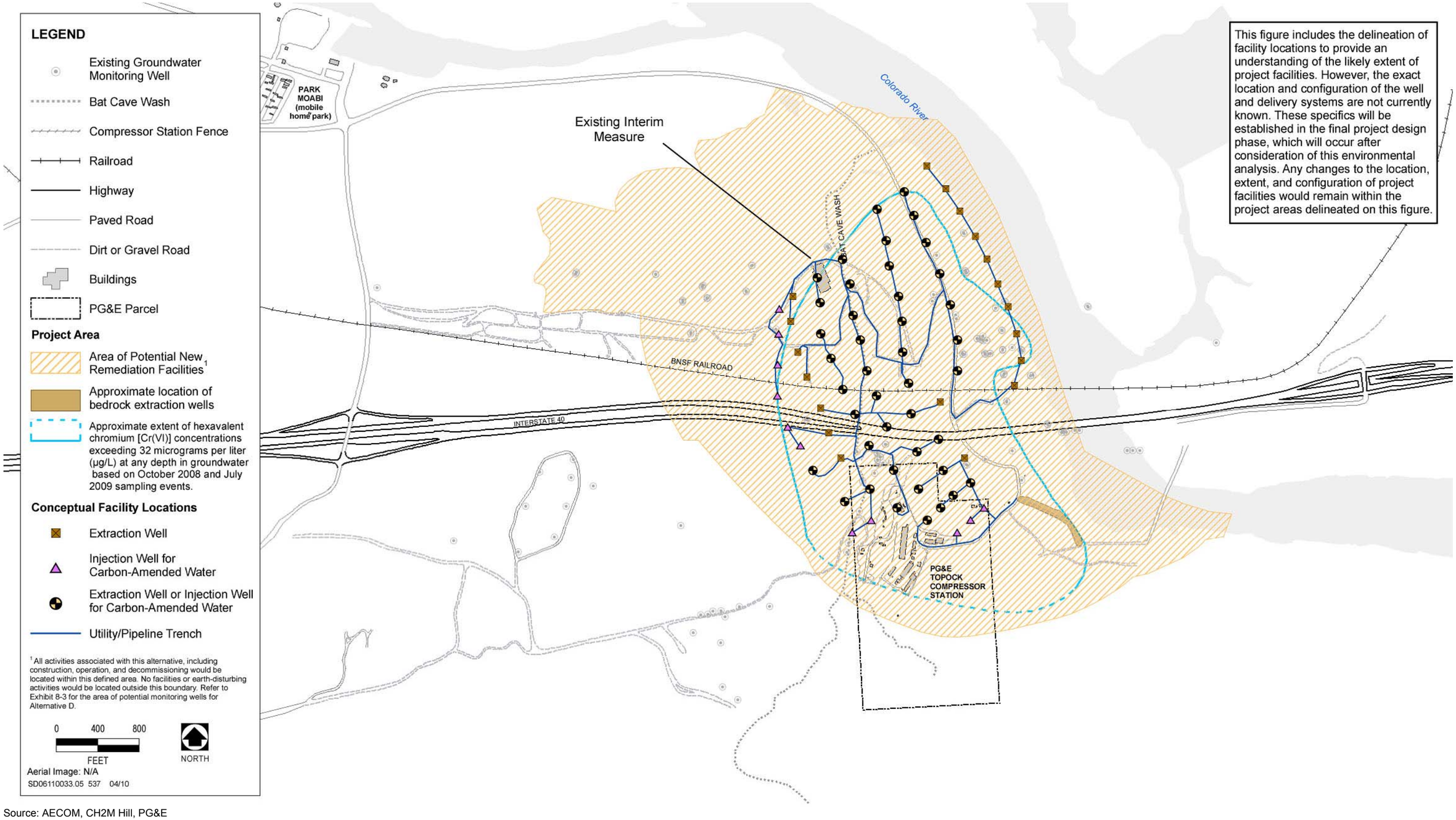
Construction activities for Alternative D could include installation of up to 280 monitoring and remediation wells and associated facilities that would be similar as described for the proposed project. The general project construction activities described above and in Chapter 3 would occur, though to a greater intensity due to the increased number of wells and infrastructure that would be required. Construction of Alternative D would extend for up to 4 years including 3 years for construction of the in situ facilities and an additional one year for decommissioning of the IM-3 facility. A maximum of 11,800 cubic yards of soil could be disturbed during construction. Estimated water use during construction could be 20.2 acre-feet (PG&E 2010). Some construction activity would occur during the estimated 18-year operation and maintenance phase, if replacement of wells is necessary.

8.4.4 ALTERNATIVE F—PUMP AND TREAT

Alternative F would involve pumping groundwater, ex situ treatment to remove chromium from the groundwater, and reinjection of the treated water back to the aquifer (otherwise known as pump and treat). The ex situ treatment process would occur within an aboveground treatment plant that is likely to include chemical reduction by addition of ferrous iron; oxidation, pH adjustment, and settling in a clarifier; and final filtration for a process that is essentially similar to the ex situ treatment processes at the current IM-3 Facility, ex situ treatment would not include reverse osmosis, as it is assumed salinity removal would not be needed.

Alternative F would include a 1,280-gpm treatment plant to remove Cr(VI) from groundwater before injection into injection wells. The treatment plant would be considerably larger than the existing IM-3 Facility. For the purposes of this analysis, it is assumed that the treatment facility would be 90,000 square feet in size and up to 45 feet high. An additional 100,000 square feet would be needed to accommodate parking and storage for equipment and materials around the treatment plant, for a total area of 190,000 square feet. The treatment plant would most likely be located within the lower yard of the compressor station; however, an alternate location could be the site of the current IM-3 Facility. The current IM-3 Facility would be decommissioned and demolished under this alternative (CH2M Hill 2009, included in Appendix CMS of this EIR). Exhibit 8-5 shows the two potential locations for the treatment plant for Alternative F.

In addition to the treatment plant, up to 120 new wells could be installed, of which 70 would be remediation wells (including extraction, injection, and IRZ wells) and 50 would be monitoring wells (refer to Exhibit 8-1 for the



Source: AECOM, CH2M Hill, PG&E

Conceptual Remedial Approach, Alternative D—Sequential In Situ Treatment **Exhibit 8-4**

area in which monitoring wells could be located). Of the 70 remediation wells, an estimated 60% would be upland remediation wells and 40% would be bedrock remediation wells. No floodplain remediation wells are proposed under this alternative (CH2M Hill 2009: Table D-19B, included in Appendix CMS of this EIR). Extraction wells would be placed in the plume and East Ravine area to extract groundwater. Extracted groundwater would be transported via piping to an aboveground treatment plant for treatment. Treated groundwater would be delivered to injection wells. Chromium removed from the groundwater via pump and treat would be collected in the sludge from the clarifier and filtration systems and would be transported off-site by truck to an appropriately licensed disposal facility. Based on disposal activities conducted to date at the compressor station, the off-site facility likely would be in the Phoenix, Los Angeles, and Kettleman City areas. Exhibit 8-4 illustrates the conceptual remedial approach for Alternative F (PG&E 2010).

8.4.4.1 WATER CONVEYANCE, UTILITIES, AND ROADWAYS

Alternative F could include up to 40,000 feet of water conveyance facilities, or pipelines, and up to 30,000 feet of utility lines (electrical and signal communications). In addition, Alternative F could include up to 6,000 feet of new and/or improved roadways. These proposed lengths include initial construction only and do not include any needed repair or replacement during the operations and maintenance period of the alternative (CH2M Hill 2009: Appendix D, included in Appendix CMS of this EIR).

8.4.4.2 OPERATIONS AND MAINTENANCE

Operation and maintenance of the treatment plant would include periodic groundwater sample collection and analysis, chemical controls, equipment maintenance and inspection, and chemical and waste management. Operation and maintenance of the extraction and injection wells would also occur throughout the remediation period, including replacement of wells and other structures that become clogged or damaged.

Depending on the performance of the alternative, it is estimated that the operation and maintenance phase (total time for cleanup of the plume to background levels of Cr(VI) for Alternative F) would range from 15 years to 150 years; however, best estimates suggest that this time could be 37 years (CH2M Hill 2009, included in Appendix CMS of this EIR). The estimated time for this alternative could be adjusted by modifying the number and location of wells and/or by modifying the flow rates. In addition, once the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, an additional 10 years of monitoring would occur.

An estimated 6,200 tons of carbon dioxide could be generated per year for vehicles and power, and an estimated 11 million kilowatt-hours per year could be consumed to power the treatment plant and associated pumps. An estimated 1.3 billion gallons of water per year would be pumped and reinjected (with no net water use), and 6,200 tons per year of sludge mass could be generated under Alternative F. Operation and maintenance of Alternative F would include an average of six on-site personnel per day 7 days per week (a total of 12 personnel on-site per week). It would also include seven workers on-site for 4 weeks per year for sampling and maintaining the monitoring well network. Additional trips that would be required throughout the duration of operation and maintenance include:

- 100 vehicles per year for regular maintenance,
- up to 10 additional vehicles per year for nonroutine maintenance,
- 100 tanker trucks per year to deliver treatment chemicals,
- one pump rig for 1 to 4 months per year for well maintenance,
- 10 delivery trucks or sampling vehicles per monitoring event,
- six passenger vehicles (42 trips per week) for treatment plant operation and site management,
- up to 300 sludge trucks per year for the treatment plant, and
- 12 miscellaneous waste trucks per year.
- Three passenger vehicles (15 trips per week) for site management

8.4.4.3 CONSTRUCTION ACTIVITIES

Construction activities for this alternative would include construction of a 1,280-gpm treatment plant with a 190,000-square-foot overall facility footprint. Depending on whether the final location is in the lower yard of the compressor station or at the current location of the IM-3 Facility, the amount of grading involved would vary. Sufficient level area is available at the compressor station site, and substantially less level area is available at the current location of the IM-3 Facility. Construction at the IM-3 Facility location may require grading that would not be required at the compressor station or IM-3 construction staging area north of the IM-3 Facility. In addition, if it were necessary to construct the plant at the IM-3 Facility location without grading, it might be necessary to extend the height of the building (CH2M Hill 2009, included in Appendix CMS of this EIR). This alternative also includes installation of up to 120 new monitoring and remediation wells and associated facilities that would be similar to those described for the proposed project. Some construction activity would occur during the estimated 37-year operation and maintenance phase, if replacement of wells is necessary.

Construction of Alternative F would extend for up to 3 years—2 years of construction for the treatment plant and installation of wells and an additional 1 year for decommissioning of the IM-3 Facility. A maximum of 22,500 cubic yards of soil could be disturbed during construction. Estimated water use during construction would be 8.0 acre-feet.

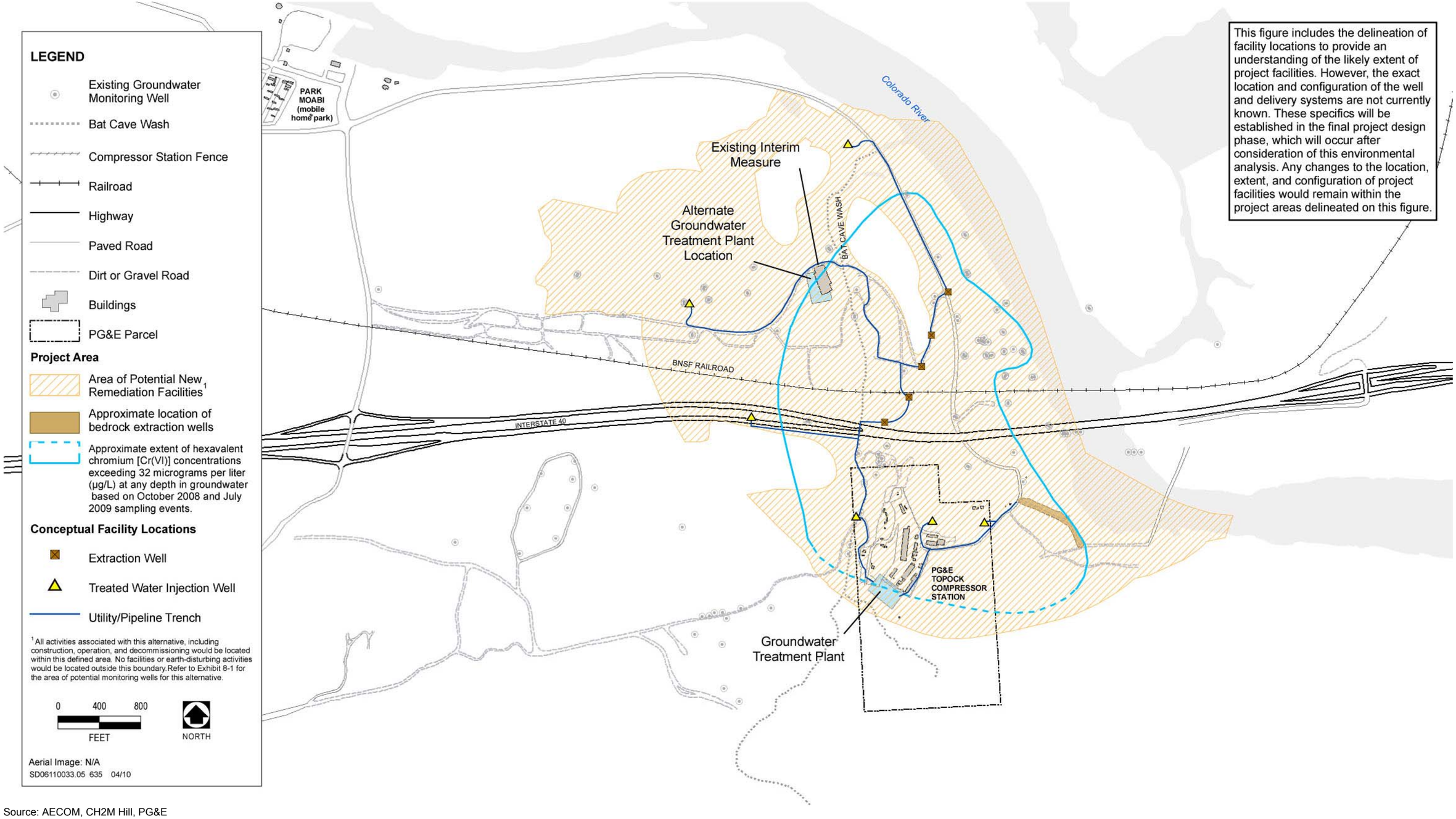
8.4.5 ALTERNATIVE G—COMBINED FLOODPLAIN IN SITU/PUMP AND TREAT

Alternative G would combine floodplain cleanup by in situ treatment with treatment of the upland portion of the plume by extraction and reinjection with ex situ pump and treat. The floodplain cleanup would involve construction of IRZ lines at National Trails Highway and between National Trails Highway and the Colorado River, as described above in Phase 1 of Alternative C (Section 8.3.3.1). Chromium in the upland portions of the site would be addressed by pumping groundwater, ex situ treatment to remove chromium from the groundwater, and reinjection of the treated water back to the aquifer.

Concurrent with the floodplain cleanup, treatment of the plume in the upland portions of the site would be by a pump and treat process that would involve one or more methods to reduce chromium concentrations. As with Alternative F, it is assumed that salinity removal would not be needed and that reverse osmosis would not be a part of the pump and treat process.

This alternative would include a 1,230-gpm treatment plant to remove Cr(VI) from groundwater before injection into injection wells. The treatment plant would be the same as for Alternative F (90,000 square feet and 45 feet high, with an additional 100,000 square feet for parking and storage for equipment and materials, for a total of 190,000 square feet). The treatment plant would most likely be located within the lower yard of the compressor station; however, an alternate location could be the site of the current IM-3 Facility. The current IM-3 Facility would be decommissioned and demolished. Exhibit 8-6 shows the two potential locations for the treatment plant for Alternative G.

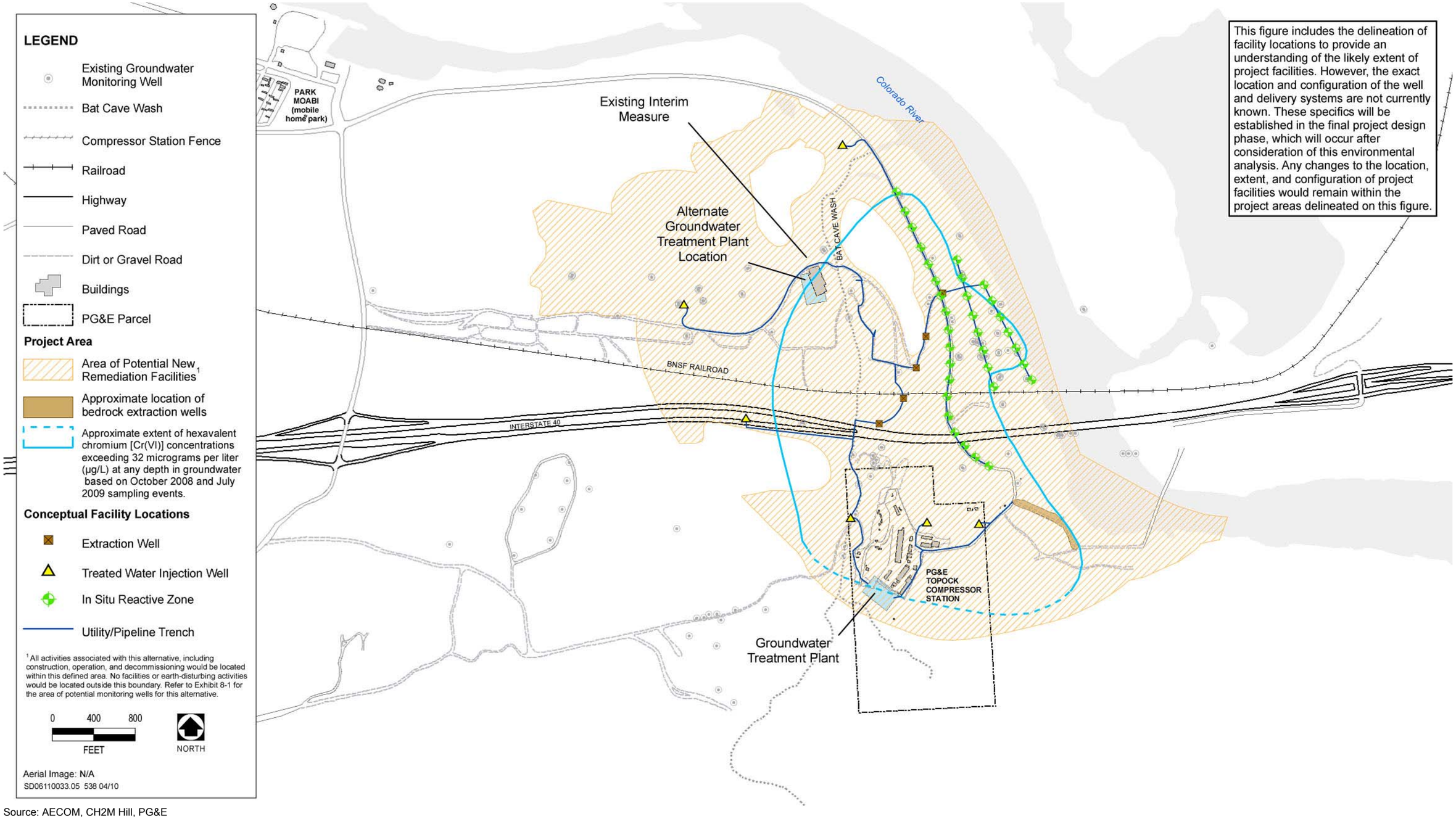
Under Alternative G up to 200 new wells could be installed, of which 140 would be remediation wells (including extraction, injection, and IRZ wells) and 60 would be monitoring wells (refer to Exhibit 8-1 for the area in which monitoring wells could be located). Of the 140 remediation wells, an estimated 30% would be upland remediation wells, 50% would be floodplain remediation wells, and 20% would be bedrock remediation wells (PG&E 2010, CH2M Hill 2009:Table D-19B, included in Appendix CMS of this EIR). Extraction wells would be placed in the central portions of the plume and the East Ravine area to extract groundwater. Extracted groundwater would be transported via piping to an aboveground treatment plant for treatment of the same size and capacity as under Alternative F, and treated groundwater would be piped to injection wells. Treated groundwater would be delivered to injection wells at approximately three locations to the west and north of the plume, and three locations in the southern portion of the plume near the mountain front. Chromium removed from the groundwater via pump and treat would be collected in the sludge from the clarifier and filtration systems and would be



Source: AECOM, CH2M Hill, PG&E

Conceptual Remedial Approach, Alternative F – Pump and Treat

Exhibit 8-5



Source: AECOM, CH2M Hill, PG&E

Conceptual Remedial Approach, Alternative G—Combined Floodplain/In Situ Pump and Treat **Exhibit 8-6**

transported off-site by truck to an appropriately licensed disposal facility. Based on disposal activities conducted to date at the compressor station, the off-site facility likely would be in the Phoenix, Los Angeles, or Kettleman City areas. Exhibit 8-6 illustrates the conceptual remedial approach for Alternative G.

8.4.5.1 WATER CONVEYANCE, UTILITIES, AND ROADWAYS

Alternative G could include up to 40,000 feet of water conveyance facilities and pipelines and up to 40,000 feet of utility lines (electrical and signal communications). In addition, Alternative G could include up to 12,000 feet of new and/or improved roadways. These proposed lengths include initial construction only and do not include any needed repair or replacement during the operations and maintenance period of the alternative (CH2M Hill 2009:Appendix D, included in Appendix CMS of this EIR).

8.4.5.2 OPERATIONS AND MAINTENANCE

Operation and maintenance of the treatment plant would include periodic groundwater sample collection and analysis, chemical controls, equipment maintenance and inspection, and chemical and waste management. Operation and maintenance of the in situ systems within the upland area would include replacement of wells and other structures that become clogged or damaged. Operation and maintenance activities for the in situ systems in the floodplain would include periodic well maintenance, groundwater sample collection and analysis, refinement of the injection/recirculation systems, management of the substrates, equipment inspections, and periodic replacement of wells and other structures that become clogged or damaged.

Depending on the performance of the alternative, it is estimated that the operation and maintenance phase (total time for cleanup of the plume to background levels of Cr(VI) for Alternative G) would range from 10 to 90 years; however, best estimates suggest that this time could be 22 years (CH2M Hill 2009, included in Appendix CMS of this EIR). In addition, once the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, an additional 10 years of monitoring would occur.

An estimated 6,400 tons of carbon dioxide could be generated per year for vehicles and power, and an estimated 11 million kilowatt-hours per year could be consumed. An estimated 1.3 billion gallons of water per year could be pumped and reinjected (with no net water use), and 6,200 tons per year of sludge mass could be generated under Alternative G. Operation and maintenance of Alternative G would have extensive operation and maintenance requirements. These requirements would include one on-site operator 5 days per week and a second operator on-site for 3 days per week. They would also include an average of six on-site personnel per day 7 days per week (a total of 12 personnel on-site per week), three site managers on-site 5 days per week, and seven workers on-site for 4 weeks per year for sampling and maintaining the monitoring well network (PG&E 2010). Additional trips that would be required throughout the duration of operation and maintenance include:

- 150 vehicles per year for regular maintenance,
- up to 100 additional vehicles per year for nonroutine maintenance,
- 140 tanker trucks per year to deliver treatment chemicals,
- one pump rig for 1 to 4 months per year for well maintenance,
- 10 delivery trucks or sampling vehicles per monitoring event,
- six passenger vehicles (42 trips per week) for treatment plant operation and site management,
- up to 300 sludge trucks per year for the treatment plant, and
- 12 miscellaneous waste trucks per year.

8.4.5.3 CONSTRUCTION ACTIVITIES

This alternative also includes construction of the proposed 1,230-gpm treatment plant with a 190,000-square-foot overall facility footprint. As with Alternative F, the plant could be located in the lower yard of the compressor station, or at the current IM-3 Facility, and the amount of grading involved would be different for either location.

Construction activities for this alternative could include installation of up to 200 monitoring and remediation wells and associated facilities that would be similar to those described for the proposed project. Refer to Exhibit 8-5 for the anticipated locations of the treatment facilities.

Construction of Alternative G would extend for up to 4 years—3 years for installation of wells and construction of the treatment plant and an additional 1 year for decommissioning of the IM-3 Facility. A maximum of 25,400 cubic yards of soil could be disturbed during construction. Estimated water use during construction could be 20.4 acre-feet (PG&E 2010). Some construction activity would occur during the estimated 37-year operation and maintenance phase, if replacement of wells is necessary.

8.4.6 ALTERNATIVE H—COMBINED UPLAND IN SITU/PUMP AND TREAT

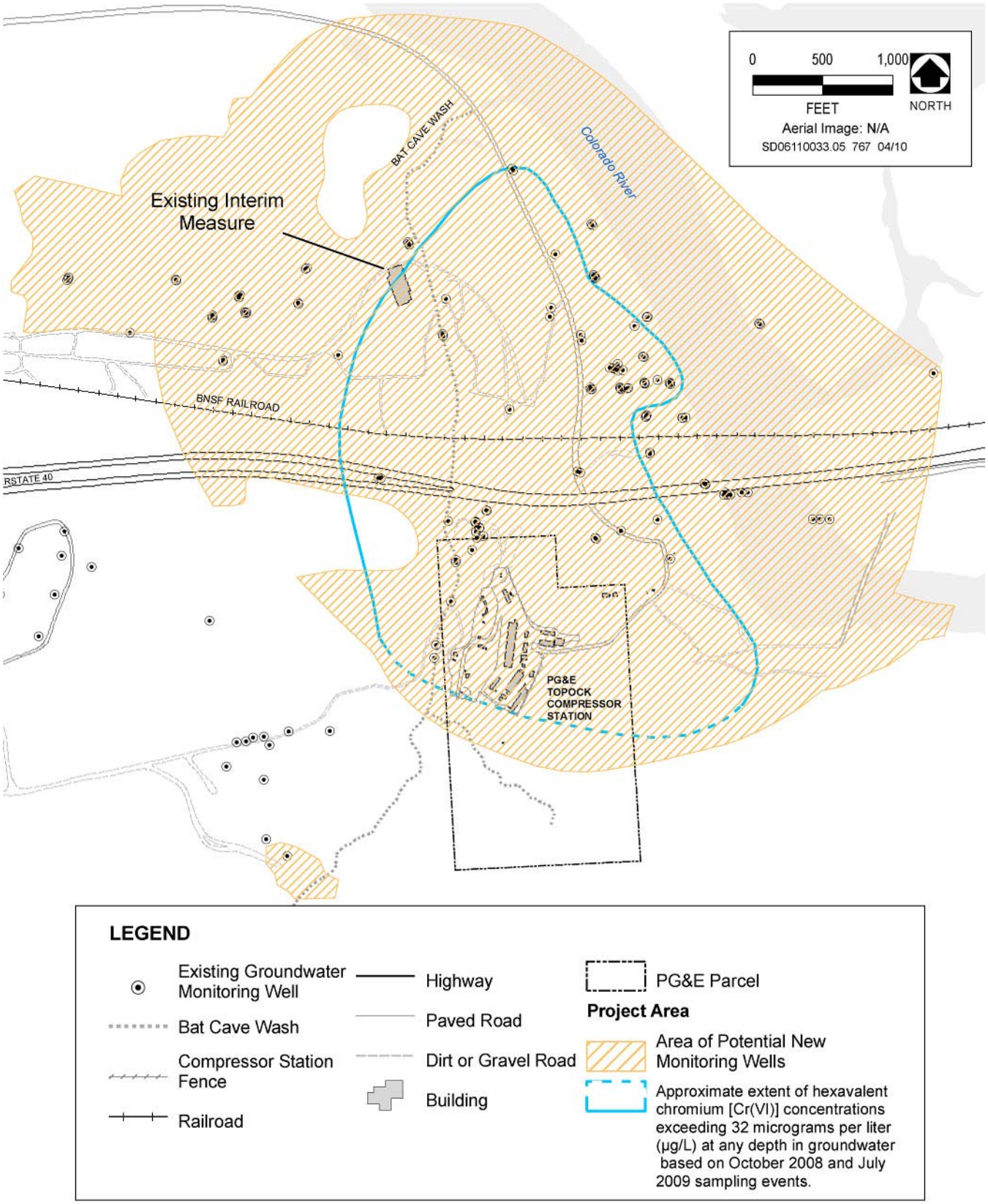
Alternative H would combine in situ treatment in the upland portions of the plume with pump and treat technology in the floodplain. Although both Alternative G and Alternative H include a combination of in situ treatment and pump and treat, this alternative differs from Alternative G by relying on in situ to be the dominant feature of the cleanup rather than pump and treat. The upland in situ cleanup would involve construction of several IRZ lines across the length and width of the plume. Organic carbon would be injected in the IRZ lines to treat the existing Cr(VI) in the alluvial zone of the aquifer. IRZ zones would be constructed by recirculating between adjacent wells within each zone or by use of vertical circulation wells.

Under Alternative H up to 210 new wells could be installed, of which 140 would be remediation wells (including extraction, injection, and IRZ wells) and 70 would be monitoring wells. Exhibit 8-7 illustrates the area in which monitoring wells would be located and Exhibit 8-8 illustrates the conceptual remedial approach for Alternative H. Of the 140 remediation wells, an estimated 70% would be upland remediation wells, 20% would be floodplain remediation wells, and 10% would be bedrock remediation wells (PG&E 2010, CH2M Hill 2009:Table D-19B, included in Appendix CMS of this EIR).

Concurrent with the upland cleanup, groundwater extraction would be used in the floodplain area of the site to remove chromium-containing water and to provide for hydraulic control of the plume. Groundwater would be extracted through a series of extraction wells across the plume at the National Trails Highway. For this alternative, extraction wells would be installed for an assumed combined flow rate of approximately 500 gpm. Extracted groundwater would be managed in two ways. One way would be that approximately one-half of the extracted water would be transported via piping to a new aboveground treatment plant. The treatment plant for this alternative would be considerably smaller than that proposed under Alternatives F and G. The treatment plant under Alternative H would be a 200- to 300-gpm facility with a 120,000-square-foot overall facility footprint, including the 55,000-square-foot treatment facility. As with the other alternatives, the current IM-3 Facility would be decommissioned and demolished.

The pump and treat process would be similar to the treatment processes at the existing IM-3 Facility: chemical reduction by addition of ferrous iron; oxidation, pH adjustment, and settling in a clarifier; and final filtration. As with Alternatives F and G, it is assumed that salinity removal would not be needed and that reverse osmosis would not be a part of the pump and treat process. Following ex situ treatment, treated groundwater would be transported via pipeline to injection wells. Treated groundwater would be reinjected into injection wells at approximately four locations within and outside the plume boundary. Chromium removed from the groundwater via pump and treat would be collected in the sludge from the clarifier and filtration systems and would be transported off-site by truck to an appropriately licensed disposal facility.

The other option for handling extracted groundwater under this alternative would involve approximately one-half of the extracted water being transported to the western edge of the plume, amended with carbon, and reinjected at approximately four locations near the western edge of the plume. The primary purpose of this reinjection is to increase the flushing efficiency by providing additional “push” to move the plume through the IRZ lines. Sufficient carbon would be added to this water to reduce the Cr(VI) in the injected water, thereby providing



Source: AECOM, CH2M Hill, PG&E

Area of Potential Monitoring Wells for Alternative H – Combined Floodplain In Situ/Pump and Treat **Exhibit 8-7**

treatment of this water concurrent with reinjection. The flows would be balanced so that the treated water injection would provide containment of all the flow lines emanating from the amended water injection wells, thus limiting the spread of the amended water and forcing it to flow back through the IRZ lines toward the extraction wells.

8.4.6.1 WATER CONVEYANCE, UTILITIES, AND ROADWAYS

Alternative H could include up to 50,000 feet of water conveyance facilities, or pipelines, and up to 50,000 feet of utility lines (electrical and signal communications). In addition, Alternative H could include up to 12,000 feet of new and/or improved roadways. These proposed lengths include initial construction only and do not include any needed repair or replacement during the operations and maintenance period of the alternative (CH2M Hill 2009: Appendix D, included in Appendix CMS of this EIR).

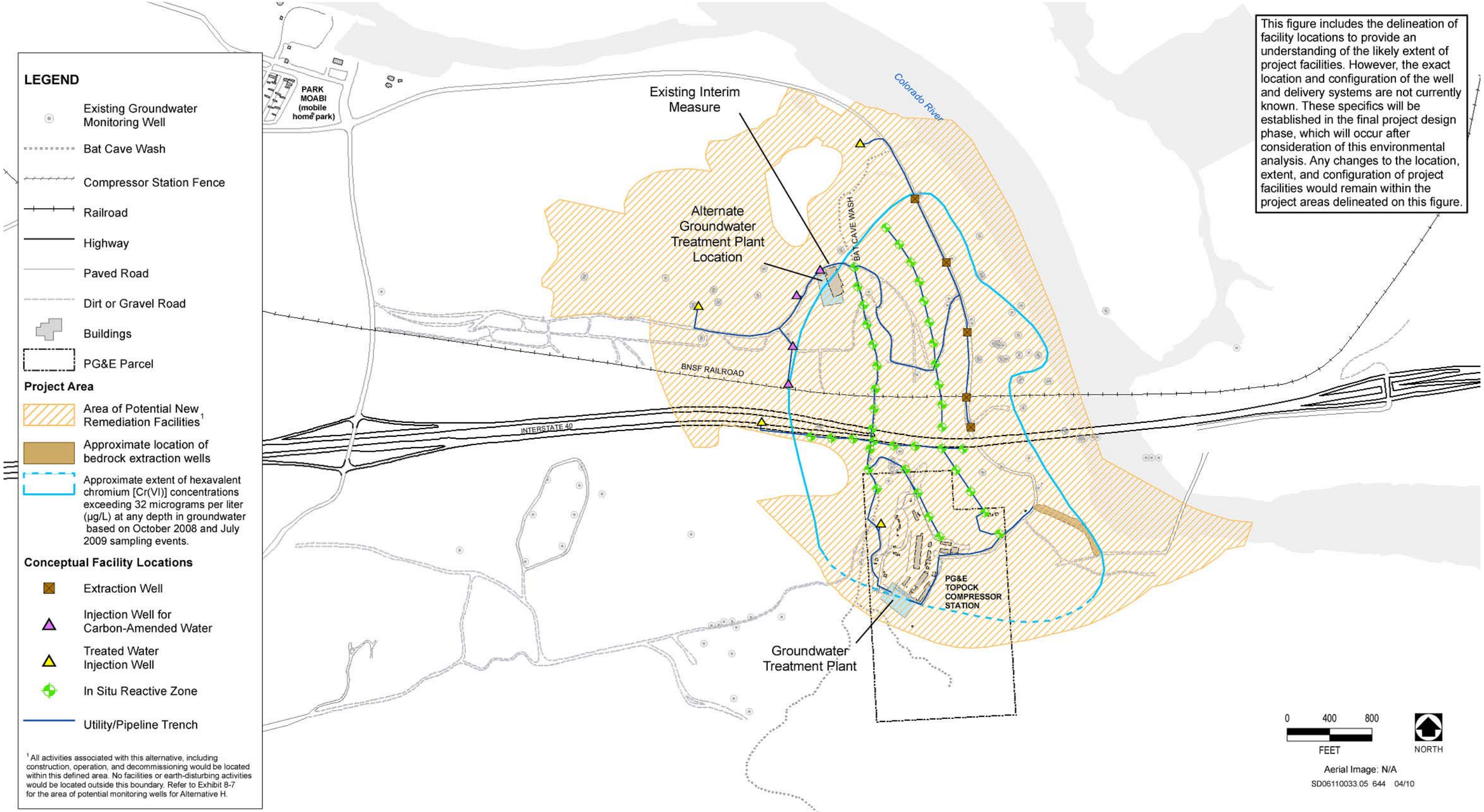
8.4.6.2 OPERATIONS AND MAINTENANCE

Operation and maintenance of the aboveground treatment plant would include periodic groundwater sample collection and analysis, chemical controls, equipment maintenance and inspection, and chemical and waste management. Operation and maintenance activities for the in situ systems would include periodic well maintenance, groundwater sample collection and analysis, refinement of the injection/recirculation systems, management of the substrates, equipment inspections, and periodic replacement of wells and other structures that become clogged or damaged.

It is estimated that the operation and maintenance phase (total time for cleanup of the plume to background levels of Cr(VI) for Alternative H) would range from 10 years to 70 years; however, best estimates suggest that this time could be 18 years (CH2M Hill 2009, included in Appendix CMS of this EIR). The length of time needed to attain cleanup goals would be dependent on the rate at which organic carbon can be distributed to all areas of contaminated groundwater and/or contaminated groundwater in recalcitrant zones can be flushed. The time for this alternative could be adjusted by modifying the number and location of wells and/or by modifying the flow rates. In addition, once the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, an additional 10 years of monitoring would occur.

An estimated 4,400 tons of carbon dioxide could be generated per year for vehicles and power, and an estimated 7.6 million kilowatt-hours per year would be consumed. An estimated 525 million gallons of water per year could be pumped and reinjected (with no net water use), and 1,300 tons per year of sludge mass could be generated under Alternative H. Operation and maintenance of Alternative H would have extensive operation and maintenance requirements. These requirements would include one on-site operator 5 days per week and a second operator on-site for 3 days per week. They would also include an average of five on-site personnel per 24-hour period 7 days per week (a total of nine personnel on-site per week), three site managers on-site 5 days per week, and seven workers on-site for 4 weeks per year for sampling and maintaining the monitoring well network (PG&E 2010). Additional trips that would be required throughout the duration of operation and maintenance include:

- 200 vehicles per year for regular maintenance,
- up to 100 additional vehicles per year for nonroutine maintenance,
- 190 tanker trucks per year to deliver treatment chemicals,
- one pump rig for 1 to 4 months per year for well maintenance,
- 10 delivery trucks or sampling vehicles per monitoring event,
- five passenger vehicles (35 trips per week) for treatment plant operation,
- three passenger vehicles (15 trips per week) for site management,
- up to 100 sludge trucks per year for the treatment plant, and
- 12 miscellaneous waste trucks per year.



Source: AECOM, CH2M Hill, PG&E

Conceptual Remedial Approach, Alternative H—Combined Upland In Situ/Pump and Treat **Exhibit 8-8**

8.4.6.3 CONSTRUCTION ACTIVITIES

This alternative includes construction of the proposed 200- to 300-gpm treatment plant. As with Alternatives F and G, possible locations for the treatment plant are in the lower yard of the compressor station or at the current IM-3 Facility location. In comparison to Alternatives F and G, the ex situ treatment plant proposed under this alternative is considerably smaller and therefore would require less level area or grading than the treatment plant proposed under Alternatives F and G. Construction activities for this alternative would also include installation of up to 210 monitoring and remediation wells, in situ substrate storage and delivery systems, and associated facilities that would be similar to those described for the proposed project. Exhibit 8-6 shows the anticipated locations for the treatment plant and other remediation facilities. Construction of Alternative H would extend for up to 4 years—3 years for installation of wells and construction of the treatment plant and an additional 1 year for decommissioning of the IM-3 Facility. A maximum of 19,900 cubic yards of soil could be disturbed during construction. Estimated water use during construction could be up to 15.9 acre-feet (PG&E 2010). Some construction activity would occur during the estimated 18-year operation and maintenance phase, if replacement of wells is necessary.

8.4.7 NO PROJECT ALTERNATIVE—ALTERNATIVE I/CONTINUED OPERATION OF INTERIM MEASURE

Continued operation of IM-3 is considered to represent the "No Project Alternative." In the Final CMS/FS, this alternative is described as Alternative I. As directed by the CEQA Guidelines, the No Project Alternative should consider the existing conditions at the time the notice of preparation (NOP) is published in addition to what would be reasonably expected to occur in the foreseeable future if the project were not approved. The ongoing operation of IM-3 was the existing condition at the time the NOP was published for this EIR, and its continued operation using existing equipment and facilities is considered the No Project Alternative because this is the most reasonable expectation of what would occur in the foreseeable future if the proposed project were not approved.

If a final remedy were not approved and an alternative remedial action cannot be selected, PG&E must still protect the beneficial water resource of the Colorado River from the potential impacts of the Cr(VI) plume contamination. Thus, the interim measure to continue extraction of contaminated groundwater, treatment, and reinjection of the treated water would continue to be required by DTSC under Section IV.A of the 1996 Correction Action Consent Agreement, which was entered into pursuant to California Health and Safety Code, Section 25187, until such treat is property mitigated. Therefore, it would not be feasible to abandon the IM-3 Facility if a final remedy were not approved. Although it has been determined that the operation of IM-3 would not meet ARARs for final remedy, the continued operation of IM-3 (Alternative I) represents the No Project Alternative required to be evaluated under the CEQA Guidelines.

The No Project Alternative would involve continued operation of the IM-3 Facility as it currently operates. Exhibit 8-9 illustrates this alternative. The IM-3 Facility would operate with the existing equipment under existing procedures, using the existing process at the current flow rate, until cleanup goals are attained. The IM-3 Facility operates using the following steps:

- Groundwater is extracted by extraction wells in the floodplain area of the site. There are currently four extraction wells (TW-2S, TW-2D, TW-3D, and PE-1), two of which are currently in operation (TW-3D and PE-1).

- Extracted groundwater is transported to a treatment plant via underground pipelines.

- Groundwater is treated in the existing treatment plant. The current groundwater treatment system is a continuous, multi-step process that involves reduction of Cr(VI) to Cr(III); precipitation and removal of precipitate solids by clarification and microfiltration; and lowering of the naturally occurring total dissolved solids using reverse osmosis.

- Treated groundwater is transported to injection wells via aboveground pipelines.

- Treated groundwater is injected into injection wells. Currently there are two injection wells: IW-02 and IW-03. It is anticipated that these injection wells would continue to operate under this alternative.

The existing monitoring systems are assumed to be sufficient; no additional monitoring wells would be constructed. However, some maintenance of these existing wells would be required, as under current conditions, which could involve replacement if required. The existing monitoring programs are assumed to be retained during the remediation period.

The No Project Alternative (Alternative I) would involve the continued operation of the IM-3 features above, with no changes to the existing configuration of the extraction, treatment, or injection. Unlike Alternatives C, D, F, G, and H, this alternative would not change the number, location, and configuration of remedial systems over time to optimize and enhance the performance of the alternative to meet changing conditions, or to enhance performance of the remedy to attain the cleanup goals. Existing contingency procedures for the extraction, treatment, and injection systems would continue to be implemented to ensure that existing performance standards for the remedial components are maintained.

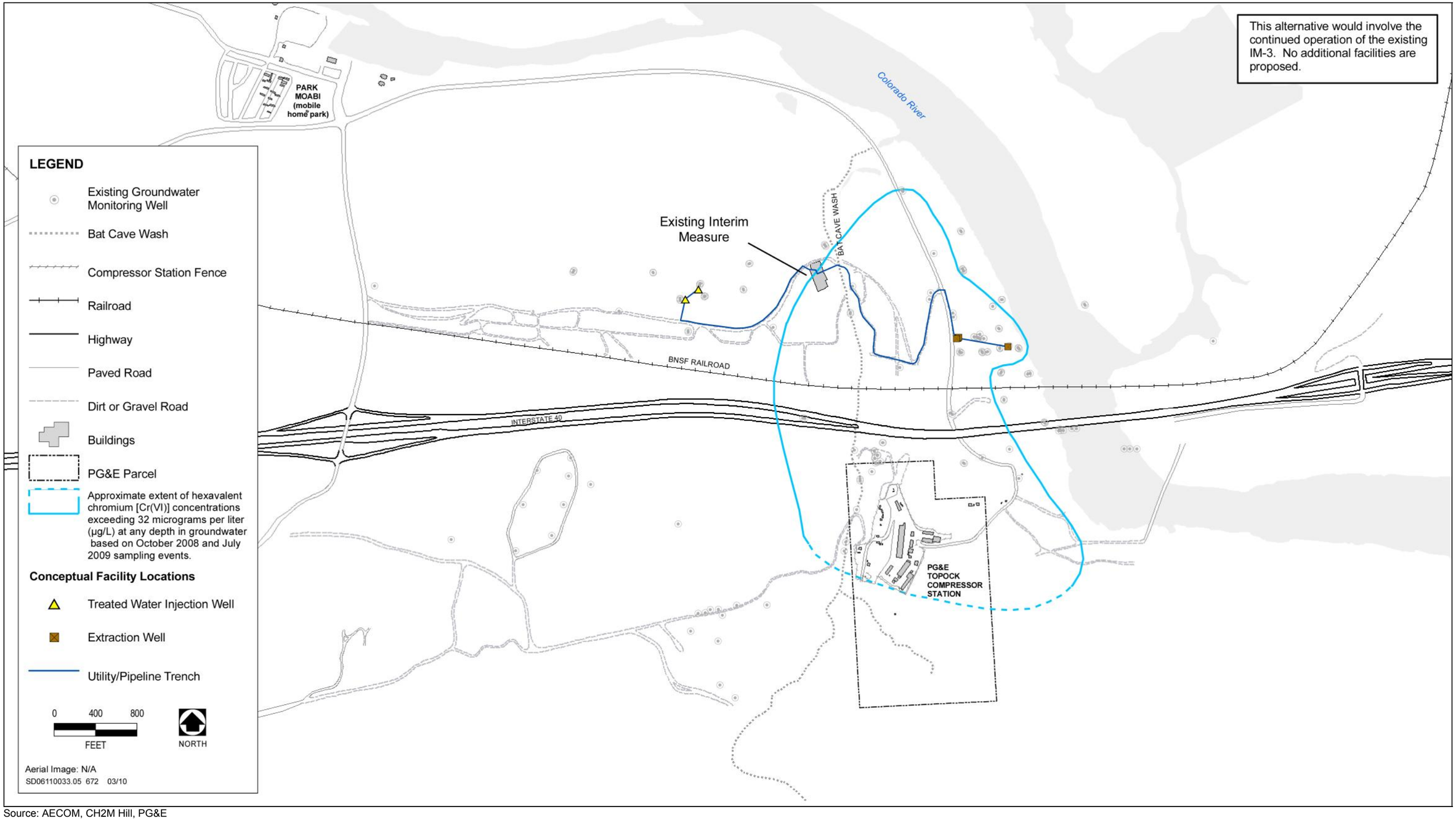
8.4.7.1 OPERATION AND MAINTENANCE

Operation of the IM-3 Facility would include periodic groundwater sample collection and analysis, chemical controls, equipment maintenance and inspection, and chemical and waste management. Operation and maintenance of the extraction and injection wells, including possible replacement of wells that become clogged, would also occur throughout the remediation period.

Under this alternative, it is estimated that the total time for cleanup of the plume to background levels of Cr(VI) could range from 100 to 960 years; however, best estimates suggest that this time could be 240 years (CH2M Hill 2009, included in Appendix CMS of this EIR). In addition, once the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, an additional 10 years of monitoring would occur.

An estimated 1,300 tons of carbon dioxide would be generated per year for vehicles and power, and an estimated 1.8 million kilowatt-hours per year would be consumed. An estimated 70 million gallons of water per year would be pumped and reinjected (with less than 2% net water use). One million gallons of brine waste and 220 tons of sludge per year would be generated under Alternative I. Operation and maintenance of Alternative I would include an average of five on-site personnel per 24-hour period 7 days per week (a total of nine personnel on-site per week), three site managers on-site 5 days per week, and seven workers on-site for 4 weeks per year for sampling and maintaining the monitoring well network. Additional trips that would be required throughout the duration of operation and maintenance include:

- 100 vehicles per year for treatment plant maintenance,
- 12 tanker trucks per year to deliver treatment chemicals,
- 200 trucks per year for brine waste disposal,
- one pump rig for 1 to 4 months per year for well maintenance,
- 10 delivery trucks or sampling vehicles per monitoring event,
- five passenger vehicles (35 trips per week) for treatment plant operation,
- three passenger vehicles (15 trips per week) for site management,
- up to 20 sludge trucks per year for the treatment plant, and
- 12 miscellaneous waste trucks per year.



Source: AECOM, CH2M Hill, PG&E

No Project Alternative/Alternative I – Continued Operation of IM-3 **Exhibit 8-9**

8.4.7.2 CONSTRUCTION ACTIVITIES

Alternative I would use the existing IM-3 Facility and would not involve any new construction of remediation facilities; however construction activities would occur from time to time over the operation and maintenance phase to replace wells or other structures that may become worn, clogged, or damaged. Once the cleanup goals for Cr(VI) that are defined in the objectives (32 µg/l) have been met, the IM-3 Facility would be decommissioned as described above and in Chapter 3, "Project Description."

8.5 ALTERNATIVES ANALYSIS

This section provides a qualitative evaluation of the environmental impacts associated with each of the project alternatives described in Section 8.3 above relative to the proposed project. The alternatives analysis must also include a comparative evaluation of the No Project Alternative per Section 15126.6(e) of the CEQA Guidelines. As described above in Section 8.3.8, Alternative I—No Project Alternative/Continued Operation of Interim Measure, is considered the "no project" alternative for this EIR. Through comparison of the alternatives, the advantages and disadvantages of each alternative compared with the proposed project can be weighed and analyzed and is summarized in Section 8.5 below.

8.5.1 ALTERNATIVE B—MONITORED NATURAL ATTENUATION

8.5.1.1 AESTHETICS

Currently, approximately 100 monitoring wells are near the compressor station. Alternative B would result in the installation of up to 60 new monitoring wells (not including replacement wells) within the monitoring well area, but no other infrastructure would be required. Because of the lack of any remediation activity or facilities (i.e., IRZ zones, remediation wells, tanks, pipelines, roads, or utility connections), ground disturbing activity, and introduction of new facilities into the visual environment aesthetic impacts would be greatly reduced from the proposed project. While the location of monitoring wells could be anywhere in the area shown in Exhibit 8-1, they would most likely be located in areas that already include some degree of visual disturbance and that would not result in a visual impact from key views. The monitoring wells would be constructed within a 4-square-foot concrete pad with a manhole-type cover, which would introduce a weak degree of contrast to the existing visual character. While the presence of these wells would be in place for a much longer period than the proposed project, the overall aesthetic impact would be much less than the proposed project and no significant impacts from any key views are anticipated. This alternative thus reduces aesthetic impacts evident at any one time, but substantially increases the duration in which these impacts would exist.

8.5.1.2 AIR QUALITY AND GLOBAL CLIMATE CHANGE

Alternative B would require installation of fewer monitoring wells than the proposed project initially and no additional infrastructure for remediation facilities, but would during the life of the project (up to 2,200 years) could involve a much greater number of monitoring wells than the proposed project over the duration of the project. Thus, construction-generated emissions of criteria air pollutants, precursors, and GHG emissions would be reduced compared to the proposed project if measured on an annual basis, or would be increased compared to the proposed project if measured on a total project basis. As with the proposed project, fugitive dust (respirable particulate matter less than or equal to 10 microns in diameter [PM_{10}]) control measures must be adopted for any construction and demolition activity; therefore, Mitigation Measure AIR-1 would be implemented to reduce the fugitive dust impact to a less-than-significant level. Vehicle trip generation under Alternative B during construction, operations and maintenance activities, and decommissioning activities would be slightly reduced compared to the proposed project if measured on an annual basis, or would be increased compared to the proposed project if measured on a total basis. Operational emissions and associated air quality and climate change impacts would occur over a much longer duration than the proposed project, but would still be less than the

proposed project if measured on an annual basis, or increased compared to the proposed project if measures on a total basis.

8.5.1.3 BIOLOGICAL RESOURCES

Depending on the number of new wells required to achieve effective monitoring, impacts would vary. Few adverse impacts would likely occur if a nominal amount of additional wells are needed. However, the greater the number of new monitoring wells increases the probability of significant impacts on sensitive biological resources. Similar to the proposed project sensitive riparian habitats that are located along the Colorado River and along the confluence of washes could also be affected by Alternative B. As with the proposed project, Alternative B could include construction of monitoring wells along the bank of the Colorado River and in Bat Cave Wash, which contain riparian habitats. Mitigation Measure **BIO-1** would be required to reduce impacts on habitats under U.S. Army Corps of Engineers jurisdiction and habitats under California Department of Fish and Game jurisdiction to a less-than-significant level. Removal or disturbance of active nests of both sensitive species and other common nesting birds could result during construction-related and operational activities. As with the proposed project, loss of occupied habitat and active nests of special-status birds could result in a substantial adverse effect on local populations of the affected species; therefore, Mitigation Measure **BIO-2a** would be required to reduce impacts to a less-than-significant level. Similar to the proposed project, Alternative B could result in impacts on desert tortoise, which would be reduced by implementation of Mitigation Measure **BIO-2b**. In addition, potential impacts on sensitive species for Alternative B could occur through removal and capping of wellheads. 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. However, to avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities from Alternative B, Mitigation Measure **BIO-2c** would be required. Similar to the proposed project monitoring well construction conducted near the Colorado River, Alternative B 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. Because freshwater intake facilities would not be required for Alternative B, the potential fish entrainment would not occur. The overall biological resources impact would be reduced compared to the proposed project.

8.5.1.4 CULTURAL RESOURCES

The area where up to 60 new monitoring wells and replacement wells would be located under Alternative B also includes a number of known cultural resources, although the Topock Maze (CA-SBR-219) has been excluded from the area of potential disturbance. The monitoring well area under Alternative B is similar to the monitoring well area under the proposed project. It is assumed that the same mitigation measures identified under the proposed project (**CUL-1a**, **CUL-1b**, **CUL-1c**, **CUL-2, CUL-3,** and **CUL-4**) would be implemented under Alternative B, to reduce impacts on previously identified or unknown historical resources, as well as any paleontological resource, during the construction, operation, and decommissioning phases. Although Alternative B would result in much less ground disturbance initially and fewer newly constructed facilities on the landscape when compared to the proposed project, tribal representatives have expressed during the Native American Communication Plan (NACP) that any new facilities in the project area would significantly affect the Topock Cultural Area. The level of impact on the Topock Cultural Area under Alternative B would be lower in degree than the proposed project, if measured on an annual basis, or higher in degree compared to the proposed project if measured on a total basis, but in either event would still remain significant and unavoidable. The discovery of human remains during ground disturbing activities would be mitigated in a manner similar to the proposed project (**CUL-4**); however, this impact too would remain significant and unavoidable to the extent that any remains would have to be removed from the project area. While the impact conclusions and mitigation would still be applicable to Alternative B, the overall cultural resources impact would be reduced when compared to the proposed project.

8.5.1.5 GEOLOGY AND SOILS

Construction activities associated with Alternative B would not require remediation wells or associated facilities (i.e., pipelines, roads, or utility connections). Alternative B would have the least amount of initial ground disturbing activity because of the absence of remediation wells and associated infrastructure; however, the approximately 60 new monitoring wells under Alternative B would result in soil disturbing activities, as will replacement monitoring wells which would be required during the many centuries of operation of Alternative B. While Alternative B would have greatly reduced ground disturbing activities as measured on an annual basis, there would still be the potential for impacts related to soil erosion, loss of top soils, or differential compaction (Impacts GEO-1a and GEO-1b). As with the proposed project, Mitigation Measures **GEO-1a** and **GEO-1b** would be required for Alternative B to reduce the potential for substantial erosion, loss of top soils, or differential compaction to a less-than-significant level.

8.5.1.6 HAZARDOUS MATERIALS

Construction activities associated with Alternative B would not require remediation wells or associated facilities (i.e., pipelines, roads, or utility connections). There would be no active remediation process that would be implemented to clean up contaminated groundwater in the project area, and cleanup would rely on natural attenuation processes over time (between 220 and 2,200 years) to reduce contaminants. Monitoring would indicate whether or not the concentration or direction of flow of the contaminated groundwater changes, and contingency measures would be in place if any indication exists that the contaminated ground water would reach the Colorado River. In addition, institutional controls would be in place to prevent ingestion of the groundwater through wells. Therefore, potential hazards associated with the contaminated groundwater contacting the Colorado River or being ingested would be less than significant.

Alternative B would have the least amount of initial ground disturbing activity because of the absence of remediation wells and associated infrastructure; however, the approximately 60 new monitoring wells under Alternative B would result in soil disturbing activities as will replacement monitoring wells required during the many centuries of operation of Alternative B. While Alternative B would have greatly reduced ground disturbing activities as measured on an annual basis, there would still be the potential for hazardous materials impacts related to the generation of dust and the exposure of construction workers to affected soils and airborne contaminants from disturbance of affected soils and the use of fuel, oils, and other lubricants on the site (Impacts HAZ-1 and HAZ-2). In addition, before it is determined that the IM-3 Facility can be decommissioned, there would be the potential for release of hazardous materials associated with the handling and transport of sludge and brine associated with the continued operation of IM-3 Facility treatment process, which would be a potentially significant impact. The presence and/or use of these chemicals could potentially result in spills of hazardous materials, which could result in soil, stormwater, or water quality impacts on the Colorado River. As with the proposed project, Mitigation Measures **HAZ-1a**, **HAZ-1b**, and **HAZ-2** would be required for Alternative B to reduce the potential for dust generation or a release or spill of a contaminant to a less-than-significant level.

8.5.1.7 HYDROLOGY AND WATER QUALITY

Construction activities associated with Alternative B would not require remediation wells or associated facilities (i.e., pipelines, roads, or utility connections). COPCs would remain present in the groundwater plume for extended periods of time (up to 2,200 years) because no active remediation process would be implemented. However, controls would be in place (such as institutional controls and contingency measures) to ensure that the larger surrounding hydrologic system is not significantly affected by the existing contamination.

Alternative B would have the least amount of initial ground disturbing activity because of the absence of remediation wells and associated infrastructure; however, the approximately 60 new monitoring wells under Alternative B would result in soil disturbing activities as will replacement monitoring wells which would be required during extended duration of Alternative B. Alternative B would still have the potential for hydrology and

water quality impacts associated with potential increased runoff, localized alteration of drainage patterns, and exposure of runoff to significant materials (Impacts HYDRO-1, HYDRO-2, and HYDRO-3). As with the proposed project, Mitigation Measure **HYDRO-1** would be required under Alternative B to reduce the potential for a water quality standard and objective or waste discharge requirement to be exceeded and for drainage patterns to be locally altered or substantial sources of polluted runoff to be added if pollutants are released and if pollutants could become exposed to stormwater runoff to a less-than-significant level.

8.5.1.8 LAND USE AND PLANNING

Alternative B would not require infrastructure for remediation facilities, and therefore would not have the potential to locate any pipelines such that they could divide existing communities. As with the proposed project, implementation of Alternative B would not conflict with the policies of the U.S. Bureau of Land Management's (BLM's) approved *Lake Havasu Field Office Resource Management Plan* (Approved RMP) or resource management goals of the U.S. Fish and Wildlife Service (USFWS), or any other plans or policies that would result in environmental impacts. Alternative B would have reduced land use and planning impacts compared to the proposed project.

8.5.1.9 NOISE

Alternative B would have similar noise impacts as with the proposed project associated with construction, operation and maintenance, decommissioning, nontransportation sources, and traffic. Remediation facilities (i.e., pipelines, roads, or utility connections) would not be required and construction noise impacts would be reduced compared to the proposed project. This alternative would require 60 new monitoring wells to be constructed as well as replacement wells over the remediation period; however, the potential locations of additional wells remains in both California and Arizona, and Mitigation Measures **NOISE-1**, **NOISE-2**, and **NOISE-3** would be required to reduce the potential for noise impacts at all sensitive receptors. Alternative B would have lesser noise impacts compared to the proposed project; however impact NOISE-1related to noise levels within the Topock Cultural Area would remain significant and unavoidable.

8.5.1.10 TRANSPORTATION

The trip distribution patterns under Alternative B would be similar to the proposed project. As with the proposed project, Alternative B would generate additional daily trips during construction, operations and maintenance activities, and decommissioning activities. Alternative B would result in fewer daily trips compared to the proposed project, with 29 trips for construction, with 49 trips for operations and maintenance with 50% construction, with 110 trips for operations and maintenance with 50% decommissioning, and 216 trips for decommissioning with removal of remedy. Accordingly, Alternative B would result in fewer peak-hour trips as well. However, the 49 trips associated with operation and maintenance would occur for as long as 2,200 years. As shown in Table 4.10-8 and 4.10-9, all roadway segments and study intersections currently operate at an acceptable level of service (LOS) and will continue to operate acceptably for the foreseeable future. Because Alternative B would result in fewer trips on an annual basis than the proposed project, this alternative would not degrade intersection or roadway segment operations below an acceptable LOS. Overall, the transportation impacts of Alternative B would be reduced on an annual basis compared to the proposed project because fewer trips annually would be required.

8.5.1.11 UTILITIES AND SERVICE SYSTEMS

Alternative B would result in the installation of up to 60 new monitoring wells plus replacement wells and the new wells would not generate any effluent that would affect wastewater treatment facilities. Like the proposed project, this alternative would also require the continued operation and maintenance of the IM-3 Facility until decommissioning is determined appropriate by the lead agency. 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 would not exceed existing treatment capacity. Because of the long period of time that would pass before attenuation would be complete and systems would be decommissioned (a best estimate of 500 years), a strong degree of speculation is involved in anticipating the available landfill capacity during the operations and maintenance and decommissioning of this component. Due to the limited construction activities proposed under Alternative B, the solid waste impact and impacts related to electrical generation impact would be much less than the proposed project. Under Alternative B a small amount of energy would be required, but compared to the proposed project the impact on energy consumption would negligible. It is assumed that all energy demands needed could be met on-site and no potential to impact on City of Needles' electrical systems would exist; therefore Impact UTIL-1 would be avoided and no mitigation would be necessary. Impacts on utilities and service systems would be less than for the proposed project.

8.5.1.12 WATER SUPPLY

Implementation of Alternative B would not increase demand for water supply at the compressor station such that additional entitlements would be necessary. About 100 monitoring wells are currently at the project site and up to 60 new wells and replacement wells would be needed for Alternative B. The consumptive water use associated with well sampling of the additional wells would be negligible.

No freshwater would be required for this alternative, when compared to the proposed project. Implementation of Alternative B would not deplete groundwater supplies or interfere substantially with groundwater recharge such that a net deficit in aquifer volume or a lowering of the local groundwater table level would occur. Sampling of monitoring wells would not perceptibly lower the surrounding water table. Any water used during construction activity would be supplied on-site from existing sources and would not be significant. The time to achieve cleanup goals would be decades longer than the proposed project, thereby preventing use of contaminated groundwater by the public through use of institutional controls. The impact on water supply from Alternative B would be less compared to the proposed project.

8.5.2 ALTERNATIVE C—HIGH VOLUME IN SITU TREATMENT

8.5.2.1 AESTHETICS

Alternative C would require the largest amount of remediation wells and infrastructure, and therefore the largest amount of associated ground disturbance out of all of the alternatives, including the proposed project. While the number of monitoring wells would be slightly greater to the proposed project (with an additional 10 wells), the number of remediation wells would more than double compared to the proposed project, from 110 wells to 240 wells, for Alternative C. Another significant increase for construction would be the addition of 10,000 linear feet of roads compared to the proposed project. As with the proposed project, Alternative C would be visible from key views 1-6, 9-11, and 13. Alternative C would include a greater intensity of construction due to the increased number of remediation wells and associated infrastructure; thus the degree of contrast from key views 1, 2, 4, 5, 9, 10, and 11 would be greater. Like the proposed project, key views 5 and 11 would be most adversely affected by the removal of floodplain vegetation, altering the existing condition of a scenic corridor and Mitigation Measures **AES-1** and **AES-2** would reduce the overall contrast of the Alternative C to a less-than-significant level. Alternative C would have greater aesthetic impacts compared to the proposed project, although these impacts would be present for a shorter period of time.

8.5.2.2 AIR QUALITY AND GLOBAL CLIMATE CHANGE

Alternative C would require installation of more monitoring and remediation wells and associated infrastructure than under the proposed project, and would result in greater associated short-term construction-related emissions of criteria air pollutants, precursors, and GHGs. As with the proposed project, fugitive dust (i.e., PM_{10}) control

measures must be adopted for any construction and demolition activity; therefore, Mitigation Measure **AIR-1** would be implemented to reduce the fugitive dust impact to a less-than-significant level. Vehicle trip generation under Alternative C during construction, operations and maintenance activities, and decommissioning activities would be greater than under the proposed project. Operational emissions and associated air quality and climate change impacts would be slightly greater than under the proposed project.

8.5.2.3 BIOLOGICAL RESOURCES

Construction activity for Alternative C includes wells, roads, pipelines, or other features that would require grading, drilling, trenching and other earth-moving activities. This alternative contains a larger amount of remediation wells and infrastructure within the same footprint as the proposed project, and therefore would have greater associated ground disturbance in both upland and floodplain areas, than the proposed project. These construction impacts could cause significant adverse effects to riparian, floodplain, sensitive habitats or drainages and would require the implementation of Mitigation Measure **BIO-1a**. Removal or disturbance of active nests of both sensitive species and other common nesting birds could result during construction-related and operational activities. As with the proposed project, loss of occupied habitat and active nests of special-status birds could result in a substantial adverse effect on local populations of the affected species; therefore, Mitigation Measure **BIO-2a** would be required. Similar to the proposed project, potential impacts on sensitive species could occur through removal and capping of wellheads, and through the decommissioning of the treatment facility and other project features such as roadways, utilities, and pipelines. Similar to the proposed project, Alternative B could result in impacts on desert tortoise, which would be reduced by implementation of Mitigation Measure **BIO-2b**. Mitigation Measure **BIO-2c** would be required to avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities. Alternative C 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. Because freshwater intake facilities would not be required for Alternative C, the potential fish entrainment would not occur. The overall biological resources impact would be greater to the proposed project.

8.5.2.4 CULTURAL RESOURCES

Alternative C would result in the installation of up to 310 new wells (240 remediation wells and 70 monitoring wells) in roughly the same amount of area as the proposed project. This would be a substantial increase in the number of built facilities in the area and would involve many more ground disturbance activities than the proposed project. While the floodplain area is not particularly rich in cultural resources, the upland areas included in the alternative do include a number of cultural resources, even with the exclusion of the Topock Maze (CA-SBR-219). It is assumed that the same mitigation measures identified under the proposed project (**CUL-1a**, **CUL-1b**, **CUL-1c**, **CUL-2, CUL-3,** and **CUL-4**) would be implemented under Alternative C, reducing impacts on cultural resources in a similar manner through the design, construction, operation, and decommissioning phases. With regards to the Topock Cultural Area, Alternative C would result in the construction and operation of a larger number of facilities compared to the proposed project. While these facilities would not physically affect the Topock Maze archaeologically, it has been expressed by tribal representatives during the NACP that any new facilities in the project area would significantly affect the Topock Cultural Area. The discovery of human remains, the possibility of which is most elevated under this alternative, may also be mitigated in a manner similar to the proposed project (**CUL-4**); however, to the extent that human remains would may have to be removed from the project site, the impacts would remain significant and unavoidable. The level of impact on the Topock Cultural Area under Alternative C would be higher in degree than the proposed project and would be considered significant and unavoidable. The overall cultural resources impact would be greater than the proposed project but these impacts would occur over a shorter period of time.

8.5.2.5 GEOLOGY AND SOILS

Construction of Alternative C would be similar to construction activities described in Chapter 3, "Project Description," for the proposed project, with a similar duration of 3 years and an anticipated 1 year for decommission. However, because of the increased amount of infrastructure that would be proposed, construction activities would be much more intensive and require more ground disturbance than the proposed project. Construction would be required for the installation of wells, utilities, pipelines, and other associated facilities required for each alternative. As with the proposed project, Alternative C would have the same potentially significant geology and soils impacts (Impacts GEO- 1a and GEO-1b) related to the potential for substantial erosion, loss of top soils, or differential compaction. As with the proposed project, Mitigation Measures **GEO-1a** and **GEO-1b** would be required to reduce the potential for substantial erosion, loss of top soils, or differential compaction to a less-than-significant level. Geology and soil impacts of Alternative C would be greater than under the proposed project because more ground would be disturbed because more remediation wells and other infrastructure would be built.

8.5.2.6 HAZARDOUS MATERIALS

Construction of Alternative C would be similar to construction activities described in Chapter 3 for the proposed project, with a similar duration of 3 years and an anticipated 1 year for decommission. However, due to the increased amount of remedial infrastructure that would be proposed, construction activities would be much more intensive and result in greater degree of ground disturbance than the proposed project due to the increased number of wells and increased linear footage of roads. Under Alternative C, an organic carbon substrate would be injected to create geochemically reduced conditions and convert the harmful and soluble Cr(VI) to the insoluble form of chromium, Cr(III). Because the reduced chromium would be deposited in the soil formation instead of being dissolved in groundwater, Cr(VI) would be removed from groundwater.

As with the proposed project, Alternative C would have the same potentially significant hazardous materials impacts related to the generation of dust and the exposure of construction workers to airborne contaminants, the use of fuel, oils, and other lubricants on the site, and the potential release of chemicals as a result of component failure, tank failure, or human error (Impacts HAZ-1, HAZ-2, and HAZ-3). Greater areas of soil disturbance, with potential for encountering greater volumes of contaminated soils and greater waste generation is anticipated for Alternative C due to the increased degree of construction. As with the proposed project, Mitigation Measures **HAZ-1a**, **HAZ-1b**, and **HAZ-2** would be required for Alternative C to reduce the potential for dust generation or a release or spill of a contaminant to a less-than-significant level. Hazardous materials impacts of Alternative C would be greater than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built.

8.5.2.7 HYDROLOGY AND WATER QUALITY

Construction of Alternative C would be similar to construction activities described in Chapter 3 for the proposed project, with a similar duration of 3 years and an anticipated 1 year for decommission. However, due to the increased amount of infrastructure that would be proposed, construction activities would be much more intensive and require more ground disturbance than the proposed project. Construction would be required for the installation of wells, utilities, pipelines, and other associated facilities required for this alternative. As with the proposed project, Alternative C would have the same potentially significant hydrology and water quality impacts associated with potential increased runoff, localized alteration of drainage patterns, and exposure of runoff to significant materials (Impacts HYDRO-1, HYDRO-2, and HYDRO-3). As with the proposed project, Mitigation Measure **HYDRO-1** would be required under Alternative C to reduce the potential for a water quality standard and objective or waste discharge requirement to be exceeded and for drainage patterns to be locally altered or substantial sources of polluted runoff to be added if pollutants are released and if pollutants could become exposed to stormwater runoff to a less-than-significant level. The potential for hydrology and water quality impacts of Alternative C would be greater than under the proposed project because more ground would be

disturbed because more remediation wells and other infrastructure would be built. Mitigation measures would be applied at more locations and over a greater total area than for the proposed project. However, because of the increased intensity of the remedial system under Alternative C, the time to cleanup levels are reached would be reduced to approximately 18 years (verses 29 for the proposed project), therefore the contamination of the groundwater would be eliminated much quicker.

8.5.2.8 LAND USE AND PLANNING

As with the proposed project, implementation of Alternative C would not conflict with the policies of BLM's Lake Havasu Field Office Approved RMP or resource management goals of the USFWS, or any other plans or policies that would result in environmental impacts. As is the case with the proposed project, Alternative C would have no land use and planning impacts.

8.5.2.9 NOISE

Alternative C would have similar noise impacts as with the proposed project associated with construction, operation and maintenance, decommissioning, nontransportation sources, and traffic increases. Compared to the proposed project Alternative C would require more wells and remediation facilities (i.e., pipelines, roads, or utility connections). Construction noise impacts would be more extensive than the proposed project, but the construction duration would be the same as the proposed project. The proposed construction area for Alternative C would only be in California; however, the potential locations of additional wells would affect Arizona receptors and Mitigation Measures **NOISE-1**, **NOISE-2**, and **NOISE-3** would be required to reduce the potential for noise impacts at all sensitive receptors. Traffic noise level increases would be nominal compared to the proposed project due to an increase in the number of daily trips required for this alternative. Noise impacts of Alternative C would be greater compared to the proposed project due to the increase in wells and remediation facilities that would be required, and impact NOISE-1related to noise levels within the Topock Cultural Area would remain significant and unavoidable.

8.5.2.10 TRANSPORTATION

The trip distribution patterns under Alternative C would be similar to the proposed project. As with the proposed project, Alternative C would generate additional daily trips during construction, operations and maintenance activities, and decommissioning activities. Alternative C would result in greater daily trips compared to the proposed project, with 116 trips for construction, with 98 trips for operations and maintenance with 50% construction, with 116 trips for operations and maintenance with 50% decommissioning, and 256 trips for decommissioning with removal of remedy. Accordingly, Alternative C would result in more peak hour trips compared to the proposed project. Even with the increased trips under Alternative C, this alternative would not be expected to degrade intersection or roadway segment operations below an acceptable level of service because the study intersections currently operate at LOS A and the roadway segments are well below the threshold of 7,000 average daily traffic (ADT). Overall, the transportation impacts of Alternative C would be greater compared to the proposed project due to the increase in trips that would be required.

8.5.2.11 UTILITIES AND SERVICE SYSTEMS

While Alternative C would require the largest amount of remediation facilities, as with the proposed project, all phases of construction, operation, and decommissioning would not generate substantial amounts of domestic wastewater. Because these are not wastewater-intensive facilities, it is not anticipated that this alternative would generate effluent that would exceed applicable standards or capacity, nor would the alternative require the construction of new treatment facilities. Like the proposed project, this alternative would also require the temporary 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. Nonhazardous incidental waste from construction, operations and maintenance, and decommissioning of IM-3 would be similar to the proposed project. Operation of Alternative C (primarily energy needed to move water through the remediation system) would require up to 2.6 million kilowatt-hours of electricity annually. Similar to the proposed project, Alternative C could potentially generate electricity on-site using natural gas-fired generators that would draw fuel from the existing gas pipeline. As with the proposed project, Mitigation Measure **UTIL-1** would ensure sufficient energy supplies would be available for the alternative. Impacts on utilities would be similar to the proposed project.

8.5.2.12 WATER SUPPLY

Implementation of Alternative C would not increase demand for water supply at the project site such that additional entitlements would be necessary. PG&E's full Lower Colorado Water Supply Project (LCWSP) entitlement is 422 acre-feet annually (afa). While the consumptive water use during construction of Alternative C would be greater than under the proposed project at 19.9 acre feet over 3 years for construction activity, it would be well under PG&E's yearly entitlement. No freshwater would be required for this alternative, when compared to the proposed project. As with the proposed project, because all water diverted would be reinjected for in situ treatment, the net consumptive use would be approximately zero. The consumptive water use of Alternative C during decommissioning would be the same as the proposed project. This impact would be less than significant.

Implementation of this Alternative C would not 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. Because Alternative C does not involve freshwater flushing the impact on groundwater would be reduced compared to the proposed project.

8.5.3 ALTERNATIVE D—SEQUENTIAL IN SITU TREATMENT

8.5.3.1 AESTHETICS

Alternative D would be constructed within a larger area compared to the project site for the proposed project, and could include construction and operation of remedial facilities within the Topock Maze Loci A, B, and C. While the number of monitoring wells would be slightly greater than under the proposed project (with an additional 20 wells), the number of remediation wells would almost double compared to the proposed project, from 110 wells to 200 wells, for Alternative D. Another significant increase for construction would be the addition of 60,000 linear feet of electrical and signal communications and 10,000 linear feet of roads compared to the proposed project. As with the proposed project, Alternative D would be visible from key views 1-6, 9-11, and 13. Because Alternative D would include a greater intensity of construction due to the increased number of remediation wells and associated infrastructure, the degree of contrast from those key views would be greater. Like the proposed project, key views 5 and 11 would be most adversely affected by the removal of floodplain vegetation, altering the existing condition of a scenic corridor and Mitigation Measures **AES-1** and **AES-2** would reduce the overall contrast of views of Alternative D from the Colorado River to a less-than-significant level. However, Alternative D would potentially include construction, operations and maintenance, and decommissioning activities in all areas of the Topock Maze, which is visible from key view 5. The pedestrian viewer sensitivity to the Topock Maze is considered moderate to high as described in Section 4.1 of the EIR. Because implementation of Alternative D would result in construction activities in all areas of the Topock Maze, the impact would be considered greater than under the proposed project. While design features would be available to reduce the visual effect of Alternative D, impacts would likely be significant and unavoidable. Overall, Alternative D would have greater aesthetic impacts compared to the proposed project.

8.5.3.2 AIR QUALITY AND GLOBAL CLIMATE CHANGE

Alternative D would require installation of a larger number of monitoring and remediation wells and additional infrastructure compared with the proposed project. In addition, Alternative D would be constructed over a larger area, and present the potential to disturb a larger volume of soil. Thus, Alternative D would be expected to result in greater associated short-term construction-related emissions of criteria air pollutants, precursors, and GHGs than under the proposed project. As with the proposed project, fugitive dust (i.e., PM_{10}) control measures must be adopted for any construction and demolition activity; therefore, Mitigation Measure **AIR-1** would be implemented to reduce the fugitive dust impact to a less-than-significant level. Vehicle trip generation under Alternative D during construction, operations and maintenance activities, and decommissioning activities would be greater than under the proposed project. Operational emissions and associated air quality and climate change impacts would be slightly greater than under the proposed project.

8.5.3.3 BIOLOGICAL RESOURCES

Construction activity for Alternative D includes wells, roads, pipelines, or other features that would require grading, drilling, trenching and other earth-moving activities. This alternative contains a larger amount of monitoring and remediation wells and infrastructure than the proposed project, and therefore would have greater associated ground disturbance than the proposed project. These construction impacts could cause significant adverse effects to riparian, floodplain, sensitive habitats or drainages and would require the implementation of Mitigation Measure **BIO-1a**. Removal or disturbance of active nests of both sensitive species and other common nesting birds could result during construction-related and operational activities. As with the proposed project, loss of occupied habitat and active nests of special-status birds could result in a substantial adverse effect on local populations of the affected species; therefore, Mitigation Measure **BIO-2a** would be required. Similar to the proposed project, potential impacts on sensitive species could occur through removal and capping of wellheads, and through the decommissioning of the treatment facility and other project features such as roadways, utilities, and pipelines. Similar to the proposed project, Alternative B could result in impacts on desert tortoise, which would be reduced by implementation of Mitigation Measure **BIO-2b**. Mitigation Measure **BIO-2c** would be required to avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities. Alternative D 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. Because freshwater intake facilities would not be required for Alternative D, the potential fish entrainment would not occur. The overall biological resources impact would be greater to the proposed project.

8.5.3.4 CULTURAL RESOURCES

Alternative D, as stated elsewhere, would result in the establishment of 10 treatment zones throughout the project area that would consist of injection and extraction wells, constructed over phases. An estimated 280 new wells would be installed (200 remediation wells, 80 monitoring wells) in the area, and the remediation wells would be connected with 60,000 linear feet of pipeline and 110,000 linear feet of utility line, both of which would introduce substantially more ground disturbance activities than the proposed project. Under Alternative D, remediation facilities and monitoring wells could be located within the loci of the Topock Maze (CA-SBR-219). It is assumed that the same mitigation measures identified under the proposed project (**CUL-1a**, **CUL-1b**, **CUL-1c**, **CUL-2, CUL-3,** and **CUL-4**) would be implemented under Alternative C, reducing many impacts on cultural and paleontological resources through the design, construction, operation, and decommissioning phases. However, possibility that both remediation wells and monitoring wells could be placed within the Topock Maze creates a significant and unavoidable impact on cultural resources. While impacts on the Topock Maze are considered significant and unavoidable under the proposed project, no direct impacts on the Topock Maze would occur. Alternative D could result in the destruction of portions of the Topock Maze archaeological feature. Impacts would be significant and unavoidable to the Topock Cultural Area under this impact. The level of impact on the Topock Cultural Area under Alternative D would be higher in degree than the proposed project due to the number

of new facilities and the possible destruction of portions of the Topock Maze archaeological feature. This impact would be considered significant and unavoidable. The discovery of human remains, the possibility of which is greatly elevated under this alternative due to the increased area of potential facility locations, may also be mitigated in a manner similar to the proposed project (**CUL-4**); however, to the extent that human remains would be removed from the project site, impacts would remain significant and unavoidable. It has been expressed by tribal representatives during the NACP that any new facilities in the project area would significantly affect the Topock Cultural Area. The overall cultural resources impact would be greater than under the proposed project.

8.5.3.5 GEOLOGY AND SOILS

Construction of Alternative D would be similar to construction activities described in Chapter 3 for the proposed project, with a similar duration of 3 years and an anticipated 1 year for decommission. However, due to the increased amount of infrastructure necessary for Alternative D compared to the proposed project, construction activities would be much more intensive and require more ground disturbance than the proposed project. Construction would be required for the installation of wells, utilities, pipelines, and other associated facilities required for this alternative. As with the proposed project, Alternative D would have the same potentially significant geology and soils impacts (Impacts GEO-1a and GEO-1b) related to the potential for substantial erosion, loss of top soils, or differential compaction. As with the proposed project, Mitigation Measures **GEO-1a** and **GEO-1b** would be required to reduce the potential for substantial erosion, loss of top soils, or differential compaction to a less-than-significant level. Geology and soil impacts of Alternative D would be greater than under the proposed project because more ground would be disturbed because more remediation wells and other infrastructure would be built.

8.5.3.6 HAZARDOUS MATERIALS

Construction of Alternative D would be similar to construction activities described in Chapter 3 for the proposed project, with a similar duration of 3 years and an anticipated 1 year for decommission. However, due to the increased amount of remedial infrastructure necessary for Alternative D compared to the proposed project, construction activities would be much more intensive and result in a greater degree of ground disturbance than the proposed project due to the increased number of wells and increased linear footage of associated utilities and roads. Construction would be required for the installation of wells, utilities, pipelines, and other associated facilities required for this alternative. There would be the potential to encounter greater volumes of contaminated soils during the construction phase and generation of greater quantities of wastes due to the larger scale of this alternative. As with the proposed project, Alternative D would have the same potentially significant hazardous materials impacts related to the generation of dust and the exposure of construction workers to airborne contaminants, the use of fuel, oils, and other lubricants on the site, and the potential release of chemicals as a result of component failure, tank failure, or human error (Impacts HAZ-1, HAZ-2, and HAZ-3). As with the proposed project, Mitigation Measures **HAZ-1a**, **HAZ-1b**, and **HAZ-2** would be required for Alternative D to reduce the potential for dust generation or a release or spill of a contaminant to a less-than-significant level. Under Alternative D, treatment of Cr(VI) would occur by injecting an organic carbon substrate throughout the plume to create geochemically reduced conditions to convert Cr(VI) to insoluble Cr(III). Because the reduced chromium would be deposited in the soil formation instead of groundwater, Cr(VI) would be removed from groundwater. Hazardous materials impacts of Alternative D would be greater than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built.

8.5.3.7 HYDROLOGY AND WATER QUALITY

Construction of Alternative D would be similar to construction activities described in Chapter 3 for the proposed project, with a similar duration of 3 years and an anticipated 1 year for decommission. However, due to the increased amount of infrastructure necessary for Alternative D compared to the proposed project, construction activities would be much more intensive and require more ground disturbance than the proposed project.

Construction would be required for the installation of wells, utilities, pipelines, and other associated facilities required for this alternative. As with the proposed project, Alternative D would have the same potentially significant hydrology and water quality impacts associated with potential increased runoff, localized alteration of drainage patterns, and exposure of runoff to significant materials (Impacts HYDRO-1, HYDRO-2, and HYDRO-3); however, there is a much greater area of with the potential for this impacts. As with the proposed project, Mitigation Measure **HYDRO-1** would be required under Alternative D to reduce the potential for a water quality standard and objective or waste discharge requirement to be exceeded and for drainage patterns to be locally altered or substantial sources of polluted runoff to be added if pollutants are released and if pollutants could become exposed to stormwater runoff to a less-than-significant level. The potential for hydrology and water quality impacts of Alternative D would be greater than under the proposed project due to a greater extent of ground disturbance based on the increased number of remediation wells and increased linear footage of the associated infrastructure (utilities and roads). However, because of the increased intensity of the remedial system under Alternative D, the time to cleanup levels are reached would be reduced to approximately 15 years (verses 29 for the proposed project), which is the shortest of all alternatives. Mitigation measures would be applied at more locations and over a greater total area than for the proposed project.

8.5.3.8 LAND USE AND PLANNING

As with the proposed project, implementation of Alternative D would not conflict with the policies of BLM's Approved RMP or resource management goals of the USFWS, or any other plans or policies that would result in environmental impacts. As with the proposed project, Alternative D would have no land use and planning impacts.

8.5.3.9 NOISE

Alternative D would have similar noise impacts as with the proposed project associated with construction, operation and maintenance, decommissioning, nontransportation sources and traffic increases. Compared to the proposed project Alternative D would require more wells and remediation facilities (i.e., pipelines, roads, or utility connections). Construction noise impacts would be more extensive than the proposed project, but the construction duration would be the same as the proposed project. The proposed construction area for Alternative D would be in California and Arizona, and Mitigation Measures **NOISE-1**, **NOISE-2**, and **NOISE-3** would be required to reduce the potential for noise impacts at all sensitive receptors. Traffic noise level increases would be nominal compared to the proposed project due to an increase in the number of daily trips required for this alternative. Noise impacts of Alternative D would be greater compared to the proposed project due to the increase in wells and remediation facilities that would be required, and impact NOISE-1related to noise levels within the Topock Cultural Area would remain significant and unavoidable.

8.5.3.10 TRANSPORTATION

The trip distribution patterns under Alternative D would be similar to the proposed project. As with the proposed project, Alternative D would generate additional daily trips during construction, operations and maintenance activities, and decommissioning activities. Alternative D would result in greater daily trips compared to the proposed project, with 130 trips for construction, with 105 trips for operations and maintenance with 50% construction, with 116 trips for operations and maintenance with 50% decommissioning, and 256 trips for decommissioning with removal of remedy. Accordingly, Alternative D would result in more peak hour trips compared to the proposed project. Even with the increased trips under Alternative D, this alternative would not be expected to degrade intersection or roadway segment operations below an acceptable level of service because the study intersections currently operate at LOS A and the roadway segments are well below the threshold of 7,000 ADT.

Overall, the transportation impacts of Alternative D would be greater compared to the proposed project due to the increase in trips that would be required.

8.5.3.11 UTILITIES AND SERVICE SYSTEMS

As with the proposed project, all phases of construction, operation, and decommissioning for Alter native D would not generate substantial amounts of domestic wastewater. Because implementation of this alternative would not construct wastewater-intensive facilities, it is not anticipated that this alternative would generate effluent that would exceed applicable standards or capacity, nor would the alternative require the construction of new treatment facilities. Like the proposed project, this alternative would also require the temporary 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. Nonhazardous incidental waste from construction, operations and maintenance, and decommissioning of IM-3 would be similar to the proposed project. Like the proposed project, it is expected that a permitted municipal solid waste facility within a 200 miles of the project site would accommodate the nonhazardous waste. Operation of Alternative D (primarily energy needed to move water through the remediation system) would require up to 2.6 million kilowatt-hours of electricity annually. Similar to the proposed project, Alternative D could potentially generate electricity on-site using natural gas-fired generators that would draw fuel from the existing gas pipeline. However, as with the proposed project, Mitigation Measure **UTIL-1** would ensure sufficient energy supplies would be available for the alternative. Impacts on utilities would be similar to the proposed project.

8.5.3.12 WATER SUPPLY

Implementation of Alternative D would not increase demand for water supply at the project site such that additional entitlements would be necessary. PG&E's full LCWSP entitlement is 422 afa. While the consumptive water use during construction of Alternative D would be greater than under the proposed project at 20.2 acre feet over 3 years, it would be well under PG&E's yearly entitlement. As with the proposed project, because all water diverted would be reinjected for in situ treatment, the net consumptive use would be approximately zero. The consumptive water use of Alternative D during decommissioning would be the same as the proposed project. This impact would be less than significant.

No freshwater would be required for this alternative, when compared to the proposed project. Implementation of this Alternative D would not 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. Because Alternative D does not involve freshwater flushing, the impact on groundwater would be reduced compared to the proposed project.

8.5.4 ALTERNATIVE F—PUMP AND TREAT

8.5.4.1 AESTHETICS

Alternative F would decommission and demolish the current IM-3 and would construct an approximately 90,000 square-foot treatment plant. An additional 100,000 square feet would be needed to accommodate parking and storage for equipment and materials. Location of treatment plant would most likely be within the lower yard of the compressor station; however an alternate location could be the site of the current IM-3 Facility. Overall, the number of monitoring and remediation wells and associated infrastructure would be reduced compared to the proposed project. Alternative F would be visible from key views 2, 9, and 10 if constructed at the compressor station location or from key views 6 and 10 if constructed at the IM-3 Facility locations. Like the proposed project, Alternative F would not introduce a strong degree of contrast to the existing visual character, except from key view 5. Key view 5 represents the view experienced by pedestrian visitors to Topock Maze Locus B looking south toward the IM-3 Facility and compressor station. With the implementation of Alternative F, a new treatment plant approximately 90,000 square feet with a maximum height of 45 feet could be introduced near the existing

IM-3 Facility; however the existing IM-3 Facility would be removed prior to the new treatment facility. The proposed structure would be highly visible from key view 5, especially when compared to the existing facility, which is 18,900 square feet and 33 feet tall. Implementation of Alternative F would require extensively altering the landform, constructing new access roads, pipelines, storage and containment tanks, and building a new structure that would be substantially larger than the existing treatment facility. The new structure has a proposed maximum height of 45 feet and may have a footprint as large as 10 times the size of the existing treatment plant. As a result, Alternative F would be noticeable to the pedestrian visitors to Topock Maze Locus B. The proposed project would not include the construction of a new treatment plant; therefore, the aesthetic impact of Alternative F would be greater than under the proposed project.

8.5.4.2 AIR QUALITY AND GLOBAL CLIMATE CHANGE

Alternative F would result in similar construction activities as the proposed project for installation of monitoring and remediation wells and infrastructure, but would also result in the decommissioning and demolition of the existing treatment facility, and construction of a new facility. Thus, Alternative F would result in greater associated short-term construction-related emissions of criteria air pollutants, precursors, and GHGs. As with the proposed project, fugitive dust (i.e., PM_{10}) control measures must be adopted for any construction and demolition activity; therefore, Mitigation Measure **AIR-1** would be implemented to reduce the fugitive dust impact to a less-than-significant level. Vehicle trip generation under Alternative F would be slightly greater than under the proposed project. Operational emissions and associated air quality and climate change impacts would be slightly greater than under the proposed project.

8.5.4.3 BIOLOGICAL RESOURCES

Construction activity for Alternative F includes wells, roads, pipelines, treatment facility or other features that would require grading, drilling, trenching and other earth-moving activities. The majority of the impacts would require removal of upland habitat; however, the potential exists for impacts on floodplain or riparian habitats as well. The new treatment facility could occupy up to 90,000 square feet of area but would be located in areas previously disturbed by other facility features. These construction impacts could cause significant adverse effects to riparian, floodplain, sensitive habitats or drainages and would require the implementation of Mitigation Measure **BIO-1a**. Removal or disturbance of active nests of both sensitive species and other common nesting birds could result during construction-related and operational activities. As with the proposed project, loss of occupied habitat and active nests of special-status birds could result in a substantial adverse effect on local populations of the affected species; therefore, Mitigation Measure **BIO-2a** would be required. Similar to the proposed project, potential impacts on sensitive species could occur through removal and capping of wellheads, and through the decommissioning of the treatment facility and other project features such as roadways, utilities, and pipelines. Similar to the proposed project, Alternative B could result in impacts on desert tortoise, which would be reduced by implementation of Mitigation Measure **BIO-2b**. Mitigation Measure **BIO-2c** would be required to avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities. Alternative F 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. Because freshwater intake facilities would not be required for Alternative F, the potential fish entrainment would not occur. The overall biological resources impact would be similar to the proposed project.

8.5.4.4 CULTURAL RESOURCES

Alternative F, as stated elsewhere, would result in the construction and operation of an aboveground treatment plant and the installation of approximately 120 new wells (70 remediation wells, 50 monitoring wells). The wells would be connected by a similar amount of pipeline and utility lines compared to the proposed project, with wells and pipelines reconfigured over the course of the remediation process. The treatment plant could either be built near the compressor station or in the same general area of IM-3, although the area of the new treatment plant

would be 10 times larger than the existing IM-3 Facility. The area of the proposed remediation facilities is smaller than the proposed project, because areas near Moabi Regional Park and in Arizona are excluded. The proposed area for monitoring wells is also similar to the proposed project. It is assumed that that the same mitigation measures identified under the proposed project (**CUL-1a**, **CUL-1b**, **CUL-1c**, **CUL-2, CUL-3,** and **CUL-4**) would be implemented under Alternative F, reducing impacts on cultural resources in a similar manner through the design, construction, operation, and decommissioning phases. The discovery of human remains, the possibility of which is greatly elevated under this alternative due to the increased area of potential facility locations, may also be mitigated in a manner similar to the proposed project (**CUL-4**); however, to the extent that human remains must be removed from the project site, impacts would remain significant and unavoidable. With regards to the Topock Cultural Area, Alternative F would result in the construction and operation of a substantially larger treatment plant than the IM-3 Facility, and there is a possibility that this treatment plant would be placed in the current IM-3 location. While ground disturbance activities would not directly affect the Topock Maze archaeologically, it has been expressed by tribal representatives during the NACP that any new facilities in the project area would significantly affect the Topock Cultural Area. The level of impact on the Topock Cultural Area under Alternative F, if the treatment plant was placed in the current IM-3 site location, would be higher in degree than the proposed project. This impact would be considered significant and unavoidable. The overall cultural resources impact would be similar to the proposed project.

8.5.4.5 GEOLOGY AND SOILS

Construction of Alternative F would be similar to construction activities described in Chapter 3 for the proposed project for monitoring and remediation wells, pipeline, and other infrastructure. However, Alternative F would decommission and demolish the current IM-3 Facility and would construct an approximately 90,000 square-foot treatment plant. An additional 100,000 square feet would be needed to accommodate parking and storage for equipment and materials. Due to the removal of the current IM-3 Facility and the construction of a new treatment plant for Alternative F, construction activities would be much more intensive and require more ground disturbance than the proposed project. As with the proposed project, Alternative F would have the same potentially significant geology and soils impacts (Impacts GEO-1a and GEO-1b) related to the potential for substantial erosion, loss of top soils, or differential compaction. As with the proposed project, Mitigation Measures **GEO-1a** and **GEO-1b** would be required to reduce the potential for substantial erosion, loss of top soils, or differential compaction to a less-than-significant level. Geology and soil impacts of Alternative F would be greater than under the proposed project because more ground would be disturbed because more remediation wells and other infrastructure would be built.

8.5.4.6 HAZARDOUS MATERIALS

Construction of Alternative F would be similar to construction activities described in Chapter 3 for the proposed project for monitoring and remediation wells, pipeline, and other infrastructure. However, Alternative F would decommission and demolish the current IM-3 Facility and would construct an approximately 90,000 square-foot treatment plant. An additional 100,000 square feet would be needed to accommodate parking and storage for equipment and materials. Due to the removal of the current IM-3 Facility and the construction of a new treatment plant for Alternative F, and the installation of monitoring and remediation wells and associated infrastructure, construction activities would be much more intensive and require a greater degree of ground disturbance than the proposed project. As with the proposed project, Alternative F would have the same potentially significant hazardous materials impacts related to the generation of dust and the exposure of construction workers to airborne contaminants, potential to encounter contaminated soils, the use of fuel, oils, and other lubricants on the site, and the potential release of chemicals as a result of component failure, tank failure, or human error (Impacts HAZ-1, HAZ-2, and HAZ-3). These potential impacts would occur over a greater area with Alternative F. As with the proposed project, Mitigation Measures **HAZ-1a**, **HAZ-1b**, and **HAZ-2** would be required for Alternative F to reduce the potential for dust generation or a release or spill of a contaminant to a less-than-significant level.

The treatment process for chromium removal would require the use of hazardous materials and results in the generation of hazardous wastes as metals enriched sludge during treatment is not an aspect of the proposed project. The quantities of sludge may be an order of magnitude greater than currently being generated at IM-3 based on the anticipated capacity of 1,280 gpm, compared to the current IM-3 operating rate of approximately 135 gpm. Disposal of the sludge requires transportation to a hazardous waste disposal facility. Additional impacts and associated mitigation measures related to the handling and storage of the sludge byproduct would be required under Alternative F. Hazardous materials impacts of Alternative F would be greater than under the proposed project due to greater ground disturbance, potential to encounter affected soils, and generation of greater quantities of wastes both during the construction of remediation wells and associated infrastructure, construction of the new, larger capacity treatment plant, and in wastes generated during the IM-3 decommissioning.

8.5.4.7 HYDROLOGY AND WATER QUALITY

Construction of Alternative F would be similar to construction activities described in Chapter 3 for the proposed project for monitoring and remediation wells, pipeline, and other infrastructure, but with a much greater extent due to construction of a 1,280 gpm aboveground treatment plant not included with the proposed project. Additionally, Alternative F would decommission and demolish the current IM-3 Facility and would construct an approximately 90,000 square-foot treatment plant. An additional 100,000 square feet would be needed to accommodate parking and storage for equipment and materials. Due to the removal of the current IM-3 Facility and the construction of a new treatment plant for Alternative F, construction activities would be much more intensive and require more ground disturbance than the proposed project. As with the proposed project, Alternative F would have the same potentially significant hydrology and water quality impacts associated with potential increased runoff, localized alteration of drainage patterns, and exposure of runoff to significant materials (Impacts HYDRO-1, HYDRO-2, and HYDRO-3). An additional potential source of adverse effects on water quality would be leaks or releases of untreated water being conveyed from extraction wells to the treatment system. As with the proposed project, Mitigation Measure **HYDRO-1** would be required for Alternative F to reduce the potential for a water quality standard and objective or waste discharge requirement to be exceeded and for drainage patterns to be locally altered or substantial sources of polluted runoff to be added if pollutants are released and if pollutants could become exposed to stormwater runoff to a less-than-significant level.
The potential for hydrology and water quality impacts of Alternative F would be greater than under the proposed project due to increased scale of this alternative resulting in greater ground disturbance during construction for the increase in remediation and monitoring wells and other infrastructure. The time to reach cleanup levels under Alternative F would be approximately 37 years (verses 29 for the proposed project). During operation and maintenance, the potential for release of untreated water is greater than under the proposed project. Mitigation measures would be applied at more locations and over a greater total area than for the proposed project.

8.5.4.8 LAND USE AND PLANNING

As with the proposed project, implementation of Alternative F would not conflict with the policies of BLM's Approved RMP or resource management goals of the USFWS, or any other plans or policies that would result in environmental impacts. As with the proposed project, Alternative F would have no land use and planning impacts.

8.5.4.9 NOISE

Alternative F would have similar noise impacts as with the proposed project associated with construction, operation and maintenance, decommissioning, nontransportation sources, and traffic increases. Compared to the proposed project Alternative F would require fewer additional wells and remediation facilities (i.e., pipelines, roads, or utility connections). Construction noise impacts would be constructed in one less year compared to the proposed project. The proposed construction area for Alternative F would only be in California, however the potential locations of additional wells would affect Arizona receptors and Mitigation Measures **NOISE-1**, **NOISE-2**, and NOISE-3 would be required to reduce the potential for noise impacts at all sensitive receptors. Traffic noise level increases would be nominal compared to the proposed project due to an increase in the number

of daily trips required for this Alternative. Groundwater treatment plants are proposed with this alternative. The potential locations for the new treatment plant are west of the existing compressor station and at the existing IM-3 site. Existing compressor station structures and topographic features (mesas) would shield noise emanating from the new treatment plant and would not create noise impacts at sensitive receptors. Noise impacts of Alternative F would be similar compared to the proposed project, and impact NOISE-1related to noise levels within the Topock Cultural Area would remain significant and unavoidable.

8.5.4.10 TRANSPORTATION

The trip distribution patterns under Alternative F would be similar to the proposed project. As with the proposed project, Alternative F would generate additional daily trips during construction, operations and maintenance activities, and decommissioning activities. Alternative F would result in greater daily trips compared to the proposed project, with 176 trips for construction, with 164 trips for operations and maintenance with 50% construction, with 152 trips for operations and maintenance with 50% decommissioning, and 284 trips for decommissioning with removal of remedy. Accordingly, Alternative F would result in more peak hour trips compared to the proposed project. Even with the increased trips under Alternative F, this alternative would not be expected to degrade intersection or roadway segment operations below an acceptable level of service because the study intersections currently operate at LOS A and the roadway segments are well below the threshold of 7,000 ADT.

Overall, the transportation impacts of Alternative F would be greater compared to the proposed project due to the increase in trips that would be required.

8.5.4.11 UTILITIES AND SERVICE SYSTEMS

As with the proposed project, all phases of construction, operation, and decommissioning for Alter native F would not generate substantial amounts of domestic wastewater. Because implementation of this alternative would not construct wastewater-intensive facilities, it is not anticipated that this alternative would generate effluent that would exceed applicable standards or capacity, nor would the alternative require the construction of new treatment facilities. Like the proposed project, this alternative would also require the temporary continued operation, maintenance of the IM-3 Facility during construction of the Alternative. Alternative F would include an approximately 90,000 square-foot treatment plant, which would eventually be decommissioned. Like the IM-3 Facility, it is expected that the new treatment plant would discharge nonhazardous wastewater to a tank on-site, which would be removed by a wastewater disposal contractor. Because this effluent would be 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 would not exceed existing treatment capacity. Nonhazardous incidental waste from construction, operations and maintenance, and decommissioning of IM-3, and the new treatment plant would be similar to the proposed project. Like the proposed project, it is expected that a permitted municipal solid waste facility within a 200 miles of the project site would accommodate the nonhazardous waste. Operation of Alternative F (primarily energy needed to move water through the remediation system) would require up to 1.1 million kilowatt-hours of electricity annually. Similar to the proposed project, Alternative F could potentially generate electricity on-site using natural gas-fired generators that would draw fuel from the existing gas pipeline. However, as with the proposed project, Mitigation Measure **UTIL-1** would ensure sufficient energy supplies would be available for the alternative. Impacts on utilities would be similar to the proposed project.

8.5.4.12 WATER SUPPLY

Implementation of Alternative F would not increase demand for water supply at the compressor station such that additional entitlements would be necessary. All extracted water would be returned to the groundwater near where it was withdrawn. The only potential water uses associated with this alternative are negligible amounts of water contained in the waste sludge produced by the treatment plant. In addition, construction of Alternative F would be

less than the proposed project at 8.0 acre feet over 3 years, and would be well under PG&E's yearly entitlement. Alternative F could require amendment of PG&E's existing entitlements to allow new points of diversions and/or types of use, but would not require additional quantities of water above their entitlement that would result in physical impacts on the environment.

No freshwater would be required for this alternative, when compared to the proposed project. Because Alternative F would not result in substantial consumptive use of water and would return extracted groundwater to the basin, it would not deplete groundwater recharge. There are no known nearby wells which could be adversely affected. Implementation of Alternative F would not 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. Overall, the Alternative F would result in a reduced impact on water supply compared to the proposed project.

8.5.5 ALTERNATIVE G—COMBINED FLOODPLAIN IN SITU/PUMP AND TREAT

8.5.5.1 AESTHETICS

Alternative G would combine floodplain cleanup by in situ treatment with treatment of the upland portion of the plume by extraction and reinjection with ex situ treatment requiring a treatment plant. The floodplain cleanup would involve construction of IRZ lines at National Trails Highway and between National Trails Highway and the Colorado River. Alternative G would include a new treatment plant of the same dimensions and potential locations as defined under Alternative G and would decommission and demolish the current IM-3 Facility. Overall, the number of monitoring and remediation wells and associated infrastructure would be greater compared to the proposed project. Alternative G would be visible from key views 2, 9, and 10 if constructed at the compressor station location or from key views 6 and 10 if constructed at the IM-3 Facility locations. Because Alternative G would include a greater intensity of construction due to the increased number of remediation wells and associated infrastructure in the floodplain, the degree of contrast from those key views would be greater compared to the proposed project. Mitigation Measure **AES-1** and **AES-2** would also be required under this alternative due to removal of floodplain vegetation, altering the existing condition of a scenic corridor. The proposed structure under Alternative F, if constructed at the existing IM-3 Facility, would be highly visible from key view 5, especially when compared to the existing facility, which is 18,900 square feet and 33 feet tall. Implementation of this Alternative G would require extensively altering the landform, constructing new access roads, pipelines, storage and containment tanks, and building a new structure that would be substantially larger than the existing treatment facility. The new structure would have a maximum height of 45 feet and may have a footprint as large as 10 times the size of the existing treatment plant. As a result, Alternative G would be noticeable to the pedestrian visitors to Topock Maze Locus B. The proposed project would not include the construction of a new treatment plant; therefore, the aesthetic impact of Alternative G would be greater than under the proposed project, although the impact would occur over a shorter period of time.

8.5.5.2 AIR QUALITY AND GLOBAL CLIMATE CHANGE

Alternative G would result in installation of more monitoring and remediation wells than under the proposed project, and would also result in the decommissioning and demolition of the existing treatment facility, and construction of a new facility, as described under Alternative F. Thus, Alternative G would result in greater associated short-term construction-related emissions of criteria air pollutants, precursors, and GHGs than under the proposed project. As with the proposed project, fugitive dust (i.e., PM_{10}) control measures must be adopted for any construction and demolition activity; therefore, Mitigation Measure **AIR-1** would be implemented to reduce the fugitive dust impact to a less-than-significant level. Vehicle trip generation under Alternative G would be slightly greater than under the proposed project. Operational emissions and associated air quality and climate change impacts would be slightly greater than under the proposed project.

8.5.5.3 BIOLOGICAL RESOURCES

Construction activity for Alternative G includes wells, roads, pipelines, treatment facility or other features that would require grading, drilling, trenching and other earth-moving activities. The majority of the impacts would require removal of floodplain or riparian habitats; however, the potential exists for impacts on upland habitat as well. The new treatment facility could occupy up to 90,000 square feet of area but would be located in areas previously disturbed by other facility features. These construction impacts could cause significant adverse effects to riparian, floodplain, sensitive habitats or drainages and would require the implementation of Mitigation Measure **BIO-1a**. Removal or disturbance of active nests of both sensitive species and other common nesting birds could result during construction-related and operational activities. As with the proposed project, loss of occupied habitat and active nests of special-status birds could result in a substantial adverse effect on local populations of the affected species; therefore, Mitigation Measure **BIO-2a** would be required. Similar to the proposed project, potential impacts on sensitive species could occur through removal and capping of wellheads, and through the decommissioning of the treatment facility and other project features such as roadways, utilities, and pipelines. Similar to the proposed project, Alternative B could result in impacts on desert tortoise, which would be reduced by implementation of Mitigation Measure **BIO-2b**. Mitigation Measure **BIO-2c** would be required to avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities. Because freshwater intake facilities would not be required for Alternative G, the potential fish entrainment would not occur. The overall biological resources impact would be similar to the proposed project.

8.5.5.4 CULTURAL RESOURCES

Alternative G, as stated elsewhere, would result in the construction of an aboveground treatment plant (similar to Alternative F), as well as a system or remediation wells in the floodplain. Up to 200 news wells could be installed (140 remediation wells, 60 monitoring wells). The wells would be connected by more linear feet of pipeline and utilities lines compared to the proposed project, with the additional facilities concentrated in the floodplain area. Similar to Alternative F, the treatment plant could either be built near the compressor station or in the same general area of IM-3, although the area of the new treatment plant would be 10 times larger than IM-3. The area of the proposed remediation facilities is smaller than the proposed project, because areas near Moabi Regional Park and in Arizona are excluded. The proposed area for monitoring wells is similar to the proposed project. It is assumed that the same mitigation measures identified under the proposed project (**CUL-1a**, **CUL-1b**, **CUL-1c**, **CUL-2, CUL-3,** and **CUL-4**) would be implemented under Alternative G, reducing impacts on cultural resources in a similar manner through the design, construction, operation, and decommissioning phases. The discovery of human remains, the possibility of which is greatly elevated under this alternative due to the increased area of potential facility locations, may also be mitigated in a manner similar to the proposed project (**CUL-4**); however, to the extent that human remains would have to be moved from the project site, impacts would remain significant and unavoidable. With regards to the Topock Cultural Area, Alternative G would result in the construction and operation of a substantially larger treatment plant than the existing IM-3 Facility and there is a possible that this treatment plant may be placed in the current IM-3 location. While ground disturbance activities would not affect the Topock Maze archaeologically, it has been expressed by tribal representatives during the NACP that any new facilities in the project area would significantly affect the Topock Cultural Area. The level of impact on the Topock Cultural Area under Alternative F, if the treatment plant was placed in the current IM-3 site location, would be higher in degree than the proposed project. This impact would be considered significant and unavoidable. The overall cultural resources impact would be similar to the proposed project.

8.5.5.5 GEOLOGY AND SOILS

Construction of Alternative G would be similar to construction activities described in Chapter 3 for the proposed project for monitoring and remediation wells, pipeline, and other infrastructure. However, Alternative G would decommission and demolish the current IM-3 Facility and would construct an approximately 90,000 square-foot treatment plant. An additional 100,000 square feet would be needed to accommodate parking and storage for

equipment and materials. Due to the removal of the current IM-3 Facility and the construction of a new treatment plant for Alternative G, construction activities would be much more intensive and require more ground disturbance than the proposed project. As with the proposed project, Alternative G would have the same potentially significant geology and soils impacts (Impacts GEO-1a and GEO-1b) related to the potential for substantial erosion, loss of top soils, or differential compaction. As with the proposed project, Mitigation Measures **GEO-1a** and **GEO-1b** would be required to reduce the potential for substantial erosion, loss of top soils, or differential compaction to a less-than-significant level. Geology and soil impacts of Alternative G would be greater than under the proposed project because more ground would be disturbed because more remediation wells and other infrastructure would be built.

8.5.5.6 HAZARDOUS MATERIALS

Construction of Alternative G would be similar to construction activities described in Chapter 3 for the proposed project for monitoring and remediation wells, pipeline, and other infrastructure. However, Alternative G would decommission and demolish the current IM-3 Facility and would construct an approximately 90,000 square-foot treatment plant. An additional 100,000 square feet would be needed to accommodate parking and storage for equipment and materials. Due to the removal of the current IM-3 Facility and the construction of a new treatment plant for Alternative G, construction activities would be much more intensive and result in greater ground disturbance than the proposed project. As with the proposed project, Alternative G would have the same potentially significant hazardous materials impacts related to the generation of dust, potential to encounter contaminated soils and the exposure of construction workers to airborne contaminants, the use of fuel, oils, and other lubricants on the site, and the potential release of chemicals as a result of component failure, tank failure, or human error (Impacts HAZ-1, HAZ-2, and HAZ-3). These potential impacts would occur over a greater area with Alternative G. As with the proposed project, Mitigation Measures **HAZ-1a**, **HAZ-1b**, and **HAZ-2** would be required for Alternative G to reduce the potential for dust generation or a release or spill of a contaminant to a less-than-significant level. The potential hazardous materials impacts of Alternative G would be greater than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built.

The treatment process for chromium removal under Alternative G would require the use of hazardous materials and results in the generation of hazardous wastes as metals enriched sludge during treatment is not an aspect of the proposed project. The quantities of sludge may be an order of magnitude greater than currently being generated at IM-3 based on the anticipated capacity of 1,230 gpm, compared to the current IM-3 operating rate of approximately 135 gpm. Disposal of the sludge requires transportation to a hazardous waste disposal facility. Additional impacts and associated mitigation measures related to the handling and storage of the sludge byproduct would be required under Alternative G. Hazardous materials impacts of Alternative G would be greater than under the proposed project due to greater ground disturbance, potential to encounter affected soils, and generation of greater quantities of wastes both during the construction of remediation wells and associated infrastructure, construction of the new, larger capacity treatment plant, and in wastes generated during the IM-3 decommissioning.

8.5.5.7 HYDROLOGY AND WATER QUALITY

Construction of Alternative G would be similar to construction activities described in Chapter 3 for the proposed project for monitoring and remediation wells, pipeline, and other infrastructure. However, Alternative G would decommission and demolish the current IM-3 Facility and would construct an approximately 90,000 square-foot treatment plant. An additional 100,000 square feet would be needed to accommodate parking and storage for equipment and materials. Due to the removal of the current IM-3 Facility and the construction of a new treatment plant for Alternative G, construction activities would be much more intensive and require more ground disturbance than the proposed project. As with the proposed project, Alternative G would have the same potentially significant hydrology and water quality impacts associated with potential increased runoff, localized alteration of drainage patterns, and exposure of runoff to significant materials (Impacts HYDRO-1, HYDRO-2,

and HYDRO-3). As with the proposed project, Mitigation Measure **HYDRO-1** would be required for Alternative G to reduce the potential for a water quality standard and objective or waste discharge requirement to be exceeded and for drainage patterns to be locally altered or substantial sources of polluted runoff to be added if pollutants are released and if pollutants could become exposed to stormwater runoff to a less-than-significant level. The potential for hydrology and water quality impacts of Alternative G would be greater than under the proposed project due to greater ground disturbance resulting from the increase in remediation wells and other infrastructure and during operation from the potential for releases of untreated water being conveyed to the treatment system. The time to reach cleanup levels under Alternative G would be approximately 22 years (verses 29 for the proposed project). Mitigation measures would be applied at more locations and over a greater total area than for the proposed project.

8.5.5.8 LAND USE AND PLANNING

As with the proposed project, implementation of Alternative G would not conflict with the policies of BLM's Approved RMP or resource management goals of the USFWS, or any other plans or policies that would result in environmental impacts. As with the proposed project, Alternative G would have no land use and planning impacts.

8.5.5.9 NOISE

Alternative G would have similar noise impacts as with the proposed project associated with construction, operation and maintenance, decommissioning, nontransportation sources, and traffic increases. Compared to the proposed project Alternative G would require more additional wells and remediation facilities (i.e., pipelines, roads, or utility connections). Construction noise impacts would be conducted in the similar duration period as the proposed project. The proposed construction area for Alternative G would only be in California, however the potential locations of additional wells would affect Arizona receptors and Mitigation Measures **NOISE-1**, **NOISE-2**, and **NOISE-3** would be required to reduce the potential for noise impacts at all sensitive receptors. Traffic noise level increases would be nominal compared to the proposed project due to an increase in the number of daily trips required for this alternative compared to the proposed project. A new treatment plant would be constructed under this alternative, as well as decommissioning and demolishing the current IM-3 Facility. The proposed locations for the new treatment plant are west of the existing compressor station and at the existing IM-3 site. Existing compressor station structures and topographic features (mesas) would shield noise emanating from these treatment plants and would not create noise impacts at sensitive receptors. Noise impacts of Alternative G would be greater compared to the proposed project, and impact NOISE-1related to noise levels within the Topock Cultural Area would remain significant and unavoidable.

8.5.5.10 TRANSPORTATION

The trip distribution patterns under Alternative G would be similar to the proposed project. As with the proposed project, Alternative G would generate additional daily trips during construction, operations and maintenance activities, and decommissioning activities. Alternative G would result in greater daily trips compared to the proposed project, with 149 trips for construction, with 155 trips for operations and maintenance with 50% construction, with 156 trips for operations and maintenance with 50% decommissioning, and 303 trips for decommissioning with removal of remedy. Accordingly, Alternative G would result in more peak hour trips compared to the proposed project. Even with the increased trips under Alternative G, this alternative would not be expected to degrade intersection or roadway segment operations below an acceptable level of service because the study intersections currently operate at LOS A and the roadway segments are well below the threshold of 7,000 ADT.

Overall, the transportation impacts of Alternative G would be greater compared to the proposed project due to the increase in trips that would be required.

8.5.5.11 UTILITIES AND SERVICE SYSTEMS

As with the proposed project, all phases of construction, operation, and decommissioning for Alternative G would not generate substantial amounts of domestic wastewater. Because implementation of this alternative would not construct wastewater-intensive facilities, it is not anticipated that this alternative would generate effluent that would exceed applicable standards or capacity, nor would the alternative require the construction of new treatment facilities. Like the proposed project, this alternative would also require the temporary continued operation, maintenance of the IM-3 Facility during construction of the Alternative. Alternative G would decommission and demolish the current IM-3 Facility after constructing an approximately 90,000 square-foot treatment plant, which would eventually be decommissioned. Like the IM-3 Facility, it is expected that the new treatment plant would discharge nonhazardous wastewater to a tank on-site, which would be removed by a wastewater disposal contractor. Because this effluent would be 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 would not exceed existing treatment capacity. Nonhazardous incidental waste from construction, operations and maintenance, and decommissioning of IM-3, and the new treatment plant would be similar to the proposed project. Like the proposed project, it is expected that a permitted municipal solid waste facility within a 200 miles of the project site would accommodate the nonhazardous waste. Operation of Alternative G (primarily energy needed to move water through the remediation system) would require up to 11 million kilowatt-hours of electricity annually. Similar to the proposed project, Alternative G could potentially generate electricity on-site using natural gas-fired generators that would draw fuel from the existing gas pipeline. However, as with the proposed project, Mitigation Measure **UTIL-1** would ensure sufficient energy supplies would be available for the alternative. Impacts on utilities would be greater than under the proposed project because of the substantial increase in estimate energy use.

8.5.5.12 WATER SUPPLY

Implementation of Alternative G would not increase demand for water supply at the project site such that additional entitlements would be necessary. PG&E's full LCWSP entitlement is 422 afa. While the consumptive water use during construction of Alternative G would be greater than under the proposed project at 20.4 acre feet over 3 years, it would be well under PG&E's yearly entitlement. As with the proposed project, because all water diverted would be reinjected for in situ treatment, the net consumptive use would be approximately zero. The consumptive water use of Alternative G during decommissioning would be the same as the proposed project. This impact would be less than significant.

No freshwater would be required for this alternative, when compared to the proposed project. Implementation of this Alternative G would not 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. Because Alternative G does not involve freshwater flushing, the impact on groundwater would be reduced compared to the proposed project.

8.5.6 ALTERNATIVE H—COMBINED UPLAND IN SITU/PUMP AND TREAT

8.5.6.1 AESTHETICS

Alternative H would combine in situ treatment in the upland portions of the plume with pump-and-treat technology in the floodplain. Alternative H would include a new 55,000-square-foot treatment plant that would be smaller than Alternatives F and G, with potential locations as defined under Alternative F. Alternative H would decommission and demolish the current IM-3 Facility. Overall, the number of monitoring and remediation wells and associated infrastructure would be greater compared to the proposed project. Alternative H would be visible from 2, 9, and 10 if constructed at the compressor station location or from key views 6 and 10 if constructed at the IM-3 Facility locations. Because Alternative H would include a greater intensity of construction due to the increased number of monitoring and remediation wells and associated infrastructure, especially in the upland area,

the degree of contrast from these key views 1would be greater compared to the proposed project. Mitigation Measure AES-1 would also be required under this alternative due to removal of floodplain vegetation, altering the existing condition of a scenic corridor. The proposed structure under Alternative H, if constructed at the existing IM-3 Facility, would be highly visible from key view 5, especially when compared to the existing facility, which is 18,900 square feet and 33 feet tall. Implementation of this Alternative H would require extensively altering the landform, constructing new access roads, pipelines, storage and containment tanks, and building a new structure that would be substantially larger than the existing treatment facility. As a result, Alternative H would be noticeable to the pedestrian visitors to Topock Maze Locus B. The proposed project would not include the construction of a new treatment plant; therefore, the aesthetic impact of Alternative H would be greater than under the proposed project, although the impact would occur over a shorter period of time.

8.5.6.2 AIR QUALITY AND GLOBAL CLIMATE CHANGE

Alternative H would result in increased construction activities associated with installation of monitoring and remediation wells compared with the proposed project. Alternative H would also result in the decommissioning and demolition of the existing treatment facility, and construction of a new treatment facility smaller than described under Alternatives F and G. Thus, Alternative H would result in greater associated short-term construction-related emissions of criteria air pollutants, precursors, and GHGs compared with the proposed project. As with the proposed project, fugitive dust (i.e., PM_{10}) control measures must be adopted for any construction and demolition activity; therefore, Mitigation Measure **AIR-1** would be implemented to reduce the fugitive dust impact to a less-than-significant level. Vehicle trip generation under Alternative H would be slightly greater than under the proposed project. Operational emissions and associated air quality and climate change impacts would be slightly greater than under the proposed project.

8.5.6.3 BIOLOGICAL RESOURCES

Construction activity for Alternative H includes wells, roads, pipelines, treatment facility or other features that would require grading, drilling, trenching and other earth-moving activities. The majority of the impacts would require removal of upland habitat; however, the potential exists for impacts on floodplain or riparian habitats as well. The new treatment facility could occupy up to 55,000 square feet of area but would be located in areas previously disturbed by other facility features. These construction impacts could cause significant adverse effects to riparian, floodplain, sensitive habitats or drainages and would require the implementation of Mitigation Measure **BIO-1a**. Removal or disturbance of active nests of both sensitive species and other common nesting birds could result during construction-related and operational activities. As with the proposed project, loss of occupied habitat and active nests of special-status birds could result in a substantial adverse effect on local populations of the affected species; therefore, Mitigation Measure **BIO-2a** would be required. Similar to the proposed project, potential impacts on sensitive species could occur through removal and capping of wellheads, and through the decommissioning of the treatment facility and other project features such as roadways, utilities, and pipelines. Similar to the proposed project, Alternative B could result in impacts on desert tortoise, which would be reduced by implementation of Mitigation Measure **BIO-2b**. Mitigation Measure **BIO-2c** would be required to avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities. Alternative H 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. Because freshwater intake facilities would not be required for Alternative H, the potential fish entrainment would not occur. The overall biological resources impact would be similar to the proposed project.

8.5.6.4 CULTURAL RESOURCES

Alternative H, as stated elsewhere, would combine in situ treatment in the upland portions of the plume with pump and treat technology in the floodplain. Alternative H is similar to Alternative G in that they both combine these two remediation treatments. Similarly, Alternative H would include the construction and operation of a

treatment plant and the installation of up to 210 new wells (140 remediation wells, 70 monitoring wells). The wells would be combined by a slightly larger amount of pipeline and utility lines compared to the proposed project, with wells and pipelines reconfigured over the course of the remediation process. As in other alternatives involving the construction and operation of a treatment plant, the facility could either be built near the compressor station or in the same general area of IM-3, although the area of the new treatment plant would be substantially larger than IM-3. Under Alternative H, remediation facilities and monitoring wells could be located within portions of the Topock Maze (CA-SBR-219). While impacts on the Topock Maze are considered significant and unavoidable under the proposed project, no direct impacts on the Topock Maze would occur. Alternative H could result in the destruction of portions of the Topock Maze archaeological feature. Impacts would be significant and unavoidable to the Topock Cultural Area under this impact. The level of impact on the Topock Cultural Area under Alternative H would be higher in degree than the proposed project due to the number of new facilities and the possible destruction of portions of the Topock Maze archaeological feature. This impact would be considered significant and unavoidable.

It is assumed that the same mitigation measures identified under the proposed project (**CUL-1a**, **CUL-1b**, **CUL-1c**, **CUL-2, CUL-3,** and **CUL-4**) would be implemented under Alternative H, reducing impacts on cultural resources through the design, construction, operation, and decommissioning phases. The discovery of human remains, the possibility of which is greatly elevated under this alternative due to the increased area of potential facility locations, may also be mitigated in a manner similar to the proposed project (**CUL-4**); however, to the extent that human remains would be removed from the project site, impacts would remain significant and unavoidable. The overall cultural resources impact would be greater than under the proposed project.

8.5.6.5 GEOLOGY AND SOILS

Alternative H would combine in situ treatment in the upland portions of the plume with pump and treat technology in the floodplain. Alternative H would include a new treatment plant that would be smaller than Alternatives F and G, with potential locations defined under Alternative F. Alternative H would decommission and demolish the current IM-3 Facility. Overall the number of monitoring and remediation wells and associated infrastructure would be increased compared to the proposed project. As with the proposed project, Alternative H would have the same potentially significant geology and soils impacts (Impacts GEO-1a and GEO-1b) related to the potential for substantial erosion, loss of top soils, or differential compaction. As with the proposed project, Mitigation Measures **GEO-1a** and **GEO-1b** would be required to reduce the potential for substantial erosion, loss of top soils, or differential compaction to a less-than-significant level. Geology and soil impacts of Alternative H would be greater than under the proposed project because more ground would be disturbed because more remediation wells and other infrastructure would be built.

8.5.6.6 HAZARDOUS MATERIALS

Alternative H would combine in situ treatment in the upland portions of the plume with ex site technology in the floodplain. Alternative H would include a new treatment plant that would be smaller than Alternatives F and G, with potential locations defined under Alternative F. Alternative H would decommission and demolish the current IM-3 Facility. Overall the number of monitoring and remediation wells and associated infrastructure would be increased compared to the proposed project and would result in greater areas of ground disturbance and waste generation. As with the proposed project, Alternative H would have similar potentially significant hazardous materials impacts related to the generation of dust and the exposure of construction workers to airborne contaminants, the use of fuel, oils, and other lubricants on the site, and the potential release of chemicals as a result of component failure, tank failure, or human error (Impacts HAZ-1, HAZ-2, and HAZ-3), but these potential impacts would occur over a greater area with Alternative H. As with the proposed project, Mitigation Measures **HAZ-1a**, **HAZ-1b**, and **HAZ-2** would be required for Alternative H to reduce the potential for dust generation or a release or spill of a contaminant to a less-than-significant level. Hazardous materials impacts of Alternative H would be greater than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built.

The treatment process for chromium removal would require use of hazardous materials and results in the generation of hazardous wastes as metals enriched sludge during treatment is not an aspect of the proposed project. The quantities of sludge may be 3 to 4 times greater than currently being generated at IM-3 based on the anticipated capacity of 200 to 300 gpm, compared to the current IM-3 operating rate of approximately 135 gpm. Disposal of the sludge requires transportation to a hazardous waste disposal facility. Additional impacts and associated mitigation measures related to the handling and storage of the sludge byproduct would be required under Alternative H. Hazardous materials impacts of Alternative H would be greater than under the proposed project due to greater ground disturbance, potential to encounter affected soils, and generation of greater quantities of wastes both during the construction of remediation wells and associated infrastructure, construction of the new, larger capacity treatment plant, and in wastes generated during the IM-3 decommissioning.

8.5.6.7 HYDROLOGY AND WATER QUALITY

Alternative H would combine in situ treatment in the upland portions of the plume with pump-and-treat technology in the floodplain. Alternative H would include a new treatment plant that would be smaller than Alternatives F and G, with potential locations defined under Alternative F. Alternative H would decommission and demolish the current IM-3 Facility. Overall the number of monitoring and remediation wells and associated infrastructure would be creased compared to the proposed project. As with the proposed project, Alternative H would have the same potentially significant hydrology and water quality impacts associated with potential increased runoff, localized alteration of drainage patterns, and exposure of runoff to significant materials (Impacts HYDRO-1, HYDRO-2, and HYDRO-3). As with the proposed project, Mitigation Measure **HYDRO-1** would be required for Alternative H to reduce the potential for a water quality standard and objective or waste discharge requirement to be exceeded and for drainage patterns to be locally altered or substantial sources of polluted runoff to be added if pollutants are released and if pollutants could become exposed to stormwater runoff to a less-than-significant level. The potential for hydrology and water quality impacts of Alternative H would be greater than under the proposed project due to greater ground disturbance resulting from the increase in remediation wells and other infrastructure and during operation from the potential for releases of untreated water being conveyed to the treatment system. The time to reach cleanup levels under Alternative G would be approximately 18 years (verses 29 for the proposed project). Mitigation measures would be applied at more locations and over a greater total area than for the proposed project.

8.5.6.8 LAND USE AND PLANNING

A As with the proposed project, implementation of Alternative H would not conflict with the policies of BLM's Approved RMP or resource management goals of the USFWS, or any other plans or policies that would result in environmental impacts. Like the proposed project, Alternative H would have no land use and planning impact.

8.5.6.9 NOISE

Alternative H would have similar noise impacts as with the proposed project associated with construction, operation and maintenance, decommissioning, nontransportation sources, and traffic increases. Compared to the proposed project Alternative H would require more new wells and remediation facilities (i.e., pipelines, roads, or utility connections). Construction noise impacts would be constructed in the similar duration period as the proposed project. The proposed construction area for Alternative H would only be in California, however the potential locations of additional wells would affect Arizona receptors and Mitigation Measures **NOISE-1**, **NOISE-2**, and **NOISE-3** would be required to reduce the potential for noise impacts at all sensitive receptors. Traffic noise level increases would be nominal compared to the proposed project due to an increase in the number of daily trips required for this alternative. A new treatment plant would be constructed under this alternative, as well as decommissioning and demolishing the current IM-3 Facility. The proposed locations for the new treatment plant are west of the existing compressor station and at the existing IM-3 site. Existing compressor station structures and topographic features (mesas) would shield noise emanating from these treatment plants and would not create noise impacts at sensitive receptors. Noise impacts of Alternative H would be greater compared

to the proposed project, and impact NOISE-1related to noise levels within the Topock Cultural Area would remain significant and unavoidable.

8.5.6.10 TRANSPORTATION

The trip distribution patterns under Alternative H would be similar to the proposed project. As with the proposed project, Alternative H would generate additional daily trips during construction, operations and maintenance activities, and decommissioning activities. Alternative H would result in greater daily trips compared to the proposed project, with 119 trips for construction, with 130 trips for operations and maintenance with 50% construction, with 146 trips for operations and maintenance with 50% decommissioning, and 298 trips for decommissioning with removal of remedy. Accordingly, Alternative H would result in more peak hour trips compared to the proposed project. Even with the increased trips under Alternative H, this alternative would not be expected to degrade intersection or roadway segment operations below an acceptable level of service because the study intersections currently operate at LOS A and the roadway segments are well below the threshold of 7,000 ADT.

Overall, the transportation impacts of Alternative H would be greater compared to the proposed project due to the increase in trips that would be required.

8.5.6.11 UTILITIES AND SERVICE SYSTEMS

As with the proposed project, all phases of construction, operation, and decommissioning for Alternative H would not generate substantial amounts of domestic wastewater. Because implementation of this alternative would not construct wastewater-intensive facilities, it is not anticipated that this alternative would generate effluent that would exceed applicable standards or capacity, nor would the alternative require the construction of new treatment facilities. Like the proposed project, this alternative would also require the temporary continued operation, maintenance of the IM-3 Facility during construction of the Alternative. Alternative H would then decommission and demolish the current IM-3 Facility and construct an approximately 55,000 square-foot treatment plant, which would eventually be decommissioned. Like the IM-3 Facility, it is expected that the new treatment plant would discharge nonhazardous wastewater to a tank on-site, which would be removed by a wastewater disposal contractor. Because this effluent would be 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 would not exceed existing treatment capacity. Nonhazardous incidental waste from construction, operations and maintenance, and decommissioning of IM-3, and the new treatment plant would be similar to the proposed project. Like the proposed project, it is expected that a permitted municipal solid waste facility within a 200 miles of the project site would accommodate the nonhazardous waste. Operation of Alternative H (primarily energy needed to move water through the remediation system) would require up to 7.6 million kilowatt-hours of electricity annually. Similar to the proposed project, Alternative G could potentially generate electricity on-site using natural gas-fired generators that would draw fuel from the existing gas pipeline. However, as with the proposed project, Mitigation Measure **UTIL-1** would ensure sufficient energy supplies would be available for the alternative. Impacts on utilities would be greater than under the proposed project due to the substantial increase in estimate energy use.

8.5.6.12 WATER SUPPLY

Implementation of Alternative H would not increase demand for water supply at the project site such that additional entitlements would be necessary. PG&E's full LCWSP entitlement is 422 afa. While the consumptive water use during construction of Alternative H would be greater than under the proposed project at 15.9 acre feet over 3 years, it would be well under PG&E's yearly entitlement. As with the proposed project, because all water diverted would be reinjected for in situ treatment, the net consumptive use would be approximately zero. The consumptive water use of Alternative H during decommissioning would be the same as the proposed project. This impact would be less than significant.

No freshwater would be required for this alternative, when compared to the proposed project. Implementation of this Alternative H would not 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. Because Alternative H does not involve freshwater flushing, the impact on groundwater would be reduced compared to the proposed project.

8.5.7 ALTERNATIVE I—NO PROJECT ALTERNATIVE/CONTINUED OPERATION OF INTERIM MEASURE 3

8.5.7.1 AESTHETICS

Alternative I would involve the continued operation of the existing IM-3 Facility until cleanup goals are reached, which could be up to 960 years. The existing IM-3 Facility is visible from sensitive key views, including key views 6 and 10. Alternative I would not require additional facilities or structures besides monitoring wells (both 60 new wells and replacement wells). While this alternative would have no substantial changes from current conditions, the conditions would persist for much longer than under the proposed project. The proposed project would result in the decommissioning of the IM-3 Facility much earlier than Alternative I, which could occur for up to 960 years. As such, aesthetic impacts related to Alternative I would be greater than under the proposed project.

8.5.7.2 AIR QUALITY AND GLOBAL CLIMATE CHANGE

Alternative I would result in no significant air quality or climate change impacts because no changes from existing conditions would occur. These emissions however, are greater than those anticipated under the proposed project. Mobile source activity related to Alternative I would be the same as existing conditions (see Table 4.2-3 of the air quality "Existing Setting" subsection). Emissions from mobile sources and stationary sources would not combine to exceed significance thresholds set by the MDAQMD and no new emissions sources would result from this component. Alternative I would result in greater air quality impacts annually, and duration of Alternative I would far exceed that of the proposed project, and emissions would occur for up to 960 years, as opposed to 110 years.

8.5.7.3 BIOLOGICAL RESOURCES

Alternative I would use the existing IM-3 Facility and would not involve any new construction of remediation facilities; however construction activities would occur from time to time over the operation and maintenance phase to replace wells or other structures that may become worn, clogged, or damaged. IM-3 is currently operating under the PBA, which concluded that the project may affect but would not likely adversely affect listed species. Under the PBA, actions including groundwater monitoring, daily activities, and permitted future activities are governed by avoidance and minimization measures. Should IM-3 operate beyond the PBA cutoff date of 2012, actions associated with the IM-3 would fall under new permit conditions. No significant biological impacts are anticipated by continued operation of IM-3. Impacts associated with Alternative I less than the proposed project.

8.5.7.4 CULTURAL RESOURCES

Alternative I would use the existing IM-3 Facility and would not involve any new construction of remediation facilities; however construction activities would occur from time to time over the operation and maintenance phase to replace wells or other structures that may become worn, clogged, or damaged. The IM-3 Facility would continue operation as the final remediation at the site. While no new monitoring wells or extraction wells are proposed under Alternative I, replacement of existing structures associated with operations and maintenance activities would occur as needed. Thus, the impact on cultural and paleontological resources would be less than under the proposed project. As discussed in Chapter 7, the operation of the IM-3 Facility has created a significant

impact on the Topock Cultural Area, however. These impacts would remain under Alternative I and would be significant and unavoidable. The overall cultural resources impact would be less than the proposed project.

8.5.7.5 GEOLOGY AND SOILS

Existing procedures for the extraction system, treatment system, and injection system would continue to be implemented under Alternative I to ensure existing performance standards for the remedial components are maintained. The existing monitoring systems and program would be used to evaluate system performance; no additional monitoring wells would be constructed initially, but replacement wells would be constructed from time to time over the operation and maintenance period. New or improved existing roadways would be constructed and maintained to provide access to the various elements (wells, conveyance piping, and potential treatment plant). As with the proposed project, Alternative I would have the same potentially significant geology and soils impacts (Impacts GEO-1a and GEO-1b) related to the potential for substantial erosion, loss of top soils, or differential compaction that would occur during the operation and maintenance phase, which could be for up to 960 years. As with the proposed project, Mitigation Measures **GEO-1a** and **GEO-1b** would be required to reduce the potential for substantial erosion, loss of top soils, or differential compaction to a less-than-significant level. While the impacts would occur over a much longer duration under Alternative I than the proposed project, the amount of new infrastructure needed would be less than that of the proposed project, and the overall geology and soils impact would be reduced compared to the proposed project.

8.5.7.6 HAZARDOUS MATERIALS

Existing procedures for the extraction system, treatment system, and injection system would continue to be implemented under Alternative I to ensure existing performance standards for the remedial components are maintained. The existing monitoring systems and program would be used to evaluate system performance; no additional monitoring wells would be constructed initially, but replacement wells would be constructed from time to time over the operation and maintenance period, which could occur for up to 960 years. No additional roadways or infrastructure would be required. The hazardous materials usage and waste generation would be consistent with the current IM-3 operations, which includes sludge (hazardous waste) and brine (nonhazardous) byproducts that require offsite disposal. Mitigation measures associated with the generation of dust and the exposure of construction workers to airborne contaminants during operation and maintenance would be required (Impact HAZ-1). Operation activities associated with implementation of the Continued Operation of IM-3 component may result in potential hazardous materials impacts associated with the potential release of chemicals as a result of component failure, tank failure, or human error (Impact HAZ-3). As with the proposed project, Mitigation Measures **HAZ-1a**, **HAZ-1b**, and **HAZ-2** would be required for Alternative I to reduce the potential for dust generation or a release or spill of a contaminant to a less-than-significant level. Because the ex situ treatment process would continue, there is the potential for greater impacts related to hazardous materials than the proposed project.

8.5.7.7 HYDROLOGY AND WATER QUALITY

Existing procedures for the extraction system, treatment system, and injection system would continue to be implemented under Alternative I to ensure existing performance standards for the remedial components are maintained. The existing monitoring systems and program would be used to evaluate system performance; no additional monitoring wells would be constructed initially, but replacement wells would be constructed from time to time over the operation and maintenance period, which could occur for up to 960 years. No additional roadways or infrastructure would be required. The hazardous materials usage and waste generation would be consistent with the current IM-3 operations. Operation activities associated with implementation of the continued operation of IM-3 may result in potential hydrology and water quality impacts associated with localized alteration of drainage patterns (Impact HYDRO-2) during grading of existing roadways. As with the proposed project, Mitigation Measure **HYDRO-1** would be required for Alternative I to reduce the potential localized alteration of drainage patterns to a less-than-significant level. Because no additional wells would be constructed under

Alternative I, the overall hydrology and water quality impacts would be reduced compared to the proposed project.

8.5.7.8 LAND USE AND PLANNING

Alternative I would not physically divide residential communities in the project area. All project elements would be located outside of communities located in the project area. All existing facilities (i.e., wells, pipelines, treatment plant) are constructed on lands managed by BLM. In addition, existing pipelines currently cross the Bat Cave Wash. Thus, the potential impact for division of an existing community would reduce compared to the proposed project. Alternative I would be considered necessary for public health and safety. For this reason, Alternative I would not conflict with the policies of BLM's Approved RMP. In addition, the existing IM-3 facilities are consistent with the management goals of USFWS. Like the proposed project, Alternative I would not result in land use and planning impacts.

8.5.7.9 NOISE

Alternative I would not result in additional construction activities associated with wells, remediation facilities, treatment plants, or increase traffic volumes from existing conditions. Continued operation of IM-3 would not change the existing noise levels that can be heard at sensitive receptors associated with operation of IM-3. Decommissioning of IM-3 would have similar noise impacts for construction activities and increased traffic volumes as compared to the proposed project. No mitigation measures would be required for Alternative I. Noise impacts of Alternative I would be lesser compared to the proposed project, but would occur for a longer duration.

8.5.7.10 TRANSPORTATION

As with the proposed project, Alternative I would generate additional daily trips during operations and maintenance activities, and decommissioning activities. Alternative I would not result in additional construction trips during the initial construction phase because this alternative assumes the existing conditions of the IM-3 are in place, but it would require a greater amount of construction over the long-term because of the length of the operation and maintenance period when compared to the proposed project. Alternative I would result in more daily trips compared to the proposed project, with over 300 trips for operations and maintenance and 152 trips for decommissioning. Additionally, the operation and maintenance phase would extend for decades, up to 960 years. However, even with this increase in traffic, as shown in Table 4.10-8 and 4.10-9, all roadway segments and study intersections currently operate at an acceptable level of service and will continue to operate acceptably during operations and maintenance, and decommissioning. While Alternative I would result in more trips than the proposed project, this alternative is not anticipated to degrade intersection or roadway segment operations below an acceptable level of service. Overall, the transportation impacts of Alternative I would be greater compared to the proposed.

8.5.7.11 UTILITIES AND SERVICE SYSTEMS

Alternative I would not result in a change to existing operations of the IM-3 Facility, which currently discharges nonhazardous wastewater to a 2,000-gallon tank on-site. The impact on wastewater facilities would be negligible. Hazardous and nonhazardous wastes (sludge and brine, respectively) would continue to require off-site disposal that would not be required by the proposed project. Energy demands required by the continued operation of IM-3 (1.8 million kilowatt hours per year) would be slightly greater than that required by the proposed project (1.6 million kilowatt hours per year). The City has stated that the existing electrical line would not be able to accommodate up to 1.6 million kilowatt-hours, and it is likely that upgrades to the electrical system would be required for Alternative I as they are for the proposed project (Impact UTIL-1). However, as with the proposed project, Mitigation Measure **UTIL-1** would ensure sufficient energy supplies would be available for the alternative. Impacts on utilities would be fewer in the short-term, but greater than under the proposed project due to the substantial increase in estimate energy use and required off-site disposal of hazardous and nonhazardous

byproducts that would be generated. The overall impact on utilities would be greater when compared to the proposed project.

8.5.7.12 WATER SUPPLY

Implementation of Alternative I would not result in increased demand for water supply at the compressor station such that additional entitlements would be necessary. No freshwater supply would be required, as is for the proposed project. Currently the facility extracts approximately 215 afa and reinjects approximately 200 afa for a net consumptive use on the order of 10 to 20 afa. Continued operation of the IM-3 Facility would have the same consumptive use as under existing conditions and there would be no change in demands or impact on water supply. However, the water supply necessary for Alternative I would be less than that required by the proposed project, because there would be no change from the existing conditions and little to no net consumptive use.

No freshwater would be required for this alternative, when compared to the proposed project. Implementation of Alternative I would not 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). Continued operation of the IM-3 Facility would not change local groundwater conditions. The time to achieve cleanup goals would be decades longer than the proposed project, thereby preventing use of contaminated groundwater by the public through use of institutional controls. There would be no impact on groundwater levels relative to current conditions, which would be a reduced impact compared to the proposed project.

8.6 SUMMARY OF ALTERNATIVES ANALYSIS

Table 8-3 summarizes the relative nature of the impacts for each of the resource areas by project alternative. This table is followed by a qualitative discussion of the environmental impacts for the project alternatives by resource topic.

The main differences in the environmental impacts between each of the alternatives are related primarily to the type of remediation (in situ or ex situ), the intensity (quantity) of facilities proposed (which affects the construction activity), and the duration of operation and maintenance. In general, while Alternative B (Monitored Natural Attenuation) would be limited to monitoring activity and would have far fewer facilities proposed than the proposed project at the outset, environmental impacts are overall considered to be less than for the proposed project, even when considering the duration of operation and maintenance phase. An exception is for cultural resources, where the monitoring activity would affect the Topock Cultural Landscape for a much longer duration than the proposed project. Of the two in situ alternatives (C and D), Alternative D would have a greater impact, particularly on cultural resources, as the Maze A and other loci could be directly affected by siting facilities within the known resources. Alternatives F, G, and H are ex situ alternatives that would all involve treatment plants and waste byproducts. In general, Alternative I, which represents the No Project Alternative of continued operation of IM-3 would have reduced impacts on the proposed project, but would have a longer operation and maintenance phase.

8.7 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA Guidelines Section 15126.6(e)(2) requires that an EIR identify an “environmentally superior alternative” among the alternatives and the proposed project. The environmentally superior alternative causes the fewest or least significant environmental impacts as compared to the other alternatives.

This chapter evaluates seven alternatives to the proposed project, as described above, which present a reasonable range of potential remedial options to clean up the contaminated groundwater in the project area. These

Table 8-3
Summary of Environmental Impacts by Project Alternative

Resource	Proposed Project	Alternative B Monitored Natural Attenuation	Alternative C High Volume In Situ Treatment	Alternative D Sequential In Situ Treatment	Alternative F Pump and Treat	Alternative G Combined Floodplain In Situ/Pump and Treat	Alternative H Combined Upland In Situ/Pump and Treat	No Project Alternative/Alternative I Continued Operation of Interim Measure
Aesthetics	PS	Less visual impact overall because of reduced amount of infrastructure; however, there would bea greatly extended duration in which impacts would occur.	Alternative C would have greater aesthetic impact than the proposed project because of the increased amount of infrastructure needed for this alternative, which would be visible from the key views considered in the analysis of the proposed project, including those sensitive key views from the Topock Maze areas and the Colorado River.	Alternative D would potentially include construction, operations and maintenance, and decommissioning activities in all areas of the Topock Maze, which is a sensitive viewer resource. Aesthetic impacts would likely be significant and unavoidable, and would be greater than the proposed project.	Alternative F would require extensively altering the landform, constructing new access roads, pipelines, storage and containment tanks, and building a new treatment plant that would be substantially larger than the existing IM-3 Facility. This would result in greater visual impacts than the proposed project.	Alternative G would require extensively altering the landform, constructing new access roads, pipelines, storage and containment tanks, and building a new structure that would be substantially larger than the existing treatment facility. This would result in greater visual impacts than the proposed project.	Alternative H would require extensively altering the landform, constructing new access roads, pipelines, storage and containment tanks, and building a new structure that would be substantially larger than the existing treatment facility. This would result in greater visual impacts than the proposed project.	The IM-3 Facility would continue operation until cleanup goals are reached, which could occur for 960 years. Under the proposed project, all project facilities would be decommissioned within 110 years. Therefore, this alternative would have greater impacts than the proposed project.
Air Quality	PS	Less construction and operation-generated emissions of criteria air pollutants, precursors, and GHG emissions if measured on an annual basis, or would be greater compared to the proposed project if measured on a total project basis (estimated 960 years).	Greater construction and operation-generated emissions of criteria air pollutants, precursors, and GHG emissions than the proposed project; however, during a shorter time period than the proposed project.	Air quality emissions would be slightly greater under Alternative D than the proposed project due to more vehicular and ground disturbing activity.	Air quality emissions would be slightly greater under Alternative F than the proposed project due to more vehicular and ground disturbing activity.	Air quality emissions would be slightly greater under Alternative G than the proposed project due to more vehicular and ground disturbing activity.	Air quality emissions would be slightly greater under Alternative H than the proposed project due to more vehicular and ground disturbing activity.	Alternative I would result in increased air quality impacts compared to the proposed project and for a much longer duration (up to 960 years).Air quality impacts for air quality would be greater than the proposed project.
Biological Resources	PS	Less potential for impacts on sensitive biological resources initially because of a lack of construction activity and overall infrastructure. However, operation and maintenance could occur for up to 960 years, which could affect sensitive species. Because of the lack of freshwater needs, there would be no impact on fish species related to the intake structure required by the proposed project.	The potential for impacts on sensitive species (birds and desert tortoise) would be greater because of the increased amount of ground disturbing activity within the project area. Because of the lack of freshwater needs, there would be no impact on fish species related to the intake structure required by the proposed project.	The potential for impacts on sensitive species (birds and desert tortoise) would be greater because the increased amount of ground disturbing activity within the project area. Because of the lack of freshwater needs, there would be no impact on fish species related to the intake structure that may be needed by the proposed project.	The potential for impacts on sensitive species (birds and desert tortoise) would be greater because of the increased amount of ground disturbing activity within the project area. Because of the lack of freshwater needs, there would be no impact on fish species related to the intake structure required by the proposed project.	The potential for impacts on sensitive species (birds and desert tortoise) would be greater because of the increased amount of ground disturbing activity within the project area. Because of the lack of freshwater needs, there would be no impact on fish species related to the intake structure required by the proposed project.	The potential for impacts on sensitive species (birds and desert tortoise) would be greater because of the increased amount of ground disturbing activity within the project area. Because of the lack of freshwater needs, there would be no impact on fish species related to the intake structure required by the proposed project.	Alternative I would largely have no significant effects on biological resources. IM-3 is currently operating under the PBA, which concluded that the project may affect but would not likely adversely affect listed species. Under the PBA, actions including groundwater monitoring, daily activities, and permitted future activities are governed by avoidance and minimization measures. Should IM-3 operate beyond the PBA cutoff date of 2012, actions associated with the IM-3 would fall under new permit conditions. No significant affects are anticipated by continued operation of IM-3.
Cultural Resources	SU	The level of impact on the Topock Cultural Area under Alternative B would be lower in degree than the proposed project, if measured on an annual basis, or higher in degree compared to the proposed project if measured on a total basis, but in either event would still remain significant and unavoidable.	Similar impacts on cultural resources, including the Topock Cultural Area, when compared to the proposed project; however, they would occur within a shorter operation and maintenance phase.	Alternative D would potentially include construction, operation and maintenance, and decommissioning activities in all areas of the Topock Maze, resulting in greater impacts than the proposed project.	Similar impacts on cultural resources, including the Topock Cultural Area, when compared to the proposed project.	Similar impacts on cultural resources, including the Topock Cultural Area, when compared to the proposed project.	Alternative H would potentially include construction, operations and maintenance, and decommissioning activities in portions of the Topock Maze, resulting in greater impacts than the proposed project.	The overall cultural resources impact would be less than the proposed project due to reduced ground disturbing activity. However, operation of the IM-3 Facility has created a significant impact on the Topock Cultural Area. These impacts would remain under Alternative I and would be significant and unavoidable.

Table 8-3 Summary of Environmental Impacts by Project Alternative								
Resource	Proposed Project	Alternative B Monitored Natural Attenuation	Alternative C High Volume In Situ Treatment	Alternative D Sequential In Situ Treatment	Alternative F Pump and Treat	Alternative G Combined Floodplain In Situ/Pump and Treat	Alternative H Combined Upland In Situ/Pump and Treat	No Project Alternative/Alternative I Continued Operation of Interim Measure
Geology and Soils	PS	Less ground disturbing activities as measured on an annual basis, but over a much longer duration. Potential for impacts related to soil erosion, loss of top soils, or differential compaction would be similar to that of the proposed project.	Greater impacts on soil and geologic resources because more ground would be disturbed because more remediation wells and other infrastructure would be built.	Greater impacts on soil and geologic resources because more ground would be disturbed because of a larger project footprint and more remediation wells and other infrastructure would be built.	Greater impacts on soil and geologic resources because more ground would be disturbed due to more remediation wells and other infrastructure.	Greater impacts on soil and geologic resources because more ground would be disturbed due to more remediation wells and other infrastructure.	Greater impacts on soil and geologic resources because more ground would be disturbed because of a larger project footprint and more remediation wells and other infrastructure would be built.	Less impacts on soils and geologic resources initially (due to less ground disturbing activity); however, the impacts would occur over a much longer duration under Alternative I than the proposed project.
Hazardous Materials	PS	Less potential for impacts related to ground disturbing activity at the outset of construction; however, there would be greater impact because of the need to transport and handle hazardous byproducts from IM-3, which would continue to operate until directed otherwise by the lead agency.	Greater impacts than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built.	Greater impacts than under the proposed project because of increased ground disturbing activity and storage of potentially hazardous materials.	Greater impacts than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built. In addition, disposal of sludge would require transportation to a hazardous waste disposal facility. Additional impacts and associated mitigation measures related to the handling and storage of the sludge byproduct would be required.	Greater impacts than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built. In addition, disposal of sludge would require transportation to a hazardous waste disposal facility. Additional impacts and associated mitigation measures related to the handling and storage of the sludge byproduct would be required.	Greater impacts than under the proposed project because more ground would be disturbed and more materials would be on-site because more remediation wells and other infrastructure would be built. In addition, disposal of sludge would require transportation to a hazardous waste disposal facility. Additional impacts and associated mitigation measures related to the handling and storage of the sludge byproduct would be required.	The hazardous materials usage and waste generation would be consistent with the current IM-3 operations, which includes sludge (hazardous waste) and brine (nonhazardous) byproducts that require off-site disposal. Because the ex situ treatment process would continue, there is the potential for greater impacts related to hazardous materials than the proposed project.

Table 8-3
Summary of Environmental Impacts by Project Alternative

Resource	Proposed Project	Alternative B Monitored Natural Attenuation	Alternative C High Volume In Situ Treatment	Alternative D Sequential In Situ Treatment	Alternative F Pump and Treat	Alternative G Combined Floodplain In Situ/Pump and Treat	Alternative H Combined Upland In Situ/Pump and Treat	No Project Alternative/Alternative I Continued Operation of Interim Measure
Hydrology and Water Quality	PS	Less ground disturbing activity initially and therefore fewer potential for impacts on water quality. However, the duration of the alternative means long-term significant impacts on hydrology and water quality could occur.	The potential for hydrology and water quality impacts of Alternative C would be greater than under the proposed project because more ground would be disturbed because more remediation wells and other infrastructure would be built. However, because of the increased intensity of the remedial system under Alternative C, the time to reach cleanup levels would be reduced to approximately 18 years (verses 29 for the proposed project). Therefore the contamination of the groundwater would be eliminated much sooner.	The potential for hydrology and water quality impacts of Alternative D would be greater than under the proposed project because more ground would be disturbed due to more remediation wells and other infrastructure associated with this alternative. However, because of the increased intensity of the remedial system under Alternative D, the time to reach cleanup levels would be reduced to approximately 15 years (verses 29 for the proposed project). Therefore the contamination of the groundwater would be eliminated sooner.	The potential for hydrology and water quality impacts of Alternative F would be greater than under the proposed project due to increased scale of this alternative resulting in greater ground disturbance during construction for the increase in remediation and monitoring wells and other infrastructure. The time to reach clean up levels under Alternative F would be approximately 37 years (verses 29 for the proposed project). During operation and maintenance, the potential for release of untreated water is greater than under the proposed project.	The potential for hydrology and water quality impacts of Alternative G would be greater than under the proposed project due to increased scale of this alternative resulting in greater ground disturbance during construction for the increase in remediation and monitoring wells and other infrastructure. The time to reach cleanup levels under Alternative G would be less than the proposed project (22 years). During operation and maintenance, the potential for release of untreated water is greater than under the proposed project.	The potential for hydrology and water quality impacts of Alternative H would be greater than under the proposed project due to increased scale of this alternative resulting in greater ground disturbance during construction for the increase in remediation and monitoring wells and other infrastructure. The time to reach cleanup levels under Alternative H would be less than the proposed project (18 years). During operation and maintenance, the potential for release of untreated water is greater than under the proposed project.	Operation activities associated with implementation of the continued operation of IM-3 may result in potential hydrology and water quality impacts associated with localized alteration of drainage patterns, which would be less than the proposed project initially, but could occur for up to 960 years.
Land Use and Planning	LTS	The smaller footprint and infrastructure needed for this alternative means fewer land use impacts would result.	Same project area as the proposed project, and there would be no land use impacts.	Same project area as the proposed project, and there would be no land use impacts.	Same project area as the proposed project, and there would be no land use impacts.	Same project area as the proposed project, and there would be no land use impacts.	Same project area as the proposed project, and there would be no land use impacts.	Same project area as the proposed project, and there would be no land use impacts.
Noise	PS	The smaller footprint and infrastructure needed for this alternative means lesser impacts related to construction and operational noise.	Noise impacts of Alternative C would be greater compared to the proposed project due to the increase in wells and remediation facilities that would be required.	Noise impacts of Alternative D would be greater when compared to the proposed project due to the increase in project area, wells, and other remediation facilities that would be required.	Existing compressor station structures and topographic features (mesas) would shield noise emanating from the new treatment plant and would not create noise impacts at sensitive receptors. Noise impacts of Alternative F would be similar compared to the proposed project.	Existing compressor station structures and topographic features (mesas) would shield noise emanating from the new treatment plant and would not create noise impacts at sensitive receptors. Noise impacts of Alternative G would be similar compared to the proposed project.	Existing compressor station structures and topographic features (mesas) would shield noise emanating from the new treatment plant and would not create noise impacts at sensitive receptors. Noise impacts of Alternative H would be similar compared to the proposed project.	Alternative I would not result in construction-related noise associated with remedial facilities, or result in increase traffic noise above existing conditions. Noise impacts of Alternative I would be lesser compared to the proposed project, but would occur for a longer duration.
Transportation	LTS	Fewer trips would be needed on an annual basis; however, trips would be required for a much longer duration than the proposed project.	Greater number of trips during construction and operation phases would be required for a shorter duration than the proposed project.	Greater number of vehicular trips during construction and operation phases would be required for a shorter duration than the proposed project.	Greater number of trips during construction and operation phases would be required for a longer duration than the proposed project.	Greater number of trips during construction and operation phases would be required for a shorter duration than the proposed project.	Greater number of trips during construction and operation phases would be required for a shorter duration than the proposed project.	Alternative I would result in more daily trips compared to the proposed project, with over 300 trips for operations and maintenance and 152 trips for decommissioning. Additionally, the operation and maintenance phase would extend for decades, up to 960 years. This impact would be greater than the proposed project.

Table 8-3
Summary of Environmental Impacts by Project Alternative

Resource	Proposed Project	Alternative B Monitored Natural Attenuation	Alternative C High Volume In Situ Treatment	Alternative D Sequential In Situ Treatment	Alternative F Pump and Treat	Alternative G Combined Floodplain In Situ/Pump and Treat	Alternative H Combined Upland In Situ/Pump and Treat	No Project Alternative/Alternative I Continued Operation of Interim Measure
Utilities & Service Systems	PS	Less demand on energy facilities therefore fewer impacts than the proposed project.	Alternative C would require more energy than the proposed project; however, proposed mitigation measures would be the same.	Alternative D would require more energy than the proposed project; however, proposed mitigation measures would be the same.	Alternative F would require more energy than the proposed project; however, proposed mitigation measures would be the same.	Alternative G would require more energy than the proposed project; however, proposed mitigation measures would be the same.	Alternative H would require more energy than the proposed project; however, proposed mitigation measures would be the same.	Energy demands required by the continued operation of IM-3 would be slightly greater than that required by the proposed project. However, upgrades to the electrical system would likely also be required, therefore impacts would be similar to the proposed project.
Water Supply	PS	No use of off-site freshwater would be needed for this alternative. No consumptive use of water. Fewer impacts than the proposed project.	No use of off-site freshwater would be needed for this alternative. No consumptive use of water. Fewer impacts than the proposed project.	No use of off-site freshwater would be needed for this alternative. No consumptive use of water. Fewer impacts than the proposed project.	No use of off-site freshwater would be needed for this alternative. No consumptive use of water. Fewer impacts than the proposed project.	No use of off-site freshwater would be needed for this alternative. No consumptive use of water. Fewer impacts than the proposed project.	No use of off-site freshwater would be needed for this alternative. No consumptive use of water. Fewer impacts than the proposed project.	There would be no impact on groundwater levels relative to current conditions, which would be a reduced impact compared to the proposed project. However, the time to achieve cleanup goals would be decades longer than the proposed project, thereby preventing use of contaminated groundwater by the public through use of institutional controls.

Notes: LTS = Less than significant; PS = potentially significant, mitigation measures would reduce the impact to a less-than-significant level; SU = Significant and unavoidable.

* For each environmental issue, the alternative is compared to the project based on the level of severity of impacts (i.e., greater, less, and similar).

Source: Data compiled by AECOM in 2010

alternatives present a range of process options (in situ, ex situ, and natural attenuation), which involve differing degrees of infrastructure and associated ground disturbing activities, intensities of cleanup activities, and duration of clean up.

The evaluation in this chapter includes several alternatives which have very limited ground-disturbance activities, including Monitored Natural Attenuation (Alternative B) and the No Project Alternative. Because these alternatives have limited project activities, they would generally have the least environmental impacts. As summarized in Sections 8.3.2 and 8.3.8, Monitored Natural Attenuation and the No Project Alternative would result in substantially reduced impacts on all issue areas, except to cultural resources in the case of Alternative B. When considering the full range and extent of environmental impacts alone, both Alternative B and the No Project Alternative could be considered environmentally superior to the proposed project.

The CEQA Guidelines Section 15126.6(e)(2) requires that "If the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives." Accordingly, DTSC has identified Alternative B as the environmentally superior alternative.

While Alternative B - Monitored Natural Attenuation is the environmentally superior alternative among the alternatives analyzed and meets some of the project objectives, it does not meet a fundamental project objective; namely, of achieving compliance with RAOs within a reasonable timeframe, as required by California State Water Board Resolution 92-49. Because time to achieve cleanup of the contaminated groundwater plume to background levels is an estimated 500 years under Alternative B (but as long as 2,200 years), Alternative B would not occur within a reasonable timeframe. Thus, a fundamental objective for the proposed project would not be met. In addition, because Alternative B does not require active remediation, the time in which the existing IM-3 Facility would be in operation would likely be much longer than for the other alternatives, thus resulting in impacts related to hazardous waste (from sludge and brine removal), operation and maintenance vehicle trips over many years, and the extended views of views of the IM-3 Facility. As such, DTSC acknowledges that this alternative may not be feasible.

8.8 ALTERNATIVES CONSIDERED BUT REJECTED

The following alternatives described in the Final CMS/FS, as stand-alone remedies, have been considered but rejected because they either are infeasible, did not meet the project objectives and RAOs, or would cause environmental consequences that are greater than the options presented in Chapter 3, "Project Description."

The objectives are defined based on the conclusions of the groundwater human health and ecological risk assessment and identification of ARARs. The RAOs for the project are intended to provide a general description of the cleanup objectives and to provide the basis for the development of site-specific remediation goals. In accordance with guidance in CERCLA, RAOs specify the contaminant of concern, the exposure routes and receptors, and an acceptable contaminant concentration for each exposure pathway (EPA 1988a and 1988b, cited in CH2M Hill 2009: 3-7, included in Appendix CMS of this EIR). Protective measures can be achieved by limiting or eliminating the exposure pathway, reducing or eliminating chemical concentrations, or both. RCRA corrective action guidance describes goals for final cleanup in terms of both protecting human health and the environment and performance standards that must also include controlling future sources of releases (EPA 2004).

The proposed project's RAOs for groundwater are to:

- prevent ingestion of groundwater as a potable water source having Cr(VI) in excess of the regional background concentration of 32 micrograms per liter (µg/l) Cr(VI);

- prevent or minimize migration of Cr(T) and Cr(VI) in groundwater to ensure that concentrations in surface waters do not exceed water quality standards that support the designated beneficial uses of the Colorado River [11 µg/l CR(VI)];

- reduce the mass of Cr(T) and Cr(VI) in groundwater at the project area to comply with ARARs, which would be achieved through the cleanup goal of 32 µg/l of Cr(VI); and

- ensure that the geographic location of the target remediation area does not permanently expand following completion of the remedial action.

The identification and screening approach is consistent with CERCLA guidance.

8.8.1 SCREENING OF REMEDIAL TECHNOLOGIES AND ALTERNATIVES

The purpose of initially considering a wide range of technologies and process options was to ensure that any potentially applicable options were not overlooked. The screening of these remedial technologies and process options is accomplished in three steps under the RCRA/CERCLA process:

1. Technical implementability screening
2. Evaluation of process options
3. Selection of representative process options

The first step in the process involves screening an initial list of technologies and process options against the criterion of technical implementability. This first screening eliminates those technologies or process options that are not applicable or not implementable because of the type and extent of contaminants and/or site characteristics found at the site. A second screening of the remaining process options against the criteria of effectiveness, implementability (both technical and administrative), and relative cost further reduces the list of remedial alternatives through a formal evaluation process. The last step involves selecting representative process options for each technology type to simplify the subsequent development and evaluation of remedial alternatives. Process options are specific categories of remedies within each remedial technology. The process options are used to implement each remedial technology.

8.8.2 SELECTION OF REPRESENTATIVE ALTERNATIVES

Following evaluations of effectiveness, implementability, and relative cost, process options are chosen to represent the range of options within a remedial technology type. These representative process options are chosen for each technology type by considering the screening results and by identifying those that can represent the entire range of process options. The representative process option may be chosen because performance and cost information is readily available, it has been previously identified or used at the site, or it otherwise ranks favorably among the other process options. The purpose of selecting a representative process option from all remaining options for each technology type (rather than including every remaining process option) is to simplify the subsequent development and evaluation of alternatives by reducing the number of alternatives formulated (EPA 1988a, cited in CH2M Hill 2009: 3-7, included in Appendix CMS of this EIR).

The representative process options that were not selected to be included in the alternative evaluations in the Final CMS/FS, and therefore are treated as alternatives that were considered but rejected in this EIR, are presented in Table 8-4.

8.9 REJECTION OF FINAL CMS/FS ALTERNATIVE A—NO ACTION

In addition to those specific process options listed above, Alternative A or "No Action" as described in the Final CMS/FS, was also rejected from further analysis in this EIR. Under Alternative A, no active construction or operational activities would occur. The operation of the existing IM-3 Facility would not continue; however, it would not be decommissioned. There would be no active treatment to reduce Cr(VI) concentrations in groundwater. Although the natural attenuation would occur within most of the fluvial sediments near the Colorado River, no land ownership changes would be initiated as part of the remedy and no institutional controls

Table 8-4
Summary of Alternatives Considered but Rejected

General Response Actions	Remedial Technology Types	Process Options	Description	Explanation of Rejection
Containment	Vertical Barriers	Soil- and Cement-Bentonite Slurry Walls	Slurry wall barriers consist of a vertical trench perpendicular to the groundwater flow direction, filled with bentonite slurry to support the trench, and backfilled with either soil or cement.	Lack of continuous aquitard at depth that is within the vertical limits of traditional trenching equipment, requiring extensive surface disturbance.
		Vibrating Beam Barrier Installation	Vibrating force is used to advance steel beam into ground; a thin wall of cement or bentonite is injected as beam is withdrawn.	See above reasons for slurry walls.
		Grout Curtains	Grout is pressure-injected along contamination boundaries in a regular overlapping pattern of drilled holes.	See above reasons for slurry walls.
Treatment	Ex Situ Physical/ Chemical Treatment	Chemical Oxidation	Oxidizing agents are used to oxidize organic contaminants or inorganic reagents in an ex situ reactor. Potential oxidizing agents are ultraviolet radiation, ozone, and/or hydrogen peroxide/ferrous iron, or permanganate.	Other treatment methods are better suited for use as a secondary process in an ex situ treatment train.
		Electrocoagulation Process	Electricity is passed through iron plates to reduce the chromium and precipitate it from solution. The resulting sludge is settled in a clarifier for disposal.	Harder to control and offers no advantage over chemical dosing. Energy intensive.
Disposal	Treated Groundwater Discharge	Publicly Owned Treatment Works	Aqueous streams are discharged to a publicly owned treatment works for treatment.	Long distances and availability of publicly owned treatment works capacity reduce likelihood of implementing this option.
		Surface Waters	Aqueous streams are discharged to surface receiving streams.	Not favorable because of sensitivities associated with the receiving waters.
		Deep Well Injection	Aqueous streams are injected into Class I wells. Recent guidance may further regulate this practice.	More difficult and expensive and less favorable than shallow reinjection.
		Agricultural	Treated water is distributed for agricultural use.	Limited agriculture surrounding the site.

Source: CH2M Hill 2009:Table 4-2, included in Appendix CMS of this EIR

would be imposed to restrict use of groundwater in locations where Cr(VI) concentrations exceed the cleanup goals. No additional groundwater monitoring facilities would be constructed under this alternative, nor would any ongoing sampling or well maintenance activities occur. This alternative would not include decommissioning of the existing wells or the IM-3 Facility.

This alternative would not provide adequate protection of human health or the environment, and does not meet defined ARARs. No active remediation would occur, and no institutional controls would exist to prohibit groundwater use for potable water supply. The existing contaminated groundwater plume would be left on surrounding landowner property without ongoing oversight. This alternative would not include monitoring to verify the effectiveness of the natural recovery process in fluvial sediments near the Colorado River over time, or to assess the effectiveness of natural recovery processes in the East Ravine bedrock. The estimated time to attain RAOs for this alternative is between 220 and 2,200 years, which is not considered a reasonable time frame. In addition, existing facilities would not be operational, but would also not be properly decommissioned and removed from the site.

Although this alternative was rejected from further analysis because it would not meet the RAOs, it was also rejected because it would result in potentially significant environmental impacts related to potential ingestion of groundwater known to be contaminated with Cr(VI), and long-term presence of contaminated groundwater could also potentially harm the environment. In addition, improper handling of existing infrastructure that has been used to monitor and remediate the contamination through the lack of a formal decommissioning process could result in significant environmental impacts. For the above reasons, Alternative A was rejected from further analysis.

9 OTHER INFORMATIONAL ANALYSIS

This chapter analyzes environmental justice and socioeconomics, two topics that are not required in a CEQA analysis. CEQA Guidelines Section 15064(a) states that economic and social changes resulting from a project shall not be treated as significant effects on the environment. Though typically provided only in those actions subject to federal approval requiring compliance with the National Environmental Policy Act (NEPA), environmental justice and socioeconomics discussions are presented in this chapter to provide decision makers with valuable information regarding the effects on socioeconomic conditions that exist in the project area and are provided for disclosure purposes only in response to agency comments received during the NOP process.

Section 9.1, "Environmental Justice," analyzes the potential of the various components to result in disproportionately high or adverse effects on low-income or minority populations, using as a model the analytical methods prescribed in federal Executive Order 12898 as well as in regulations promulgated by the Council on Environmental Quality (CEQ). Section 9.2, "Socioeconomics," examines the ways in which impacts on the physical environment caused by the various components could affect local and regional economies.

9.1 ENVIRONMENTAL JUSTICE

This section provides an assessment of the potential of the proposed project to result in disproportionately high and adverse effects on low-income and minority populations, as defined below. The analysis of the cultural, social, health and environmental effects that these populations may sustain relative to the rest of society is referred to as "environmental justice." The purpose of an analysis of environmental justice issues is to better ensure equity for low-income and minority populations when an action or program could create such effects. "Equity" in this document means that these groups do not bear a disproportionate burden of the environmental and health consequences of an action relative to potential benefits.

This section cites federal law by analogy only because federal law provides a robust analytical framework for determining if a project would result in disproportionate impacts on minority or low-income populations.

9.1.1 EXISTING SETTING

This section describes the demographic profile of the surrounding region. This section also describes presence of cultural resources of relevance to environmental justice within the project location boundaries.

9.1.1.1 DEMOGRAPHIC SETTING

The CEQ guidance requires the use of U.S. Census Bureau data to identify minority populations for environmental justice analysis (CEQ 1997). Accordingly this section identifies minority status for several geographic units around the project area. The CEQ guidance defines "minority persons" as "individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black (not of Hispanic origin); or Hispanic" (CEQ 1997:25).

The same guidance suggests that low-income populations should be identified using demographic data and poverty thresholds used by the U.S. Census Bureau. While more recent poverty thresholds exist, U.S. Census data from 2000 are the most comprehensive, most complete, and more customizable dataset currently available for the geographies presented in this description of existing conditions. Because the most recent census data for poverty was collected in regards to economic conditions in 1999, for the 2000 census, poverty status is tabulated relative to the 1999 poverty threshold. The various poverty thresholds, calculated for age and number of dependents, for 1999 are provided by the Census Bureau (U.S. Census Bureau 2006). The weighted average poverty threshold for a family of four was $17,029 in 1999.

The Interagency Federal Working Group on environmental justice guidance states that a minority and/or low-income population may be present in an area if the proportion of the populations in the area of interest are "meaningfully greater" than that of the general population, or where the proportion exceeds 50% of the total population. For the purposes of this analysis, minority and low-income populations of individual communities or block groups (a subunit of a census tract) were compared against the general population of the county as a whole. A meaningfully greater population was interpreted to either be 50% of the total population of the geographic unit or simply "greater" than the surrounding larger geography (which provides for a more conservative analysis).

Table 9-1 illustrates the presence and relative percentage of various minority groups for the two counties and other geographic units that are contiguous to or near the project area. Table 9-1 indicates that minority groups comprise approximately 56.0% of the population in San Bernardino County, and 16.0% of the population in Mohave County, Arizona. Other significant concentrations of minorities occur on the Chemehuevi Reservation (56.8%), the Colorado River Reservation (57.7%), and the Fort Mojave Reservation (66.2%).

Table 9-2 presents the income and poverty status data from the 2000 Census for the same geographic units. In San Bernardino County at the time of the 2000 census (1999), 15.8% of the population lived below the poverty line. In Mohave County, 13.9% of the population fell below the poverty threshold. Needles, CA (26.1%), the Chemehuevi Reservation (30.7%), the Colorado River Reservation (21.8%), and the Fort Mojave Reservation (18.2%) all have a relatively greater proportion of the population living below the poverty threshold.

Tables 9-3 and 9-4, respectively, tabulate racial and minority status as well as income and poverty status for the 2000 Census block groups that are within a 5-mile radius of the project area. None of these block groups has a significantly greater proportion of the population living below the poverty line, relative to the proportions for San Bernardino County or Mohave County. By far the greatest concentration of minority individuals occurs in Tract 0105 Block Group 002 (in San Bernardino County), which contains a large amount of land area south of the immediate project site, across the Colorado River from Lake Havasu City. In this Block Group, minority individuals constitute approximately 39.4% of the population. The nearest residences to the project site are within the Park Moabi Regional Park Mobile Home Park (MHP), as well as those residences in the Topock Marina MHP on the Arizona side of the river. Demographic data are not available at a sufficient resolution to identify the constituents of the Park Moabi Regional Park MHP or the Topock Marina MHP, but it is possible that the residences at these MHPs are second homes for seasonal residents. In this case, it is expected that the community would exhibit a demographic and socioeconomic distribution similar to that of the region as a whole. However, since no statistics are available, it is assumed that the Park Moabi Regional Park MHP and Topock Marina MHP community exhibit demographic and socioeconomic distributions similar to other mobile home parks throughout the southwest, which typically include meaningfully greater proportions of minority and/or low-income residents.

9.1.1.2 CULTURAL SETTING

As described in Section 4.4 "Cultural Resources," the project area and vicinity contain numerous prehistoric and historic era cultural resources. This section briefly describes the Topock Cultural Area, a resource of particular and sacred significance to some Native Americans that are culturally affiliated with the project area. The Topock Cultural Area consists of the Topock Maze, a large geoglyph that includes windrows of pebbles and gravels stained with desert varnish, and the surrounding area within the 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 the larger landscape, the Topock Cultural Area has distinctive importance because of the traditional cultural values at Topock itself. A full description of this resource is provided in Section 4.4 "Cultural Resources," however the presence of the resource is also relevant to environmental justice analysis. The proposed project could result in impacts to the Topock Cultural Area associated with the introduction of new features to the area that are inconsistent with the setting and could potentially damage the cultural value of the resource of some members of the Native American community. This impact could result in a disproportionate burden on these populations because the resource is imbued with cultural, religious, and sacred values to the Native American community.

Table 9-1
Race, Ethnicity, and Proportion of Total Minority For Cities and Counties

Geographic Unit	Total Population		White		Black/African American		American Indian and Alaskan Native		Asian		Native Hawaiian, Pacific Islander		Some Other Race		Two or More Races		Hispanic/ Latino		Total Minority	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
San Bernardino County (CA)	1,709,434	100.0	1,006,960	58.9	155,348	9.1	19,915	1.2	80,217	4.7	5,110	0.3	355,843	20.8	86,041	5.0	669,387	39.2	957,212	56.0
Mohave County (AZ)	155,032	100.0	139616	90.1	833	0.5	3,733	2.4	1,186	0.8	168	0.1	6,200	4.0	3,296	2.1	17,182	11.1	24,749	16.0
Needles (CA)	4,830	100.0	3761	77.9	78	1.6	338	7.0	69	1.4	6	0.1	308	6.4	270	5.6	887	18.4	887	18.4
Mojave Valley (AZ)	13,694	100.0	12,433	90.8	62	0.5	320	2.3	129	0.9	16	0.1	447	3.3	287	2.1	1640	12.0	2301	16.8
Chemeheuvi Reservation (CA)	345	100.0	158	45.8	1	0.3	149	43.2	0	0.0	0	0.0	16	4.6	21	6.1	77	22.3	196	56.8
Colorado River Reservation (CA-AZ)	9201	100.0	4957	53.9	120	1.3	2292	24.9	48	0.5	8	0.1	1445	15.7	331	3.6	2940	32.0	5306	57.7
Fort Mojave Reservation (CA-AZ-NV)	813	100.0	392	48.2	3	0.4	363	44.7	2	0.3	0	0.0	32	3.9	21	2.6	222	27.3	538	66.2

Source: US Census Bureau 2000 Census (1999 Data)

Table 9-2
Income and Poverty Status for Cities and Counties

Geographic Area	Median Household Income	Per Capita Income	Percent Below Poverty Line	Number Below Poverty Line	Total Population
San Bernardino County (CA)	$42,066	$16,856	15.8	263,412	166,2617
Mohave County (AZ)	$31,521	$16,788	13.9	21,252	153,062
Needles (CA)	$26,108	$15,156	26.1	1,263	4,841
Mojave Valley (AZ)	$34,321	$16,287	11.0	1,473	13,442
Chemeheuvi Reservation (CA)	$19,750	$13,130	30.7	100	326
Colorado River Reservation (CA-AZ)	$27,354	$12,621	21.8	1,939	8,892
Fort Mojave Reservation (CA-AZ-NV)	$26,875	$12,776	18.2	138	758

Source: US Census Bureau, 2000 Census (1999 Data)

Table 9-3
Ethnicity and Proportion of Total Minority Population for Census Block Groups within a 5-mile Radius

Geographic Unit	Total Population		White		Black/African American		American Indian and Alaskan Native		Asian		Native Hawaiian, Pacific Islander		Some Other Race		Two or More Races		Hispanic/ Latino		Total Minority	
Mohave County AZ	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Tract 9405, Block Group 006	930	100.0	893	96.0	4	0.4	12	1.3	3	0.3	1	0.1	7	0.8	10	1.08	34	3.7	62	6.7
Tract 9520, Block Group 003	1,159	100.0	1,111	95.9	6	0.5	7	0.6	5	0.4	2	0.2	12	1.0	16	1.38	75	6.5	104	9.0
Tract 9524, Block Group 001	991	100.0	945	95.4	1	0.1	6	0.6	5	0.5	0	0.0	30	3.0	4	0.40	86	8.7	101	10.2
San Bernardino County CA																				
Tract 0105 Block Group 002	662	100.0	427	64.5	4	0.6	158	23.9	0	0.0	0	0.0	25	3.8	48	7.25	116	17.5	261	39.4

Source: US Census Bureau, 2000 Census (1999 Data)

Table 9-4
Income and Poverty Status for Census Block Groups within a 5-mile Radius

Geographic Area	Median Household Income	Per Capita Income	Percent Below Poverty Line	Number Below Poverty Line	Total Population
Mohave County AZ					
Tract 9405, Block Group 006	$24,968	$16,006	13.8	133	961
Tract 9520, Block Group 003	$26,848	$16,372	15.8	182	1,155
Tract 9524, Block Group 001	$26,369	$12,912	14.1	136	964
San Bernardino County CA					
Tract 0105 Block Group 002	$24,531	$14,326	25.2	162	644

Source: US Census Bureau, 2000 Census (1999 Data)

9.1.2 REGULATORY BACKGROUND

9.1.2.1 EXECUTIVE ORDER 12898

Executive Order 12898 applies to federal agencies (Section 1-101). This order requires federal agencies to identify and address any disproportionate environmental or health impacts that federal actions or programs create on minority and low-income populations. Two specific provisions of Executive Order 12898 provide further guidance to federal agencies.

Section 1-103 of the order requires that each federal agency develop an agency-specific environmental justice strategy, defining how the agency will identify disproportionate adverse effects on minority and low income populations, and attempt to avoid those effects. Section 2-2 of the order requires that federal agencies should perform their actions and programs in a manner that neither excludes minority and low income populations from relevant participation in the action or program nor denies those groups the benefits of the action.

Three documents provide additional guidance in implementing environmental justice analysis under Executive Order 12898. The CEQ guidance for performing environmental justice analysis as part of NEPA process (CEQ 1997) offers useful definitions for this section. The U.S. Department of the Interior *Environmental Compliance Memorandum No. ECM95-3* requires compliance with Executive Order 12898 for U.S. Department of the Interior actions and programs. The U.S. Department of the Interior Environmental Justice Strategic Plan implements Executive Order 12898 for federal actions and programs within the Department's agencies and bureaus.

9.1.2.2 COUNCIL ON ENVIRONMENTAL QUALITY GUIDANCE

The CEQ publishes a guidance document that provides useful definitions and methods relevant to environmental justice analysis (CEQ 1997:25-26). This guidance indicates that federal agencies shall identify low-income populations as follows (CEQ 1997: 25):

> Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect.

Minority individuals and populations are defined as:

> Minority: Individual(s) [are] members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.
>
> Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. In identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed/transient set of individuals (such as migrant workers or Native American), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds (CEQ 1997:25).

These definitions thus provide specific ways to implement environmental justice analysis by defining the relevant study populations.

9.1.2.3 ENVIRONMENTAL COMPLIANCE MEMORANDA NO. ECM 95-3

This memorandum provides guidance for compliance with Executive Order 12898 for U.S. Department of the Interior actions and programs (Taylor 1995). The memorandum stipulates that all environmental documents prepared by U.S. Department of the Interior agencies shall analyze the effect of agency actions on minority and low income populations. The memorandum directs agencies to evaluate the equity of the effects imposed on these populations relative to the benefit of the action. The relevant environmental document should identify any such effects, or the absence of effects on minority and low-income populations.

9.1.2.4 U.S. DEPARTMENT OF THE INTERIOR ENVIRONMENTAL JUSTICE STRATEGIC PLAN 1995

Executive Order 12898 requires federal agencies to develop agency agency-specific environmental justice plans. The U.S. Department of the Interior Environmental Justice Strategic Plan 1995 provides the following goals (DOI 1995):

GOAL 1. The Department will involve minority and low-income communities as we make environmental decisions and assure public access to our environmental information.

GOAL 2. The Department will provide its employees environmental justice guidance and with the help of minority and low-income communities develop training which will reduce their exposure to environmental health and safety hazards.

GOAL 3. The Department will use and expand its science, research, and data collection capabilities on innovative solutions to environmental justice-related issues (for example, assisting in the identification of different consumption patterns of populations who rely principally on fish and/or wildlife for subsistence).

GOAL 4. The Department will use our public partnership opportunities with environmental and grassroots groups, business, academic, labor organizations, and Federal, Tribal, and local governments to advance environmental justice.

9.1.2.5 CALIFORNIA GOVERNMENT CODE AMENDMENTS (SENATE BILL 115, SOLIS)

Amendments to the California Government Code designate the Office of Planning and Research (OPR) as the coordinating agency in state government for environmental justice programs (Government Code Section 65040.12[a]). This section defines environmental justice as the "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies" (Government Code Section 65040.12[e]).

9.1.2.6 CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCE CONTROL ENVIRONMENTAL JUSTICE POLICY 2008

The California DTSC has adopted an environmental justice policy (DTSC 2008). As an agency, DTSC has stated that it shall:

- protect public health or the environment if a reasonable threat of serious harm exists based upon the best available science and other relevant information, even if absolute and undisputed scientific evidence is not available to assess the exact nature and extent of risk;

- promote investigation/cleanup of contaminated sites in areas with ethnic minority and low-income populations using both voluntary agreements and enforcement tools;
- facilitate and advocate that the issue of environmental justice for communities most affected, including low-income and racial minority populations, is considered in the continued efforts of Brownfields activities of DTSC;
- ensure that hazardous substances sites that most impact, or threaten to impact, public health or the environment are prioritized and remediated expeditiously;
- consider regional impacts of our decisions and activities, utilizing Geographic Information System (GIS), census, and other demographic data to the extent feasible to meet Public Participation and CEQA obligations;
- characterize areas with demographic data surrounding sites and facilities where contamination may have migrated off-site; evaluate potential exposures to sensitive receptors, such as children, and minimize potential cumulative impacts from facilities and sites on community health and the environment by significantly reducing exposure risks from individual sites; and
- work with environmental justice stakeholders to develop cross-media and cross-agency approaches to community concerns.

9.1.2.7 GOVERNOR'S OFFICE OF PLANNING AND RESEARCH, ENVIRONMENTAL JUSTICE IN CALIFORNIA STATE GOVERNMENT

OPR has published a summary and history of California's state environmental justice policies (OPR 2003). Under the California Government Code OPR is empowered to act as the coordinating agency for state government environmental justice programs. To facilitate the integration of environmental justice policy into state government OPR (2003:15) has developed the following policies for the State of California:

- **GOAL 1** A state government that is inclusive and responsive to people of all races, cultures and incomes with respect to development, adoption and implementation of environmental laws, regulations and policies.
- **GOAL 2** A state where people of all races, cultures and incomes are ensured a healthy environment.

9.1.3 ENVIRONMENTAL JUSTICE EFFECTS

As described in Section 9.1.1, both low-income and minority populations that are meaningfully greater than the surrounding area have been identified within the study area for Environmental Justice. This environmental justice analysis identifies whether any significant environmental impact identified in this EIR (see Table 1-1 for a summary of anticipated impacts) would disproportionately affect those low-income or minority populations. Impacts identified in this EIR that could be mitigated to less than significant or are less than significant without mitigation are not discussed further because they would not result in significant impacts, let alone a disproportionate affect on minority or low-income populations.

9.1.3.1 ANALYSIS METHODOLOGY

The CEQ guidance directs provides a framework for determining if a project would result either in disproportionately high and adverse human health effects or in disproportionately high and adverse environmental effects (CEQ 1997:26-27). The CEQ guidance provides an explanation of the nature of each impact. Disproportionately high and adverse human health and environmental effects occur when:

- human health effects are significant when measured by risk or rates of incidence, or above generally accepted norms;
- there are significant ecological, cultural, economic, or social impacts to a minority population, low-income population, or Native American tribe that are associated with impacts on the natural or physical environment;
- the risk or rate of hazard exposure or incidence of sociocultural impact sustained by a minority population (including Native American tribes) or low-income population is significant and appreciably exceeds the exposure or incidence sustained by the general population;
- health effects or sociocultural impacts would occur in a minority population, low-income population, or Native American tribe affected by multiple or cumulative exposures from the environmental hazard.

The following sections analyze the potential for impacts that would remain significant after implementation of all feasible mitigation measures to result in disproportionately high and adverse environmental or health effects on minority or low-income populations.

9.1.3.2 IMPACT ANALYSIS

Cultural Resource Effects

As described in Section 4.4, "Cultural Resources," 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. The only mitigation that would reduce this impact to a less-than-significant level would be avoidance of any type of project-related activity. 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 and unavoidable impacts on the Topock Cultural Area. (**IMPACT CUL-1a**)

Project construction, operations, and decommissioning could also disturb or alter a number of documented and undocumented and/or buried historical and archaeological 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. 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, these impacts are potentially significant and unavoidable. (**IMPACT CUL-1b, CUL-1c, CUL-2**)

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. 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. **(IMPACT CUL-4)**

Because these cultural resources have great cultural value to tribal members that attach religious and cultural significance to the Topock Cultural Area, as well as individual cultural resource sites and features in the vicinity, the disturbance of these resources and the potential disturbance of previously undiscovered human remains (IMPACT CUL-1a, CUL-1b, CUL-1c, CUL-2, and CUL-4) would result in a disproportionately high and adverse effect on a minority population.

Noise Effects

This impact analyzes the effect that the introduction of new sources of noise and vibration caused by implementation of the proposed project. 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. These groundborne noise and vibration levels could result in annoyance or architectural/structural damage. Vibration levels from the construction of additional wells may generate an annoyance or cause sleep disturbance dependent upon the distance between receptor and the location of the well construction. Predicted vibration levels are difficult to determine for comparison with applicable vibration standards under the assumptions used for vibration analysis; however, the potential for exceeding applicable standards still exists, making this impact potentially significant and unavoidable. (**IMPACT NOISE-1**)

Implementation of the proposed project could result in future noise that could expose the Topock Cultural Area to levels that exceed the County's standards or would conflict with Native American values associated with this resource. 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. The potential for future noise to conflict with the values associated with the Topock Cultural Area by Native American participants would still exist. Meteorological conditions (wind direction) would also affect the noise levels experienced by Native American participants. Although mitigation measures would achieve the normally acceptable exterior noise level standard for places of worship, the unique values associated with the Topock Cultural Area cannot be reconciled with additional project-related noise (**IMPACT NOISE-3**).

The potentially significant and unavoidable noise and vibration impacts on sensitive receptors identified by Impact NOISE-1, in and of itself, are not considered a significant environmental justice effect because it would not result in a disproportionately high and adverse environmental or health effect on those receptors as defined above and in the CEQ guidance. However, because the Topock Cultural Area embodies traditional cultural values for Native Americans, the introduction of new noise and vibration could adversely affect the setting and overall

feeling of this resource (**IMPACT NOISE-3**). While the noise analysis in this EIR identifies mitigation to reduce this impact, the possibility remains that noise impacts on this sensitive land use would remain significant. Therefore, the proposed project may result in disproportionately high and adverse noise effects to members of the Native American community.

Beneficial Effects

Environmental Justice analysis requires a discussion and balancing of disproportionate impacts on minority and low-income populations with the potential benefits of an action. While the remediation of the Cr(VI) may result in disproportionate impacts on Native American tribes these impacts must be compared to the commensurate benefits of the action.

The California DTSC has adopted an environmental justice policy (DTSC 2008), described above. The goals of this policy include the cleanup of contaminated areas with ethnic minority and low-income populations and the expeditious remediation of chemicals of concern (COCs) where such chemicals pose a threat to public health and the environment. Because the proposed project would reduce concentrations of Cr(VI) and other chemicals of concern (COCs) in contaminated soil and groundwater at the Topock Compressor Station the proposed project is consistent and helps to implement this with DTSC policy and promotes public and environmental health. The proposed project would reduce or avoid the possibility that such chemicals would enter the Colorado River, an important source of water for municipal, agricultural, and other uses and an important habitat corridor for numerous special status species. The proposed project would thus create tangible and environmental benefits that would accrue to the environment and the public at large, including minority and low-income populations.

9.1.3.3 Environmental Justice Outreach and Minimization Efforts

As described above, this environmental justice discussion has indicated that significant cultural and noise impacts associated with the proposed project could disproportionately affect minority (Native American) populations. The following section explains the efforts by DTSC and its consultants to ensure that environmental and community effects are addressed, and that equity is achieved among all parties involved. Minimization of disproportionate environmental impacts requires outreach to the communities that could be affected to ensure that the expressed wishes and preferences of the affected populations can be understood and considered. This section describes these efforts.

To facilitate the identification of concerns and potential effects on the Native American community, DTSC and its consultants created a Native American Communication Plan (NACP). One of the primary concerns driving the creation of the plan was identified traditional cultural property concerns about potential impacts on the Topock Maze, the Colorado River, and the Topock Cultural Area. Other identified concerns were the need to assure a timely project in order to protect water quality in the Colorado River and concerns that impacts to the water could affect tribal lands, traditional tribal ways of life, and tribal economic interests, consistently with the expressed concerns of numerous Native American tribes identified during the NACP. The NACP facilitates outreach to tribal members. In addition to outreach conducted under the NACP, DTSC has communicated extensively with Native Americans to identify resources that may be affected by the project and the significance these resources hold for these stakeholders.

In addition to the NACP, other minimization efforts to reduce disproportionate effect include consultation among the DTSC, the contractors, and PG&E staff so that construction, operations and maintenance, and decommissioning activities are coordinated with Native American stakeholder visits to the Topock Maze to minimize or avoid noise impacts that would diminish the traditional cultural function of this resource. This may reduce the impact of noise associated with the construction, operation and maintenance, and decommissioning of all components on Native Americans and the values embodied in the Topock Maze and Cultural Area.

Notice, outreach, and consultation were also conducted during the CEQA scoping process. The results of the scoping process including received comments are summarized in the Scoping Report for the Draft Environmental Impact Report, Pacific Gas and Electric Company, Topock Compressor Station, Environmental Investigation and Cleanup Project, which is incorporated by reference as provided for in the CEQA Guidelines (California Code of Regulations Section 15150). The report is available for inspection at the offices of DTSC (5796 Corporate Avenue Cypress, California 90630).

In addition DTSC periodically posts fact sheets on the project website that describe the project. In July of 2009 DTSC posted a fact sheet providing notice of community meetings for the purposes of outreach, and documented additional outreach efforts in the form of a community survey regarding the proposed project that DTSC performed in 2009 (DTSC 2009). Per the notice provided in the fact sheet DTSC held the following community meetings:

- Tuesday, July 28, 2009, Parker Community Center, Parker Arizona
- Thursday, July 30, 2009, Golden Shores Civic Association, Topock Arizona

These meetings were held after DTSC distributed a community survey in January of 2009 (DTSC 2009). The survey was designed to gather information about the community's level of awareness and interest in the project, and allow an opportunity for the community to express any specific concerns about project. The survey results provided an important feedback tool, resulting in over 200 community responses (DTSC 2009). The responses showed that the community is interested in receiving information about the environmental impacts of the contaminated soil and groundwater and being informed about the timeline for remediation.

9.2 SOCIOECONOMICS

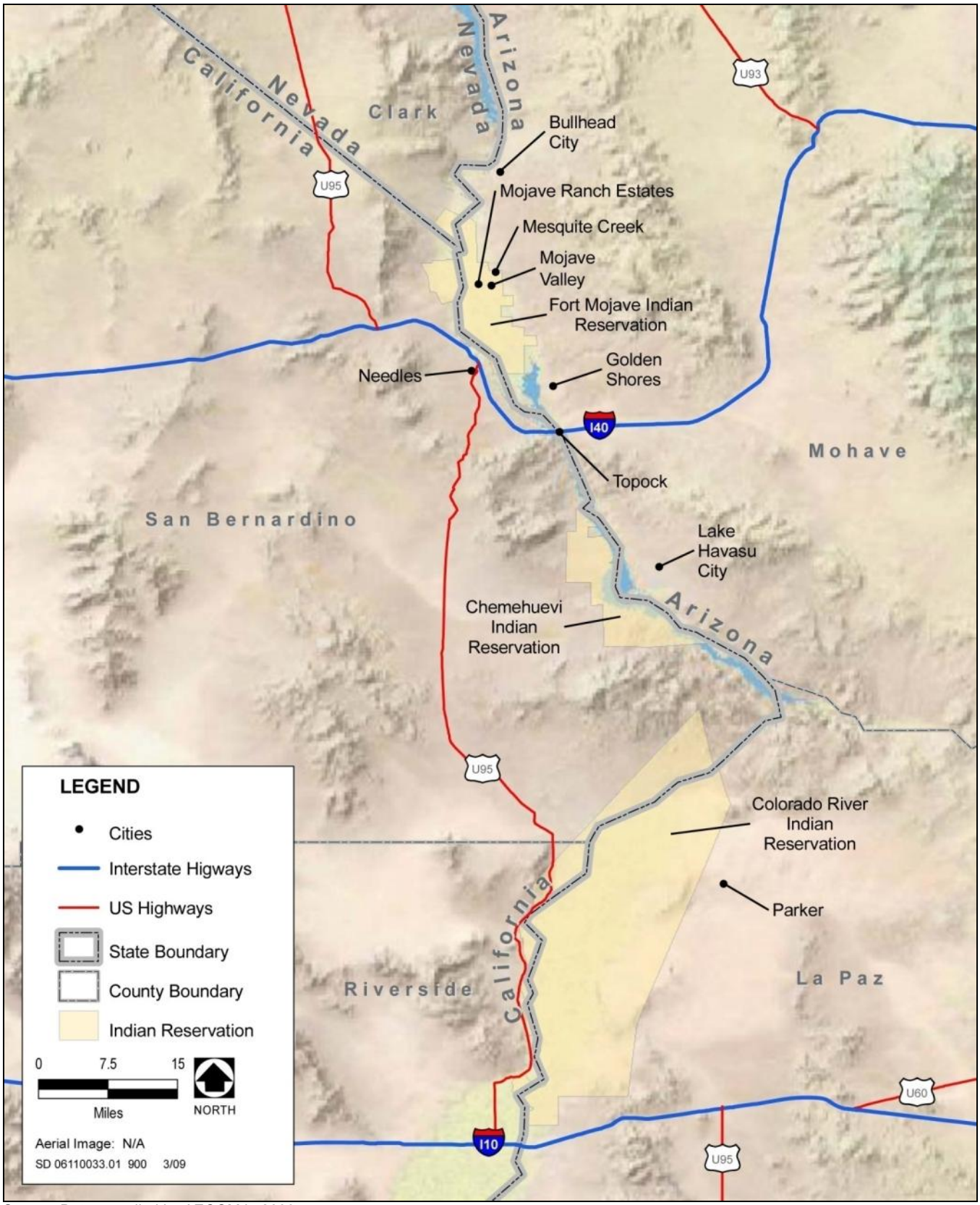
This section provides a description of the socioeconomic conditions for the project area, including nearby population centers and surrounding counties. Descriptions of the historic and contemporary context, population, employment, income, and regional economic base are provided. Effects of the proposed project to the socioeconomic resources of the area are assessed and mitigation measures are recommended, as needed.

9.2.1 EXISTING SETTING

The proposed project is located in the Mojave Desert approximately 12 miles southeast of the City of Needles, California. The project area spans Interstate 40 and the Colorado River. Communities presented in this analysis may realize socioeconomic effects (including beneficial effects) as a result of the construction, operation and maintenance, and decommissioning of the proposed project described in Chapter 3 of this EIR. These communities extend beyond Needles and include the following communities in Nevada and Arizona: Bullhead City, Golden Shores, Lake Havasu City, Mesquite Creek, Mojave Ranch Estates, Mohave Valley, Parker, and Topock. Reservations associated with three Native American Tribes—Chemehuevi Indian Tribe, Fort Mojave Indian Tribe (FMIT), and the Colorado River Indian Tribe (CRIT)—(Exhibit 9-1) may also be affected by the proposed project. Data presented in this section includes these communities[1], where available, as well as the counties of San Bernardino, Riverside, Mohave, La Paz, and Clark. In addition, some statewide economic indicators for California, Arizona, and Nevada are provided to help put local conditions in perspective.

Due to the rural nature of the vicinity surrounding the proposed project, U.S. Census Bureau data from 2000 is used in this section when providing information for all geographies combined. While this dataset is not as recent as others provided by state or county agencies, it is the most detailed, complete, consistent, and available dataset and provides comparable data across all geographies presented in this document. It is likely that these geographies have experienced slight demographic changes since the 2000 U.S. Census; however, it is anticipated that general

[1] The communities of Topock and Golden Shores are captured in the presentation of U.S. Census Bureau Block Group data for 9405.6 and 9520.3 in Mohave County, AZ.



Source: Data compiled by AECOM in 2009

Socioeconomic Regional Map **Exhibit 9-1**

socioeconomic trends have not shifted substantially due to the rural nature of the area and the relatively normal growth patterns in the region, and that these data are reliable for the analysis presented herein.

9.2.1.1 HISTORICAL CONTEXT

The area surrounding the compressor station has a rich prehistoric context, as it is a location of pronounced spiritual and cultural importance for the nearby Native American tribes. The area has also played an important role historically for settlers and migrants to California, as the Topock/Needles area has been a primary crossing for the Colorado River for over 100 years. The reader is directed to Section 4.4, "Cultural Resources," for a summary of the prehistoric, ethnographic, and historic details for the area.

Current-Day Social and Cultural Context

Towns neighboring the project area, like Needles, continued to survive by catering to travelers through the area, while other small towns, such as Topock and Golden Shores, grew (at least seasonally) with the emigration of retirees, recreationists, and other people in search of mild winters and sunny weather. Other neighboring communities have similar histories, including Bullhead City, which was originally a small port for steamboats moving along the Colorado River. Mining and the construction of Davis Dam helped grow the population in Bullhead City during the early to mid-20th century. Recently, however, the growth of Bullhead City is primarily due to the growth of neighboring Laughlin, Nevada (Bullheadcity.com 2009).

The town of Lake Havasu City can also trace part of its history to the construction of Parker Dam, which created the lake for which the city is named. The area was used by the military as a recreation area, but was eventually abandoned after the war ended. The origin of the modern Lake Havasu City can be most directly traced to the endeavors of Robert McCulloch, an inventor, manufacturer, and oil baron, who decided to move his small engine testing facility to Lake Havasu in the 1960s. Struck by the natural beauty of the area, he purchased a large tract of land and built a chainsaw manufacturing plant in the city to spur growth. Meanwhile, McCulloch also began to market the remote area as a retreat area for the wealthy and created a lively resort and accommodation industry. Lake Havasu City is probably most famous, however, for being the home of the London Bridge, a granite bridge originally built over the Thames River in 1831, which was transplanted to Lake Havasu City for a cost of over $2,460,000 in the late 1960s (Holmes 2009). The bridge is now a key landmark in the city and a regional tourist attraction.

As stated previously, the area surrounding the project location also includes reservations associated with three Native American tribes: Fort Mojave Indian Tribe (FMIT), Chemehuevi Indian Tribe, and the Colorado River Indian Tribes (CRIT). The FMIT Reservation is located north of the project area, with the vast majority of the lands located on the Arizona side of the Colorado River. Originally established in 1870, the main economic activity on the reservation is agriculture, with lands leased to large farming companies. Many Fort Mohave tribal members in the area live in the neighboring community of Mohave Valley. In addition to the typical service and retail industries common for a town of its size, Mohave Valley is home to the Spirit Mountain Casino and is just east of the Avi Resort and Casino (both casinos are on the FMIT Reservation). Other amenities in the area include a movie theatre, restaurants, entertainment venues, and the Mojave Resort Golf Club. The FMIT is also developing two subdivisions located on the reservation: Desert Springs, an active-adult community near Laughlin, and Mesquite Creek (Mohave Valley Chamber of Commerce 2009).

The town of Parker is located near the CRIT Reservation and is the county seat of La Paz County, Arizona. The CRIT Reservation was established in 1865 for all Native Americans living along the river, which included Mojave, Chemehuevi, Navajo, and Hopi peoples. Assisted by the construction of the Grant-Dent Canal, agriculture was started on the reservation soon after. Early agricultural attempts were generally unsuccessful due to engineering and environmental challenges, and the area primarily remained a railroad stop into the 1940s when the agricultural industry began to flourish. The town of Parker was situated along the railroad line in 1909 and, by the 1950s, had emerged as a center for agricultural service and shipping. Today, Parker is a home to the

BlueWater Resort and Casino (on the CRIT reservation), which includes 200 rooms and a 160-dock marina (Town of Parker 2009).

The Chemehuevi Valley Reservation was established in 1907 to provide a homeland for the Chemehuevi people, who had been historically scattered by war with the Mojave in the mid-19th century. The creation of the Parker Dam, however, destroyed a large proportion of their reservation in 1940. Federal recognition was also rescinded and many Chemehuevi moved to Parker or nearby Lake Havasu City. Federal recognition was reestablished in 1970, and a new reservation was established on the California side of the Colorado River. While the reservation is not densely populated, it is home to the Havasu Landing Resort and Casino, which hosts river recreation amenities, a campground, and events (Chemehuevi Indian Tribe 2009).

Socioeconomic Context

This section describes existing socioeconomic conditions for the region surrounding the project area to provide a baseline for assessing the potential effects of the proposed project. For example, the proposed project may affect local employment or economic activity in nearby communities or along the Colorado River through construction and operation of wells, pipelines, and roads. Demographics and selected economic indicators of social well-being also are presented to help provide context and put local conditions in perspective relative to statewide conditions.

Socioeconomic statistics presented in this section include those areas immediately surrounding the proposed project area, including nearby communities, as well as areas where workers for the project area may reside. The combination of these two types of areas is meant to capture the locations where socioeconomic effects may be the most relevant, as effects may accrue to nearby residential areas, as well as to primary employment centers. The inclusion of these primary employment centers is important in a socioeconomic analysis because it is assumed that project impacts to socioeconomics (e.g., changes in employment) would affect these areas. In many cases, residential locations near a project area are also considered primary employment centers for that project location. Due to the rural nature of this project location, however, some locations outside of the immediate area house large proportions of workers in proximity to the project area. A Labor Shed Report provided by the U.S. Census Bureau for 2006 suggests that Bullhead City and Clark County, Nevada are two locations where substantial proportions of workers in the project area reside in the vicinity of the project area (U.S. Census Bureau 2009). As shown in Exhibit 9-1, these areas, in combination with the smaller communities in closer proximity to the project, form the Region of Influence (ROI) for socioeconomics.

Population

Table 9-5 shows the population of the communities within the ROI for the years 1990 and 2000. Overall, the communities in proximity to the project area exhibited a substantial amount of growth between 1990 and 2000, with the highest growth seen for the area that includes the towns of Topock and Golden Shores, Arizona. Other communities exhibiting large growth include Mojave Valley (96.7%), Lake Havasu City (72.1%), and Bullhead City (53.8%). The communities of Mesquite Creek and Mojave Ranch Estates were called out separately in the 2000 U.S. Census, but were lumped together during the previous census, suggesting that these two communities also grew in the decade between censuses. Two of the three Native American reservations included in ROI exhibited some growth between 1990 and 2000, although this growth was somewhat lower than the amount experienced by the state as a whole. The population of the Chemehuevi Reservation and the community of Needles, California slightly dropped between 1990 and 2000. Of the surrounding counties, Clark County exhibited the largest growth between 1990 and 2000, although much of this growth can likely be attributed to the growth of the Las Vegas metropolitan area. For those counties in closer proximity to the project area, there was a higher amount of growth in the Arizona counties of La Paz and Mohave than the California counties of Riverside and San Bernardino. Overall, these growth rates suggest a higher rate of growth for Arizona and its communities than for California during the same time period, with the entire region experiencing at least some growth despite pockets of reduced population.

Table 9-5
Total Population and Population Growth, 1990 and 2000

Communities	1990 Total	2000 Total	Growth 1990-2000	Average Annual Growth
Bullhead City, AZ	21,951	33,769	53.8%	5.4%
Lake Havasu, AZ	24,363	41,938	72.1%	7.2%
Mesquite Creek, AZ	**	205	**	**
Mojave Ranch Estates, AZ	**	28	**	**
Mojave Valley, AZ	6,962	13,694	96.7%	9.7%
Parker, AZ	2,897	3,140	8.4%	0.8%
Topock and Golden Shores, AZ*	918	2,089	127.6%	12.8%
Needles, CA	5,191	4,830	-7.0%	-0.7%
Native American Reservations				
Colorado River Indian Tribes	7,865	9,201	17.0%	1.7%
Fort Mojave Indian Tribe	758	1,043	37.6%	3.8%
Chemehuevi	358	345	-3.6%	-0.4%
Counties				
La Paz, AZ	13,844	19,715	42.4%	4.2%
Mohave, AZ	93,497	155,032	65.8%	6.6%
Riverside, CA	1,170,413	1,545,387	32.0%	3.2%
San Bernardino, CA	1,418,380	1,709,434	20.5%	2.1%
Clark, NV	741,459	1,375,765	85.5%	8.6%
States				
Arizona	3,665,228	5,130,632	40.0%	4.0%
California	29,760,021	33,871,648	13.8%	1.4%
Nevada	1,201,833	1,998,257	66.3%	6.6%

Notes:
* Comprised of Block Group 9405.6 and 9520.3 (2000); Block Group 9521.2 and 9521.3 (1990)
** Data unavailable for 1990
Source: U.S. Census Bureau 1990, 2000

Table 9-6 presents the racial and ethnic breakdown of the total population for nearby communities, Native American reservations, surrounding counties, and the states of Arizona, California, and Nevada. Many of the communities near the proposed project location exhibit high proportions of white residents, with the communities of Topock and Golden Shores, Lake Havasu City, Mesquite Creek, Mojave Valley, Bullhead City, and Needles all exhibiting proportions higher than 77%. These proportions are larger than those exhibited by Arizona, California, or Nevada as a whole, although Mohave County exhibits a white proportion of 90.1%. Expectedly, high proportions of Native American residents are seen within the Native American Reservations included in the ROI, with 53.9%of FMIT residents, 43.2%of Chemehuevi residents, and 24.9%of CRIT residents responding as American Indian or Alaska Native. The community of Parker also exhibited a large proportion of American Indian or Alaska Native residents (23.1%), most likely due to its proximity to the CRIT reservation.

Table 9-6
Race and Ethnicity, 2000

Communities	White		Black or African American		American Indian or Alaska Native		Asian		Native Hawaiian or Pacific Islander		Some Other Race		Two or More Races		Hispanic		Total Population	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Bullhead City, AZ	28,896	85.6	340	1.0	452	1.3	339	1.0	25	0.1	2,787	8.3	930	2.8	6,807	20.2	33,769	100.0
Lake Havasu, AZ	39,568	94.3	129	0.3	291	0.7	245	0.6	41	0.1	1,051	2.5	613	1.5	3,298	7.9	41,938	100.0
Mesquite Creek, AZ	190	92.7	2	1.0	2	1.0	1	0.5	0	0.0	4	2.0	6	2.9	15	7.3	205	100.0
Mojave Ranch Estates, AZ	13	46.4	0	0.0	7	25.0	0	0.0	0	0.0	4	14.3	4	14.3	22	78.6	28	100.0
Mojave Valley, AZ	12,433	90.8	62	0.5	320	2.3	129	0.9	16	0.1	447	3.3	287	2.1	1,640	12.0	13,694	100.0
Parker, AZ	1,948	62.0	59	1.9	725	23.1	27	0.9	5	0.2	234	7.5	142	4.5	935	29.8	3,140	100.0
Topock and Golden Shores, AZ	2,004	95.9	10	0.5	19	0.9	8	0.4	3	0.1	19	0.9	26	1.2	109	5.2	2,089	100.0
Needles, CA	3,761	77.9	78	1.6	338	7.0	69	1.4	6	0.1	308	6.4	270	5.6	887	18.4	4,830	100.0
Native American Reservations																		
Colorado River Indian Tribe	4,957	53.9	120	1.3	2,292	24.9	48	0.5	8	0.1	1,445	15.7	331	3.6	2,940	32.0	9,201	100.0
Fort Mojave Indian Tribe	402	38.5	3	0.3	559	53.6	2	0.2	0	0.0	36	3.5	41	3.9	261	25.0	1,043	100.0
Chemehuevi	158	45.8	1	0.3	149	43.2	0	0.0	0	0.0	16	4.6	21	6.1	77	22.3	345	100.0
Counties																		
La Paz, AZ	14,619	74.2	155	0.8	2,470	12.5	80	0.4	19	0.1	1,844	9.4	528	2.7	4,420	22.4	19,715	100.0
Mohave, AZ	139,616	90.1	833	0.5	3,733	2.4	1,186	0.8	168	0.1	6,200	4.0	3,296	2.1	17,182	11.1	155,032	100.0
Riverside, CA	1,013,478	65.6	96,421	6.2	18,168	1.2	56,954	3.7	3,902	0.3	288,868	18.7	67,596	4.4	559,575	36.2	1,545,387	100.0
San Bernardino, CA	1,006,960	58.9	155,348	9.1	19,915	1.2	80,217	4.7	5,110	0.3	355,843	20.8	86,041	5.0	669,387	39.2	1,709,434	100.0
Clark, NV	984,796	71.6	124,885	9.1	10,895	0.8	72,547	5.3	6,412	0.5	118,465	8.6	57,765	4.2	302,143	22.0	1,375,765	100.0
States																		
Arizona	3,873,611	75.5	158,873	3.1	255,879	5.0	92,236	1.8	6,733	0.1	596,774	11.6	146,526	2.9	1,295,617	25.3	5,130,632	100.0
California	20,170,059	59.5	2,263,882	6.7	333,346	1.0	3,697,513	10.9	116,961	0.3	5,682,241	16.8	1,607,646	4.7	10,966,556	32.4	33,871,648	100.0
Nevada	1,501,886	75.2	135,477	6.8	26,420	1.3	90,266	4.5	8,426	0.4	159,354	8.0	76,428	3.8	393,970	19.7	1,998,257	100.0

Source: U.S. Census Bureau 2000

Proportions of Hispanic residents shown in the census data range from 19.7% in Nevada to 32.4% in California. Among the counties, the area with the highest proportion of Hispanic residents is San Bernardino County (39.2%), followed by Riverside County (36.2%). The county with the lowest proportion of Hispanic residents was Mohave County in Arizona (11.1%). Among the local communities and Native American reservations, the proportion of Hispanic residents was highest in Mojave Ranch Estates (78.6%), although the small population in this community tends to overstate relative percentages. Among communities with sizable populations, the highest proportions are seen on the CRIT reservation and in neighboring Parker, with 32.0% and 29.8% of the population reported as Hispanic, respectively.

Table 9-7 presents the distribution of sex and age among the communities and Native American reservations within the ROI, as well as the surrounding counties and states. The proportions of males and females among the different geographies is relatively equal, suggesting that the communities and Native American reservations within the ROI are not overwhelming skewed by outside socioeconomic forces. The distributions of age among the states of Arizona, California, and Nevada are relatively similar, with peak percentages in the 18-39 year old age range, and proportions of senior citizens ranging from 10.6 % in California to 13.0 in Arizona. The counties of Riverside, San Bernardino, and Clark have similar proportions of senior citizens, ranging between 8.6% and 12.7%. The two Arizona counties present in the data, La Paz and Mohave, have much higher proportions of senior citizens compared to neighboring counties and the states as a whole, exhibiting proportions of 25.8%and 25.5%, respectively, reflecting the retirement-oriented community lifestyle present in these counties. Among the communities and Native American reservations within the ROI, proportions of children and senior citizens are both higher than the state averages, although the proportions of senior citizens on the CRIT and FMIT reservations are smaller than surrounding La Paz and Mohave counties. It should be noted that, when taken together, the communities and Native American reservations have a much higher proportion of residents aged 40-64, with an overall age breakdown more similar to the counties of Mohave and La Paz than other counties.

Table 9-8 presents the number of households and average household size among the communities and Native American reservations within the ROI, as well as the surrounding counties and states. Average household size among the states ranges from 2.87 in California to 2.62 in Nevada, with an average household size in Arizona of 2.64. Among the counties, La Paz and Mohave have smaller average household sizes than the Californian counties included in the table. This trend is not necessarily exhibited by the communities and Native American reservations within the ROI, however, with average household size ranging from 4.67 in Mojave Ranch Estates, to 1.93 in Mesquite Creek. Among those communities having more than 1,000 households, the range is less extreme, with Topock and Golden Shores exhibiting average household sizes of between 1.95 and 2.1, and Parker exhibiting an average household size of 2.93.

Employment

Table 9-9a presents a range of employment data for the communities and Native American reservations within the ROI, and Table 9-9b presents the same information for the surrounding counties and states. This information includes employment status, occupations and industries, and class of worker. Among the communities and reservations included, there is a wide range in the percentages of residents in the labor force. For example, the communities of Mojave Ranch Estates and Parker exhibit relatively high proportions (89.5% and 70.0%, respectively), when compared to the surrounding counties. Other communities, however, such as Topock and Golden Shores (both at 37.7%) and Mesquite Creek (32.3%), exhibit lower proportions. The labor force in the counties of La Paz and Mohave counties also is relatively low, compared to other counties included in the table and Arizona as a whole.

This information, coupled with the age-related information presented above, reinforces the suggestion that there are substantial clusters of retired residents in the ROI, although there are sizeable labor forces in the communities of Mohave Valley (56.9%), Bullhead City (56.5%), Lake Havasu City (50.4%), Needles (50.1%), and on all three Native American reservations (ranging from 58.8% to 55.2%).

Table 9-7
Sex and Age Distribution, 2000

Communities	Male		Female		Ages 0-17		Ages 18-39		Ages 40-64		Ages 65+	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Bullhead City, AZ	16,768	49.7	17,001	50.3	7,594	22.5	8,477	25.1	11,219	33.2	6,479	19.2
Lake Havasu, AZ	20,624	49.2	21,314	50.8	8,151	19.4	8,636	20.6	14,456	34.5	10,695	25.5
Mesquite Creek, AZ	99	48.3	106	51.7	13	6.3	11	5.4	89	43.4	92	44.9
Mojave Ranch Estates, AZ	11	39.3	17	60.7	12	42.9	8	28.6	8	28.6	0	0.0
Mojave Valley, AZ	6,912	50.5	6,782	49.5	3,366	24.6	3,254	23.8	4,820	35.2	2,254	16.5
Parker, AZ	1,521	48.4	1,619	51.6	1,030	32.8	847	27.0	967	30.8	296	9.4
Topock and Golden Shores, AZ	1,059	50.7	1,030	49.3	286	13.7	291	13.9	778	37.2	734	35.1
Needles, CA	2,375	49.2	2,455	50.8	1,332	27.6	1,152	23.9	1,588	32.9	758	15.7
Native American Reservations												
Colorado River Indian Tribe	4,653	50.6	4,548	49.4	2,643	28.7	2,428	26.4	2,690	29.2	1,440	15.7
Fort Mojave Indian Tribe	522	50.0	521	50.0	334	32.0	272	26.1	293	28.1	144	13.8
Chemehuevi	171	49.6	174	50.4	91	26.4	56	16.2	117	33.9	81	23.5
Counties												
La Paz, AZ	10,123	51.3	9,592	48.7	4,159	21.1	3,987	20.2	6,481	32.9	5,088	25.8
Mohave, AZ	77,099	49.7	77,933	50.3	35,860	23.1	35,359	22.8	52,085	33.6	31,728	20.5
Riverside, CA	769,384	49.8	776,003	50.2	468,691	30.3	470,874	30.5	409,858	26.5	195,964	12.7
San Bernardino, CA	853,024	49.9	856,410	50.1	552,047	32.3	557,829	32.6	453,099	26.5	146,459	8.6
Clark, NV	699,728	50.9	676,037	49.1	351,770	25.6	465,350	33.8	411,746	29.9	146,899	10.7
States												
Arizona	2,561,057	49.9	2,569,575	50.1	1,366,947	26.6	1,649,453	32.1	1,446,393	28.2	667,839	13.0
California	16,874,892	49.8	16,996,756	50.2	9,249,829	27.3	11,409,835	33.7	9,616,326	28.4	3,595,658	10.6
Nevada	1,018,051	50.9	980,206	49.1	511,799	25.6	652,229	32.6	615,300	30.8	218,929	11.0

Source: U.S. Census Bureau 2000

Table 9-8
Households and Average Household Size, 2000

Communities	Households	Average Household Size
Bullhead City, AZ	13,909	2.42
Lake Havasu, AZ	17,911	2.32
Mesquite Creek, AZ	106	1.93
Mojave Ranch Estates, AZ	6	4.67
Mojave Valley, AZ	5,217	2.61
Parker, AZ	1,064	2.93
Topock and Golden Shores, AZ	1,028	1.95 - 2.10
Needles, CA	1,940	2.48
Native American Reservations		
Colorado River Indian Tribe	3,271	2.73
Fort Mojave Indian Tribe	337	3.04
Chemehuevi	157	2.2
Counties		
La Paz, AZ	8,362	2.32
Mohave, AZ	62,809	2.45
Riverside, CA	506,218	2.98
San Bernardino, CA	528,594	3.15
Clark, NV	512,253	2.65
States		
Arizona	1,901,327	2.64
California	11,502,870	2.87
Nevada	751,165	2.62

Source: U.S. Census Bureau 2000

Unemployment percentages, taken as a percent of the civilian labor force, are greatest on the CRIT Reservation (9.6%), with the neighboring community of Parker also exhibiting a relatively high percentage of 8.5%. Topock and Golden Shores also exhibit a high proportion of unemployed residents at 9.4%. These figures exceed proportions seen among the counties and states included in the table, although San Bernardino and La Paz counties have percentages of 8.0% or higher. It should be noted that the Chemehuevi and FMIT reservations also exhibit proportions of unemployed workers higher than other communities in the ROI, at 8.5% and 7.2%, respectively.

Occupations within the communities and Native American reservations within the ROI are typically concentrated in the service fields, with the communities of Bullhead City, Mojave Ranch Estates, Topock and Golden Shores, Needles, and all three Native American reservations exhibiting the highest percentages in this occupation grouping. Other communities have substantial proportions of residents in the service field, although the highest proportion is in the sales and office fields. These communities include Lake Havasu City, Mesquite Creek, Mohave Valley, and Parker. Despite the prevalence of farmland in the region, occupations in farming are not heavily concentrated in any one community[2], although higher proportions are seen among the Native American reservations in the ROI. This trend may be attributable to seasonal variation in agricultural labor eluding the U.S. Census, or it may be attributable to the type of agriculture in the region, which may not be especially labor intensive.

Industries among the communities and Native American reservations within the ROI are typically concentrated in the arts, entertainment, recreation, accommodation, and food service. The highest proportion of employees in these fields is in Bullhead City, although high proportions are also seen in Mojave Ranch Estates, Mesquite Creek, Topock and Golden Shores, and the Chemehuevi reservation. In those communities where arts, entertainment, recreation, accommodation, and food service are not the primary industries, educational, health, and social services tend to be the primary industries. This is true for Lake Havasu City, Parker, Needles, and the CRIT reservation. It should also be noted that retail trade, while not the primary industry in any community or Native American reservation, comprises a substantial proportion of employed residents in much of the ROI. The majority of the workers in the ROI are considered private wage and salary workers, although higher proportions of government workers are generally located on the Native American reservations included in the ROI, as well as the community of Parker (which neighbors the CRIT reservation).

Income

Table 9-10 presents the household income and median household income for the communities and Native American reservations within the ROI, as well as the surrounding counties and states. Exhibit 9-2 presents a graphical representation of the distribution of household income across the various geographies, with the exception of Mojave Ranch Estates. As can be seen in Table 9-11 and Exhibit 9-2, the proportion of those household incomes over $100,000 within the communities and Native American reservations is typically less than what is seen statewide in Arizona, California, and Nevada. The counties of Riverside, San Bernardino, and Clark also demonstrate high proportions of residents earning over $100,000, although La Paz and Mohave counties have proportions similar to many of the communities and Native American reservations included in the ROI. Exhibit 9-2 suggests that, of the communities and Native American reservations included, the proportions of residents earning between $10,000 and $49,999 are typically greater than those seen in the surrounding counties and states. The median household income for the communities and Native American reservations within the ROI ranges from $19,750 on the Chemehuevi reservation, to $42,917 in Mojave Ranch Estates. The highest median household income for a community of more than 1,000 households is Lake Havasu City ($36,499), while the lowest is in the Topock and Golden Shores area ($24,968).

Per capita income and poverty information is presented for the communities and Native American reservations in Table 9-11. The table also includes information for the surrounding counties and the states as a whole. On the whole, per capita income among the communities in the ROI is lower than the state averages, as are the averages

[2] With the exception of Mojave Ranch Estates, which exhibits a proportion of 23.5%. The small size of this community, however, overstates relative percentages.

Table 9-9a
Labor Force Characteristics, 2000

Subject	COMMUNITIES																NATIVE AMERICAN RESERVATIONS					
	Bullhead City, AZ		Lake Havasu, AZ		Mesquite Creek, AZ		Mojave Ranch Estates, AZ		Mojave Valley, AZ		Parker, AZ		Topock and Golden Shores, AZ		Needles, CA		CRIT		FMIT		Chemehuevi	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Employment Status																						
Population 16 Years and Over	27,092	100.0	34,720	100.0	223	100.0	19	100.0	10,613	100.0	2,244	100.0	1,881	100.0	3,687	100.0	6,852	100.0	704	100.0	240	100.0
In Labor Force	15,313	56.5	17,513	50.4	72	32.3	17	89.5	6,038	56.9	1,571	70.0	709	37.7	1,848	50.1	3,779	55.2	391	55.5	141	58.8
Civilian Labor Force	15,313	56.5	17,496	50.4	72	32.3	17	89.5	6,038	56.9	1,568	69.9	709	37.7	1,837	49.8	3,776	55.1	391	55.5	141	58.8
Employed	14,321	52.9	16,536	47.6	69	30.9	17	89.5	5,687	53.6	1,434	63.9	642	34.1	1,728	46.9	3,413	49.8	363	51.6	129	53.8
Unemployed	992	3.7	960	2.8	3	1.3	0	0.0	351	3.3	134	6.0	67	3.6	109	3.0	363	5.3	28	4.0	12	5.0
Percent of Civilian Labor Force		6.5		5.5		4.2		0.0		5.8		8.5		9.4		5.9		9.6		7.2		8.5
Armed Forces	0	0.0	17	0.0	0	0.0	0	0.0	0	0.0	3	0.1	0	0.0	11	0.3	3	0.0	0	0.0	0	0.0
Not in Labor Force	11,779	43.5	17,207	49.6	151	67.7	2	10.5	4,575	43.1	673	30.0	1,172	62.3	1,839	49.9	3,073	44.8	313	44.5	99	41.3
Occupation																						
Management and Professional	2,373	16.6	3,784	22.9	16	23.2	6	35.3	1,027	18.1	405	28.2	106	16.5	385	22.3	768	22.5	68	18.7	18	14.0
Service	5,498	38.4	3,089	18.7	16	23.2	7	41.2	1,502	26.4	350	24.4	205	31.9	539	31.2	837	24.5	102	28.1	52	40.3
Sales and Office	3,839	26.8	5,141	31.1	32	46.4	0	0.0	1,745	30.7	354	24.7	164	25.5	283	16.4	830	24.3	91	25.1	25	19.4
Farming, Fishing, and Forestry	83	0.6	14	0.1	0	0.0	4	23.5	40	0.7	36	2.5	0	0.0	0	0.0	233	6.8	24	6.6	4	3.1
Construction, Extraction, and Maintenance	1,437	10.0	2,295	13.9	2	2.9	0	0.0	753	13.2	126	8.8	88	13.7	214	12.4	304	8.9	39	10.7	11	8.5
Production, Transportation, and Material Moving	1,091	7.6	2,213	13.4	3	4.3	0	0.0	620	10.9	163	11.4	79	12.3	307	17.8	441	12.9	39	10.7	19	14.7
Industry																						
Agriculture, Forestry, Fishing and Hunting, and Mining	108	0.8	52	0.3	0	0.0	7	41.2	89	1.6	59	4.1	2	0.3	8	0.5	361	10.6	41	11.3	0	0.0
Construction	902	6.3	1,752	10.6	3	4.3	0	0.0	593	10.4	54	3.8	76	11.8	79	4.6	177	5.2	33	9.1	4	3.1
Manufacturing	300	2.1	1,529	9.2	5	7.2	0	0.0	173	3.0	58	4.0	21	3.3	32	1.9	127	3.7	8	2.2	4	3.1
Wholesale Trade	140	1.0	328	2.0	0	0.0	0	0.0	167	2.9	12	0.8	3	0.5	13	0.8	36	1.1	0	0.0	3	2.3
Retail Trade	1,780	12.4	2,717	16.4	12	17.4	0	0.0	844	14.8	146	10.2	74	11.5	160	9.3	392	11.5	28	7.7	6	4.7
Transportation and Warehousing, and Utilities	404	2.8	965	5.8	3	4.3	0	0.0	455	8.0	87	6.1	46	7.2	270	15.6	166	4.9	15	4.1	11	8.5
Information	235	1.6	263	1.6	0	0.0	0	0.0	54	0.9	23	1.6	7	1.1	7	0.4	46	1.3	10	2.8	0	0.0
Finance, Insurance, Real Estate, and Rental/Leasing	575	4.0	1,117	6.8	9	13.0	3	17.6	235	4.1	73	5.1	9	1.4	65	3.8	104	3.0	15	4.1	22	17.1
Professional, Scientific, Management, Administrative, and Waste Management Services	524	3.7	994	6.0	3	4.3	0	0.0	254	4.5	40	2.8	35	5.5	70	4.1	130	3.8	7	1.9	3	2.3
Educational, Health, and Social Services	1,530	10.7	2,588	15.7	7	10.1	0	0.0	807	14.2	362	25.2	72	11.2	472	27.3	671	19.7	39	10.7	16	12.4
Arts, Entertainment, Recreation, Accommodation, and Food Service	6,899	48.2	2,483	15.0	27	39.1	7	41.2	1,595	28.0	254	17.7	217	33.8	375	21.7	631	18.5	105	28.9	46	35.7
Other Services (except Public Administration)	606	4.2	990	6.0	0	0.0	0	0.0	193	3.4	63	4.4	38	5.9	76	4.4	148	4.3	15	4.1	2	1.6
Public Administration	318	2.2	758	4.6	0	0.0	0	0.0	228	4.0	203	14.2	42	6.5	101	5.8	424	12.4	47	12.9	12	9.3
Class of Worker																						
Private Wage and Salary	12,318	86.0	12,878	77.9	67	97.1	14	82.4	4,621	81.3	806	56.2	513	79.9	1,281	74.1	2,058	60.3	283	78.0	73	56.6
Government	1,228	8.6	2,066	12.5	2	2.9	3	17.6	703	12.4	554	38.6	91	14.2	365	21.1	1,117	32.7	77	21.2	41	31.8
Self-employed	722	5.0	1,528	9.2	0	0.0	0	0.0	344	6.0	72	5.0	35	5.5	82	4.7	227	6.7	3	0.8	15	11.6
Unpaid Family	53	0.4	64	0.4	0	0.0	0	0.0	19	0.3	2	0.1	3	0.5	0	0.0	11	0.3	0	0.0	0	0.0

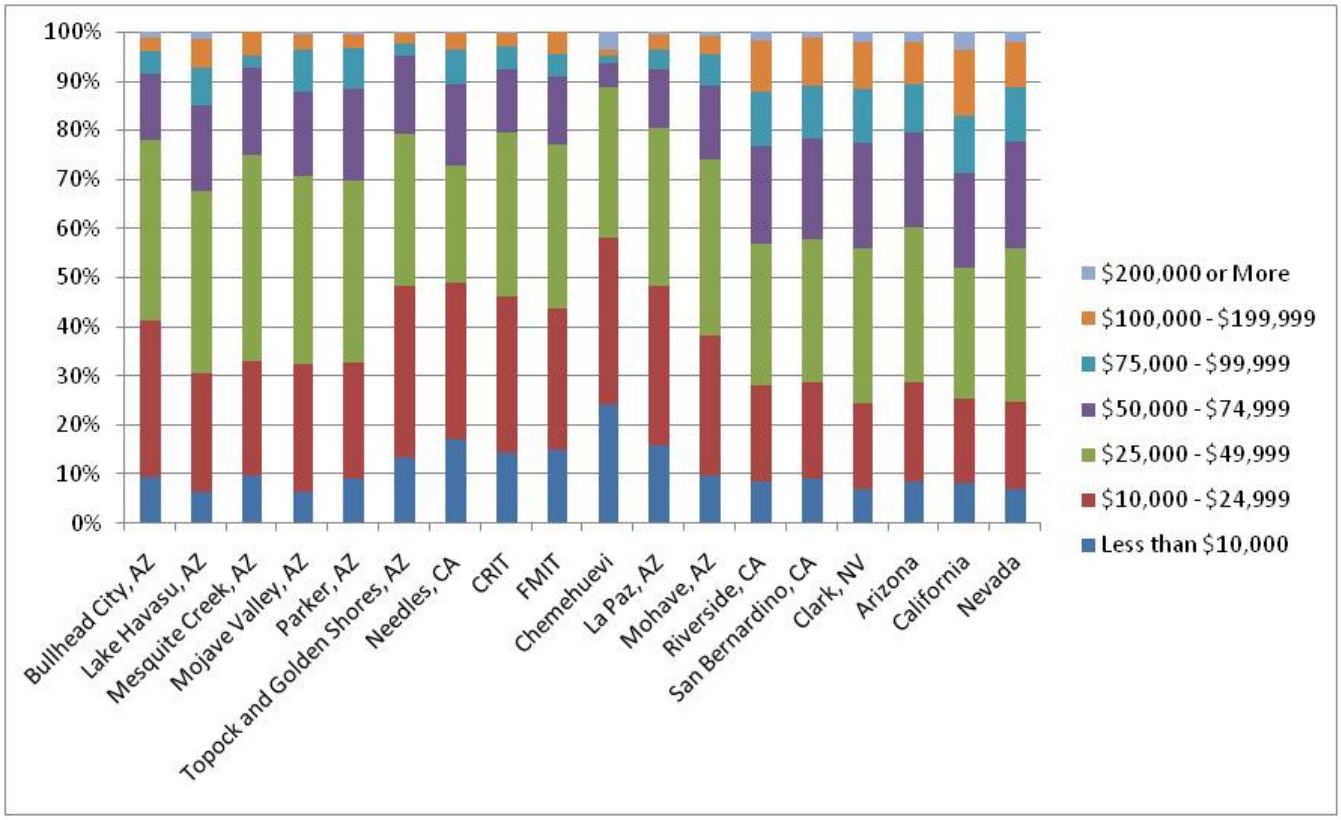
Source: U.S. Census Bureau 2000

Table 9-9b
Labor Force Characteristics, 2000

Subject	COUNTIES										STATES					
	La Paz, AZ		Mohave, AZ		Riverside, CA		San Bernardino, CA		Clark, NV		Arizona		California		Nevada	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Employment Status																
Population 16 Years and Over	16,134	100.0	123,257	100.0	1,124,807	100.0	1,214,368	100.0	1,058,120	100.0	3,907,229	100.0	25,596,144	100.0	1,538,516	100.0
In Labor Force	7,142	44.3	65,081	52.8	654,387	58.2	735,589	60.6	688,917	65.1	2,387,139	61.1	15,977,879	62.4	1,003,293	65.2
Civilian Labor Force	7,139	44.2	65,048	52.8	651,952	58.0	721,185	59.4	682,073	64.5	2,366,372	60.6	15,829,202	61.8	995,200	64.7
Employed	6,567	40.7	60,517	49.1	602,856	53.6	661,272	54.5	637,339	60.2	2,233,004	57.2	14,718,928	57.5	933,280	60.7
Unemployed	572	3.5	4,531	3.7	49,096	4.4	59,913	4.9	44,734	4.2	133,368	3.4	1,110,274	4.3	61,920	4.0
Percent of Civilian Labor Force		8.0		7.0		7.5		8.3		6.6		5.6		7.0		6.2
Armed Forces	3	0.0	33	0.0	2,435	0.2	14,404	1.2	6,844	0.6	20,767	0.5	148,677	0.6	8,093	0.5
Not in Labor Force	8,992	55.7	58,176	47.2	470,420	41.8	478,779	39.4	369,203	34.9	1,520,090	38.9	9,618,265	37.6	535,223	34.8
Occupation																
Management and Professional	1,565	23.8	12,366	20.4	167,739	27.8	186,096	28.1	155,520	24.4	730,001	32.7	5,295,069	36.0	239,717	25.7
Service	1,537	23.4	15,237	25.2	105,446	17.5	104,728	15.8	171,589	26.9	362,547	16.2	2,173,874	14.8	229,795	24.6
Sales and Office	1,562	23.8	16,892	27.9	163,095	27.1	180,447	27.3	177,727	27.9	636,970	28.5	3,939,383	26.8	257,647	27.6
Farming, Fishing, and Forestry	349	5.3	261	0.4	9,499	1.6	3,040	0.5	653	0.1	13,893	0.6	196,695	1.3	2,499	0.3
Construction, Extraction, and Maintenance	726	11.1	7,989	13.2	70,974	11.8	74,519	11.3	71,502	11.2	245,578	11.0	1,239,160	8.4	106,600	11.4
Production, Transportation, and Material Moving	828	12.6	7,772	12.8	86,103	14.3	112,442	17.0	60,348	9.5	244,015	10.9	1,874,747	12.7	97,022	10.4
Industry																
Agriculture, Forestry, Fishing and Hunting, and Mining	575	8.8	602	1.0	13,063	2.2	5,934	0.9	1,724	0.3	32,676	1.5	282,717	1.9	14,938	1.6
Construction	387	5.9	5,849	9.7	55,751	9.2	49,517	7.5	62,115	9.7	193,464	8.7	915,023	6.2	86,327	9.2
Manufacturing	314	4.8	4,266	7.0	72,837	12.1	84,166	12.7	23,478	3.7	228,590	10.2	1,930,141	13.1	45,794	4.9
Wholesale Trade	81	1.2	1,308	2.2	21,400	3.5	27,174	4.1	15,064	2.4	73,441	3.3	596,309	4.1	25,121	2.7
Retail Trade	834	12.7	8,328	13.8	76,466	12.7	84,460	12.8	71,237	11.2	273,864	12.3	1,641,243	11.2	105,382	11.3
Transportation and Warehousing, and Utilities	324	4.9	3,476	5.7	31,683	5.3	46,776	7.1	32,410	5.1	111,186	5.0	689,387	4.7	48,102	5.2
Information	114	1.7	978	1.6	13,956	2.3	14,961	2.3	14,464	2.3	62,577	2.8	577,463	3.9	20,969	2.2
Finance, Insurance, Real Estate, and Rental/Leasing	236	3.6	2,770	4.6	34,348	5.7	36,860	5.6	43,631	6.8	175,311	7.9	1,016,916	6.9	60,216	6.5
Professional, Scientific, Management, Administrative, and Waste Management Services	309	4.7	3,133	5.2	51,577	8.6	50,726	7.7	58,783	9.2	229,660	10.3	1,711,625	11.6	82,172	8.8
Educational, Health, and Social Services	1,069	16.3	9,070	15.0	113,407	18.8	140,063	21.2	74,923	11.8	402,183	18.0	2,723,928	18.5	119,967	12.9
Arts, Entertainment, Recreation, Accommodation, and Food Service	1,229	18.7	15,020	24.8	59,131	9.8	49,494	7.5	191,596	30.1	225,129	10.1	1,204,211	8.2	245,679	26.3
Other Services (except Public Administration)	265	4.0	2,980	4.9	30,166	5.0	34,428	5.2	24,656	3.9	103,305	4.6	761,154	5.2	36,742	3.9
Public Administration	830	12.6	2,737	4.5	29,071	4.8	36,713	5.6	23,258	3.6	121,618	5.4	668,811	4.5	41,871	4.5
Class of Worker																
Private Wage and Salary	4,058	61.8	47,911	79.2	456,252	75.7	493,910	74.7	541,158	84.9	1,743,777	78.1	11,257,393	76.5	769,055	82.4
Government	1,921	29.3	7,934	13.1	93,494	15.5	118,500	17.9	68,189	10.7	339,554	15.2	2,158,071	14.7	116,296	12.5
Self-employed	577	8.8	4,435	7.3	50,874	8.4	46,468	7.0	26,614	4.2	143,564	6.4	1,249,530	8.5	45,578	4.9
Unpaid Family	11	0.2	237	0.4	2,236	0.4	2,394	0.4	1,378	0.2	6,109	0.3	53,934	0.4	2,351	0.3

Source: U.S. Census Bureau 2000

for the counties included in Table 9-12. Excluding the small population in Mojave Ranch Estates, the per capita incomes among the communities range from $15,016 in Parker to $20,517 in Mesquite Creek. For those communities with more than 1,000 residents, the highest per capita income is in Lake Havasu City, at $20,403. In all cases, per capita income among those living on Native American reservations is lower than the outside communities in the ROI, ranging from $12,621 on the CRIT reservation to $13,130 on the Chemehuevi reservation. The proportion of those with incomes below the poverty level also is generally greater on the Native American reservations included in the ROI, ranging from 21.8% on the CRIT reservation to 30.7% on the Chemehuevi reservation. The City of Needles also has a relatively high proportion of residents with income below poverty, at 26.1%. In general, the percentage of residents with income below the poverty level is similar to those seen by the surrounding counties as a whole, which range from 10.8% in Clark to 19.6% in La Paz.



Source: U.S. Census Bureau 2000

Household Income, 2000 **Exhibit 9-2**

Table 9-10
Household Income and Median Household Income, 1999

Communities	Less than $10,000		$10,000 - $24,999		$25,000 - $49,999		$50,000 - $74,999		$75,000 - $99,999		$100,000 - $199,999		$200,000 or More		Median Household Income
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Bullhead City, AZ	1,304	9.4	4,430	31.9	5,100	36.7	1,868	13.4	650	4.7	400	2.9	150	1.1	$30,221
Lake Havasu, AZ	1,127	6.3	4,317	24.2	6,599	37.0	3,119	17.5	1,377	7.7	1,033	5.8	265	1.5	$36,499
Mesquite Creek, AZ	12	9.7	29	23.4	52	41.9	22	17.7	3	2.4	6	4.8	0	0.0	$33,125
Mojave Ranch Estates, AZ	0	0.0	0	0.0	5	100.0	0	0.0	0	0.0	0	0.0	0	0.0	$42,917
Mojave Valley, AZ	334	6.4	1,362	25.9	2,007	38.2	911	17.4	449	8.6	159	3.0	28	0.5	$34,321
Parker, AZ	97	9.1	251	23.6	391	36.8	198	18.6	88	8.3	32	3.0	5	0.5	$34,625
Topock and Golden Shores, AZ	143	13.5	370	34.9	325	30.7	169	16.0	27	2.5	21	2.0	4	0.4	$26,848 - $24,968
Needles, CA	340	17.2	625	31.6	474	24.0	324	16.4	141	7.1	68	3.4	5	0.3	$26,108
Native American Reservations															
Colorado River Indian Tribe	474	14.5	1,036	31.6	1,097	33.5	421	12.8	152	4.6	89	2.7	9	0.3	$27,354
Fort Mojave Indian Tribe	51	14.9	99	28.9	114	33.3	47	13.7	15	4.4	16	4.7	0	0.0	$26,875
Chemehuevi	34	24.1	48	34.0	43	30.5	7	5.0	2	1.4	2	1.4	5	3.5	$19,750
Counties															
La Paz, AZ	1,329	15.8	2,715	32.4	2,701	32.2	997	11.9	345	4.1	256	3.1	49	0.6	$25,839
Mohave, AZ	6,123	9.8	17,960	28.6	22,307	35.5	9,529	15.2	3,906	6.2	2,350	3.7	621	1.0	$31,521
Riverside, CA	43,183	8.5	99,596	19.7	145,501	28.7	100,840	19.9	56,058	11.1	51,793	10.2	9,810	1.9	$42,887
San Bernardino, CA	47,943	9.1	103,603	19.6	154,752	29.3	107,689	20.4	56,907	10.8	50,952	9.6	6,993	1.3	$42,066
Clark, NV	36,317	7.1	89,725	17.5	160,201	31.2	110,363	21.5	57,155	11.1	48,137	9.4	10,816	2.1	$44,616
States															
Arizona	163,221	8.6	385,162	20.3	598,502	31.5	365,024	19.2	184,026	9.7	166,994	8.8	38,696	2.0	$40,558
California	967,089	8.4	1,967,026	17.1	3,061,046	26.6	2,202,873	19.1	1,326,569	11.5	1,577,866	13.7	409,551	3.6	$47,493
Nevada	53,981	7.2	131,955	17.5	234,466	31.2	163,415	21.7	83,304	11.1	68,976	9.2	15,880	2.1	$44,581

Source: U.S. Census Bureau 2000

Table 9-11
Per Capita Income and Low-Income Residents, 1999

Communities	Per Capita Income	Income Below Poverty Level	
Bullhead City, AZ	$16,250	5,074	15.1%
Lake Havasu, AZ	$20,403	3,946	9.5%
Mesquite Creek, AZ	$20,517	15	6.7%
Mojave Ranch Estates, AZ	$8,359	0	0.0%
Mojave Valley, AZ	$16,287	1,473	11.0%
Parker, AZ	$15,016	460	14.7%
Topock and Golden Shores, AZ	$16,372 - $16,006	315	14.9%
Needles, CA	$15,156	1,263	26.1%
Native American Reservations			
Colorado River Indian Tribe	$12,621	1,939	21.8%
Fort Mojave Indian Tribe	$12,776	228	22.6%
Chemehuevi	$13,130	100	30.7%
Counties			
La Paz, AZ	$14,916	3,798	19.6%
Mohave, AZ	$16,788	21,252	13.9%
Riverside, CA	$18,689	214,084	14.2%
San Bernardino, CA	$16,856	263,412	15.8%
Clark, NV	$21,785	145,855	10.8%
States			
Arizona	$20,275	698,669	13.9%
California	$22,711	4,706,130	14.2%
Nevada	$21,989	205,685	10.5%

Source: U.S. Census Bureau 2000

Table 9-12
Annual Output and Employment by Sector for the Five-County Region, 2008

Industry Sector	Output		Employment	
	$ Millions	Percent	Jobs	Percent
Agriculture, Forestry, Fishing, and Hunting	$3,119	0.8	22,708	0.8
Mining	$1,201	0.3	3,460	0.1
Utilities	$6,447	1.7	8,927	0.3
Construction	$37,337	10.0	247,583	8.7
Manufacturing	$52,802	14.2	145,855	5.1
Wholesale Trade	$15,240	4.1	90,874	3.2
Retail Trade	$25,058	6.7	338,248	11.9
Transportation and Warehousing	$14,824	4.0	113,833	4.0
Information	$11,756	3.2	32,649	1.1
Finance and Insurance	$17,247	4.6	92,329	3.2
Real Estate and Rental	$43,600	11.7	179,728	6.3
Professional, Scientific, and Technical Services	$16,306	4.4	126,129	4.4
Management	$5,570	1.5	23,255	0.8
Administrative and Waste Services	$12,358	3.3	200,361	7.0
Educational Services	$1,658	0.4	28,255	1.0
Health and Social Services	$20,089	5.4	214,550	7.5
Arts, Entertainment, and Recreation	$10,172	2.7	91,865	3.2
Accommodation and Food Services	$31,032	8.3	343,650	12.01
Other	$10,585	2.8	152,738	5.4
Government	$35,294	9.5	396,852	13.9
Total	**$371,697**	**100.0**	**2,854,108**	**100.0**

Source: IMPLAN 2009

Regional Economic Base

Existing regional annual economic output and employment information for the project area is summarized in Table 9-12. This regional area includes the counties immediately surrounding the project area (San Bernardino and Mohave), as well as neighboring counties that may experience regional economic effects due to changes in employment or increased economic output (Riverside, La Paz, and Clark). The data in these tables are derived from an IMPLAN input-output model existing conditions dataset, as the IMPLAN input-output model itself will be used in the subsequent regional economic base impact analysis to provide an estimate of the direct, indirect, and induced impacts that may accrue to the regional economy as a result of the construction and operation of the proposed project components.[3] The employment data presented in these tables are more recent than what is presented above for the communities in the and Native American reservations in the ROI; however, these data

[3] IMPLAN uses region-specific input/output accounts by industry to estimate the impacts of economic stimuli. The data which from the foundation of the IMPLAN model include national-level technology matrices, as well as estimates of regional institutional demand and transfers, industry output, employment, and value-added multipliers for each county.

combine the employment figures among the five counties included in the region and produce an overall description of the regional economic base that is not specific to individual communities.

As can be seen in Table 9-12, the total economic output for the five-county area was estimated to be just over $371 billion in 2008. The three largest industry sectors (in terms of output) include manufacturing, real estate and rental, and construction (14.2, 11.7, and 10.0%, respectively). The government and accommodation/food services industries in the five-county area also are relatively large, accounting for 9.5% and 8.3%, respectively, of the regional economy in terms of output. Local, state, federal, and tribal governments are the largest employers in the five-county area, accounting for 13.9% of all employment. Other industry sectors with high employment figures include accommodation/food services (12.0%), retail trade (11.9%), and construction (8.7%). The construction industry in the five-county area accounts for just over $37.3 billion of the total economic output, and approximately 247,000 workers. The utility industry accounts for approximately $6.4 billion in total output, with just over 8,900 employees (0.3% of all employment).

9.2.2 REGULATORY BACKGROUND

A number of federal, state and regional regulations have been developed to include socioeconomic analyses in the project decision-making process. The most applicable set of federal legislation with respect to the project area is the Federal Land Policy and Management Act (FLPMA). State guidance includes the CEQA policies regarding socioeconomic and economic impacts. The regional plan that pertains to the proposed project is the *County of San Bernardino 2007 General Plan*. These plans, policies and regulations are summarized below. Note that this section cites federal law by analogy only because federal law provides a more robust analytical framework a socioeconomic analysis.

9.2.2.1 FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Federal Land Policy and Management Act of 1976, Section 202(c)(2), as amended

Section 202(c)(2) of the FLPMA states that any land use planning decisions made by the Bureau of Land Management should, "use a systematic approach to achieve integration consideration of physical, biological, economic, and other sciences."

Code of Federal Regulations Title 43 Section 1610.4-3; Section 1610.4-6

Section 1610.4-3 of the Code of Federal Regulations Title 43, entitled "Inventory data and information collection," requires that the field managers in the process of resource management planning should, "arrange for resource, environmental, social, economic and institutional data and information to be collected, or assembled if already available." This data should be complied in collaboration with all cooperating agencies. New information collected should emphasize significant issues and decisions with the greatest potential impacts, and should "be collected in a manner that aids application in the planning process, including subsequent monitoring requirements."

Section 1610.6, entitled "Estimation of effects of alternatives," requires that the field manager, "estimate and display the physical, biological, economic, and social effects of implementing each alternative considered in detail." It recommends that the NEPA be used in guiding the planning criteria and procedures.

9.2.2.2 STATE PLANS, POLICIES, REGULATIONS, AND LAWS

California Environmental Quality Act, Section 15131(a)–(c)

Section 15131 states that socioeconomic information may be included in an EIR in whatever form the agency desires; however, socioeconomic effects of a project may not be treated as significant in an EIR. CEQA notes that

socioeconomic effects may only be used as a criteria to judge the significance of environmental effects, stating that, "economic or social effects of a project may be used to determine the significance of physical changes caused by a project."

9.2.2.3 REGIONAL PLANS

County of San Bernardino 2007 General Plan, Economic Development Element

The Economic Development Element of the *County of San Bernardino 2007 General Plan* outlines a number of goals and policies meant to maintain and enhance the economic character of the county while providing for a stable annual budget. Countywide policies within the Economic Development Element with particular relevance to the proposed project include:

- ED 7.2: Provide incentives for extractive industries to use their materials locally, to the extent possible.
- ED 9.5: The County will work with federal land management agencies, such as the National Park Service, U.S. Forest Service and Bureau of Land Management, to promote tourist activities appropriate to the federal lands open to the public that will benefit both the economic development of the County and the health and well being of the landscape and associated natural and cultural resources that attract people to visit [the area].
- ED 10.2: Encourage the expansion of existing businesses and efforts at business retention.
- ED 21.1: Continue to promote identity-building events, such as Route 66 events and other "festival" events.
- ED 24.1: Where there is a clear economic development advantage for the County and local jurisdictions, minimize the fiscalization of land use and develop innovative tax-sharing methods.

Policies within the Desert Region of the Economic Development Element with particular relevance to the proposed project include:

- D/ED 1.1: Support commercial development that is of a size and scale that complements the natural setting, is compatible with surrounding development and enhances the rural character.

9.2.3 SOCIOECONOMIC EFFECTS

9.2.3.1 ANALYSIS METHODOLOGY

Socioeconomic effects from implementation of the proposed project are evaluated by addressing how impacts to the physical environment may affect the socioeconomics of the area, as well as addressing how socioeconomic effects associated with the proposed project may affect the physical environment. For this particular project, changes associated with increased economic output and employment will be assessed for the surrounding region of influence, as identified in Section 9.2.1, for the construction, operation and maintenance, and decommissioning phases of the proposed project and project alternatives. These modeled outputs will be analyzed as to their respective affects on population and housing within the region.

The analysis presented in this section is based upon value analyses estimates provided by PG&E in December 2009, modeled outputs provided by the IMPLAN economic modeling software, and the demographic and socioeconomic data sources presented in Section 9.2.1.

The proposed project would provide a modest economic benefit to the surrounding region, which may attract new residents resulting in some indirect growth. The magnitude of this growth is analyzed in the following pages,

based on the projected direct, indirect, and induced economic output and employment for the proposed project components.

The transformation of modeled total economic output and employment into quantitative values is meaningful in the estimation of population and housing effects and is based on the following key underlying assumptions:

- Each projected job resulting from the proposed project is anticipated to produce two new residents within the ROI. This estimate is likely somewhat high, as many projected jobs are relatively low-skill and could be filled by existing residents. Regardless, a ratio of 1:2 provides for a cautious analysis of growth in the region as a result of increased economic activity.

- Each projected job resulting from the proposed project is anticipated to require one housing unit within the ROI. Again, this estimate is likely somewhat high, as many projected jobs are relatively low-skill and could be filled by existing residents in existing housing. Regardless, a ration of 1:1 provides for a cautious analysis of growth in the region as a result of increased economic activity.

- An indicator for substantial population growth is a 3.5% annual increase for any one year. This amount is slightly higher than the projected annual average for population growth of San Bernardino County between 2000 and 2010 (2.6%) (CDF 2007), but slightly lower than the projected annual average for population growth of Mohave County for the same years (4.3%) (U.S. Census Bureau 2000, Arizona Department of Commerce 2006).

- An indication of employment and housing need is a 1.8% annual increase for any one year. This amount was established through the application of the ratios assumed above to the indicators for substantial population growth.

The proposed project includes the construction, operation, and decommissioning of a mix of different facilities, including remediation wells (in situ reactive zone [IRZ], injection, and extraction), storage facilities, monitoring wells, water conveyance pipelines, and access roads. The proposed project also includes the decommissioning of IM-3 and monitoring activities throughout the remediation phase. For the purposes of the socioeconomic analysis of the proposed project, the Alternative E cost summary was used to provide the economic modeling inputs for the impact model (CH2M Hill 2009). It should be noted that, while other analyses throughout Chapter 4 analyze the proposed project based on its maximum possible extent so as to fully capture all possible project-related impacts, the price figures used in this section are mid-range values and are based on PG&E's *anticipated* extent of the proposed project (this is what is portrayed in Exhibit 3-4). Depending on the ultimate extent of the amount of facilities need for they proposed project, socioeconomic impacts may differ from what is presented in this analysis. However, even assuming the maximum extent of the proposed project facilities, anticipated effects to the socioeconomics of the region are not anticipated to be substantial and the analysis presented here provides an adequate characterization of effects.

9.2.3.2 IMPACT ANALYSIS

Construction of these facilities that are included within the proposed project (as described in Chapter 3, "Project Description") is anticipated to occur over approximately 3 years and cost an estimated $51.5 million. The operation and maintenance of the proposed project over the first 30 years is anticipated to cost an estimated $4.0 million per year, with additional monitoring (years 31–40) costing an estimated $0.9 million per year. Decommissioning, which is anticipated to take approximately 1 year and cost an estimated $7.3 million, would occur in year 41. Because the level of effort varies greatly from construction, operation and maintenance, and decommissioning, it is necessary to present each stage separately in this analysis.

Despite some modest economic benefits associated with the proposed project, substantial socioeconomic effects are not anticipated for the ROI. The vast majority of economic benefit is expected to occur during the construction

phase, but these impacts are expected to be short-term. Long-term economic effects associated with operation and maintenance of the proposed project are anticipated to be relatively modest compared with the economic output of the surrounding region. Employment associated the operation and maintenance of the proposed project would also be modest, resulting little change to population and housing, and well below projected growth for the region.

Construction of the Proposed Project

Cost estimates provided by PG&E, along with standard ratios of employment for the region per employment sector embedded in the IMPLAN model, estimate that approximately $14.5 million would be spent on well installation, $2.0 million would be spent on the decommissioning of IM-3, $11.3 million would be spent on pipelines and other conveyance infrastructure, $62,000 would be spent on access roads, and $23.7 million would be spent on a mix of construction personnel, project management, operations, and monitoring.[4] A total of 155 jobs are directly modeled as part of the construction of the proposed project. Table 9-13 presents the anticipated direct, indirect, and induced output and employment associated with the proposed project.

Approximately $21.9 million is anticipated to be directly produced annually by the proposed project, with $17.1 million anticipated in the professional, scientific, and technical services, $2.7 million in the mining industry, and $2.1 million in construction. The total anticipated output is approximately $39.5 million, with real estate, professional services, and health and social service industries being the most affected by indirect and induced economic activity. The indirect and induced employment effects resulting from construction of the proposed project include small gains in retail trade, administrative and waste services, and professional services. A total of approximately 295 new jobs are anticipated as a result of the construction of the proposed project.

The total output and employment figures are spread over the entire ROI, however, and the increases described above do not account for a perceivable increase for the economy of the ROI in total. In fact, the only noticeable increase occurs for the mining and professional services industries, with projected output increasing the regional total for those industries by 0.2% and 0.1%, respectively. Projected employment also increases the regional total for those industries by the same proportion.

The estimated total number of new residents to the ROI as a result of the construction of the proposed project is approximately 590, which would likely be distributed throughout the five counties included in the ROI. This increase would represent approximately 0.012% growth for the region. According to a 2006 Labor Shed Report, the majority of those employed in the Topock area reside in Bullhead City. In the unlikely event that all new residents associated with proposed project construction chose to reside in Bullhead City, an additional 590 residents would only represent approximately 1.7% growth from 2000 levels. An additional 295 households in Bullhead City would only represent an increase of approximately 2.1% from 2000 levels. These increases are well below the indicator levels established for this project, even in this extremely unlikely case, suggesting that construction of the proposed project would not result in a substantial change to the socioeconomics of the region and would provide modest benefits.

Operations and Maintenance of the Proposed Project

The timeline for the operation of the proposed project would vary depending on the efficiency of the remediation activities, which can be in turn be affected by the complexity of the IRZ well array, volume of the water circulated through the system, and overall scale of the effort. The current estimates are that operation and maintenance of the proposed project would occur for approximately 30 years, with an additional 10 years of monitoring. For the purposes of this analysis, one full year of operation and maintenance activity was modeled, as well as one year of monitoring. Subsequent years of operation and maintenance/monitoring past the modeled year are anticipated to result in similar levels of changes until full remediation is achieved and operations cease.

[4] These figures assume that $10.3 million in contingency is spread proportionally among all major categories.

Table 9-13
Construction of Proposed Project, Modeled Annual Output and Employment Impacts

Industry Sector	Output						Employment					
	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase
Agriculture, Forestry, Fishing, and Hunting	$3,119	$0.0	$0.0	$0.0	$0.1	0.0%	22,708	0	0	0	0	0.0%
Mining	$1,201	$2.7	$0.0	$0.0	$2.7	0.2%	3,460	7	0	0	7	0.2%
Utilities	$6,447	$0.0	$0.1	$0.2	$0.3	0.0%	8,927	0	0	0	0	0.0%
Construction	$37,337	$2.1	$0.1	$0.1	$2.2	0.0%	247,583	13	1	1	15	0.0%
Manufacturing	$52,802	$0.0	$0.6	$0.8	$1.4	0.0%	145,855	0	1	2	3	0.0%
Wholesale Trade	$15,240	$0.0	$0.3	$0.6	$0.8	0.0%	90,874	0	2	3	5	0.0%
Retail Trade	$25,058	$0.0	$0.1	$1.4	$1.4	0.0%	338,248	0	1	19	19	0.0%
Transportation and Warehousing	$14,824	$0.0	$0.3	$0.3	$0.6	0.0%	113,833	0	2	2	4	0.0%
Information	$11,756	$0.0	$0.4	$0.3	$0.7	0.0%	32,649	0	1	1	2	0.0%
Finance and Insurance	$17,247	$0.0	$0.6	$0.8	$1.4	0.0%	92,329	0	3	4	7	0.0%
Real Estate and Rental	$43,600	$0.0	$0.6	$2.1	$2.7	0.0%	179,728	0	4	5	9	0.0%
Professional, Scientific, and Technical Services	$16,306	$17.1	$2.2	$0.4	$19.7	0.1%	126,129	135	15	3	152	0.1%
Management	$5,570	$0.0	$0.2	$0.1	$0.3	0.0%	23,255	0	1	0	1	0.0%
Administrative and Waste Services	$12,358	$0.0	$0.9	$0.2	$1.1	0.0%	200,361	0	16	3	19	0.0%
Educational Services	$1,658	$0.0	$0.0	$0.1	$0.1	0.0%	28,516	0	0	2	2	0.0%
Health and Social Services	$20,089	$0.0	$0.0	$1.5	$1.5	0.0%	214,550	0	0	16	16	0.0%
Arts, Entertainment, and Recreation	$10,172	$0.0	$0.1	$0.2	$0.3	0.0%	91,865	0	1	3	3	0.0%
Accommodation and Food Services	$31,032	$0.0	$0.5	$0.7	$1.2	0.0%	343,650	0	7	9	17	0.0%
Other	$10,585	$0.0	$0.3	$0.5	$0.7	0.0%	152,738	0	2	8	11	0.0%
Government	$35,294	$0.0	$0.1	$0.2	$0.3	0.0%	396,852	0	1	1	2	0.0%
Total	**$371,697**	**$21.9**	**$7.2**	**$10.4**	**$39.5**	**0.0%**	**2,854,108**	**155**	**58**	**83**	**295**	**0.0%**

Source: IMPLAN 2009

Price estimates provided by PG&E, along with standard ratios of employment for the region per employment sector embedded in the IMPLAN model, estimate that approximately $1.4 million would be spent on new well installation, $1.3 million would be spent on maintenance of facilities, $0.4 million would be spent on monitoring, $0.8 million will be spent on operations and environmental studies, and $2,600 would be spent on road maintenance. [5] A total of 24 jobs are directly modeled as part of the operations and maintenance of the proposed project. Table 9-14 presents the anticipated annual direct, indirect, and induced output and employment under operations of the proposed project.

Approximately $4.0 million is anticipated to be directly produced annually by the proposed project, with $1.4 million anticipated in the mining industry, $1.4 million in construction, and $1.2 million in professional services. The total anticipated annual output is approximately $6.6 million, with real estate and rental industries being the most affected by indirect and induced economic activity. The annual employment effects under the operation of the proposed project include small gains in the retail trade, health and social services, and professional services industries, to name a few. An annual total of just over 44 new jobs is anticipated as a result of the operation and maintenance of the proposed project.

The total output and employment figures are spread over the entire ROI, however, and the increases described above only account for a perceivable increase for the economy of the ROI in the mining sector (0.1% increase). Modest benefits regionally may accrue under operation and maintenance of the proposed project.

The estimated total number of new residents to the ROI as a result of the operations and maintenance of the proposed project is approximately 88, which would likely be distributed throughout the five counties included in the ROI. This increase would represent approximately 0.0018% growth for the region. According to a 2006 Labor Shed Report, the majority of those employed in the Topock area reside in Bullhead City. In the unlikely event that all new residents associated with component operations chose to reside in Bullhead City, an additional 88 residents would only represent approximately 0.3% growth from 2000 levels. An addition 44 households in Bullhead City would only represent an increase of approximately 0.3% from 2000 levels. These increases are well below the indicator levels established for this project, even in this extremely unlikely case, suggesting that operations and maintenance of the proposed project would not result in a substantial change to the socioeconomics of the region.

Effects of the long-term monitoring are even less discernable. Price estimates provided by PG&E, along with standard ratios of employment for the region per employment sector embedded in the IMPLAN model, estimate that approximately $0.5 million would be spent on maintenance, $0.2 million would be spent on monitoring, and $0.2 million would be spent on operations and environmental studies. [6] A total of 7 jobs are directly modeled as part of the operations and maintenance of the proposed project, with an annual total that includes indirect and induced employment of 13 jobs. Table 9-15 presents the anticipated annual direct, indirect, and induced output and employment under operations of the proposed project.

Decommissioning of the Proposed Project

Decommissioning of the proposed project would occur after the approximately 40 years of operation and would last approximately 1 year. It is likely that the socioeconomics of the ROI will change substantially in the coming decades, and the modeled results presented here should be considered to represent the scale and type of changes that may occur from eventual decommissioning. If decommissioning activity lasts beyond one year, a similar level of effect is anticipated to continue annually until decommissioning is complete.

[5] These figures assume that $0.8 million in contingency is spread proportionally among all major categories.
[6] These figures assume that $0.2 million in contingency is spread proportionally among all major categories.

Table 9-14
Operation and Maintenance of Proposed Project, Modeled Annual Output and Employment Impacts

Industry Sector	Output						Employment					
	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase
Agriculture, Forestry, Fishing, and Hunting	$3,119	$0.0	$0.0	$0.0	$0.0	0.0%	22,708	0	0	0	0	0.0%
Mining	$1,201	$1.4	$0.0	$0.0	$1.4	0.1%	3,460	3	0	0	3	0.1%
Utilities	$6,447	$0.0	$0.0	$0.0	$0.0	0.0%	8,927	0	0	0	0	0.0%
Construction	$37,337	$1.4	$0.0	$0.0	$1.4	0.0%	247,583	11	0	0	11	0.0%
Manufacturing	$52,802	$0.0	$0.2	$0.1	$0.3	0.0%	145,855	0	0	0	1	0.0%
Wholesale Trade	$15,240	$0.0	$0.1	$0.1	$0.2	0.0%	90,874	0	0	1	1	0.0%
Retail Trade	$25,058	$0.0	$0.0	$0.2	$0.2	0.0%	338,248	0	1	3	3	0.0%
Transportation and Warehousing	$14,824	$0.0	$0.1	$0.0	$0.1	0.0%	113,833	0	1	0	1	0.0%
Information	$11,756	$0.0	$0.0	$0.0	$0.1	0.0%	32,649	0	0	0	0	0.0%
Finance and Insurance	$17,247	$0.0	$0.1	$0.1	$0.2	0.0%	92,329	0	0	1	1	0.0%
Real Estate and Rental	$43,600	$0.0	$0.1	$0.3	$0.4	0.0%	179,728	0	1	1	1	0.0%
Professional, Scientific, and Technical Services	$16,306	$1.2	$0.3	$0.1	$1.5	0.0%	126,129	10	2	0	12	0.0%
Management	$5,570	$0.0	$0.0	$0.0	$0.1	0.0%	23,255	0	0	0	0	0.0%
Administrative and Waste Services	$12,358	$0.0	$0.1	$0.0	$0.1	0.0%	200,361	0	2	1	2	0.0%
Educational Services	$1,658	$0.0	$0.0	$0.0	$0.0	0.0%	28,516	0	0	0	0	0.0%
Health and Social Services	$20,089	$0.0	$0.0	$0.2	$0.2	0.0%	214,550	0	0	2	2	0.0%
Arts, Entertainment, and Recreation	$10,172	$0.0	$0.0	$0.0	$0.0	0.0%	91,865	0	0	0	1	0.0%
Accommodation and Food Services	$31,032	$0.0	$0.0	$0.1	$0.1	0.0%	343,650	0	1	1	2	0.0%
Other	$10,585	$0.0	$0.0	$0.1	$0.1	0.0%	152,738	0	0	1	2	0.0%
Government	$35,294	$0.0	$0.0	$0.0	$0.1	0.0%	396,852	0	0	0	0	0.0%
Total	**$371,697**	**$4.0**	**$1.1**	**$1.5**	**$6.6**	**0.0%**	**2,854,108**	**24**	**8**	**12**	**44**	**0.0%**

Source: IMPLAN 2009

Table 9-15
Long Term Monitoring of Proposed Project, Modeled Annual Output and Employment Impacts

Industry Sector	Output						Employment					
	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase
Agriculture, Forestry, Fishing, and Hunting	$3,119	$0.0	$0.0	$0.0	$0.0	0.0%	22,708	0	0	0	0	0.0%
Mining	$1,201	$0.0	$0.0	$0.0	$0.0	0.0%	3,460	0	0	0	0	0.0%
Utilities	$6,447	$0.0	$0.0	$0.0	$0.0	0.0%	8,927	0	0	0	0	0.0%
Construction	$37,337	$0.5	$0.0	$0.0	$0.5	0.0%	247,583	4	0	0	4	0.0%
Manufacturing	$52,802	$0.0	$0.0	$0.0	$0.1	0.0%	145,855	0	0	0	0	0.0%
Wholesale Trade	$15,240	$0.0	$0.0	$0.0	$0.0	0.0%	90,874	0	0	0	0	0.0%
Retail Trade	$25,058	$0.0	$0.0	$0.1	$0.1	0.0%	338,248	0	0	1	1	0.0%
Transportation and Warehousing	$14,824	$0.0	$0.0	$0.0	$0.0	0.0%	113,833	0	0	0	0	0.0%
Information	$11,756	$0.0	$0.0	$0.0	$0.0	0.0%	32,649	0	0	0	0	0.0%
Finance and Insurance	$17,247	$0.0	$0.0	$0.0	$0.1	0.0%	92,329	0	0	0	0	0.0%
Real Estate and Rental	$43,600	$0.0	$0.0	$0.1	$0.1	0.0%	179,728	0	0	0	0	0.0%
Professional, Scientific, and Technical Services	$16,306	$0.4	$0.1	$0.0	$0.5	0.0%	126,129	3	1	0	4	0.0%
Management	$5,570	$0.0	$0.0	$0.0	$0.0	0.0%	23,255	0	0	0	0	0.0%
Administrative and Waste Services	$12,358	$0.0	$0.0	$0.0	$0.0	0.0%	200,361	0	1	0	1	0.0%
Educational Services	$1,658	$0.0	$0.0	$0.0	$0.0	0.0%	28,516	0	0	0	0	0.0%
Health and Social Services	$20,089	$0.0	$0.0	$0.1	$0.1	0.0%	214,550	0	0	1	1	0.0%
Arts, Entertainment, and Recreation	$10,172	$0.0	$0.0	$0.0	$0.0	0.0%	91,865	0	0	0	0	0.0%
Accommodation and Food Services	$31,032	$0.0	$0.0	$0.0	$0.0	0.0%	343,650	0	0	0	1	0.0%
Other	$10,585	$0.0	$0.0	$0.0	$0.0	0.0%	152,738	0	0	0	1	0.0%
Government	$35,294	$0.0	$0.0	$0.0	$0.0	0.0%	396,852	0	0	0	0	0.0%
Total	**$371,697**	**$0.9**	**$0.2**	**$0.5**	**$1.6**	**0.0%**	**2,854,108**	**7**	**2**	**4**	**13**	**0.0%**

Source: IMPLAN 2009

Price estimates provided by PG&E, along with standard ratios of employment for the region per employment sector embedded in the IMPLAN model, estimate that approximately $5.2 million on decommissioning of wells, $1.3 million on restoration of the environment, and $0.9 million on decommissioning of roads and small structures.[7] A total of 36 jobs are directly modeled as part of the decommissioning of the proposed project. Table 9-16 presents the anticipated direct, indirect, and induced output and employment under decommissioning of the proposed project.

Approximately $7.3 million is anticipated to be directly produced by the decommissioning of the proposed project, with $5.2 million anticipated in the mining industry, $0.9 million in construction, and $1.3 million in professional services. The total anticipated output is approximately $12.6 million, with real estate and rental industries being the most affected by indirect and induced economic activity. The employment effects under the decommissioning of the proposed project include small gains in the professional services and retail trade, industries, to name a few. A total of approximately 74 new jobs are anticipated as a result of the decommissioning of the proposed project.

The total output and employment figures are spread over the entire ROI, however, and the increases described above only account for a perceivable increase for the economy of the ROI in the mining sector (0.4% increase). Modest benefits regionally may accrue under decommissioning of the proposed project.

The estimated total number of new residents to the ROI as a result of the operations and maintenance of the proposed project is approximately 148, which would likely be distributed throughout the five counties included in the ROI. This increase would represent approximately 0.003% growth for the region. According to a 2006 Labor Shed Report, the majority of those employed in the Topock area reside in Bullhead City. In the unlikely event that all new residents associated with component operations chose to reside in Bullhead City, an additional 148 residents would only represent approximately 0.4% growth from 2000 levels. An addition 74 households in Bullhead City would only represent an increase of approximately 0.5% from 2000 levels. These increases are well below the indicator levels established for this project, even in this extremely unlikely case, suggesting that decommissioning of the proposed project would not result in a substantial change to the socioeconomics of the region.

ALTERNATIVES TO THE PROPOSED PROJECT

As discussed in Chapter 8, the alternatives to the proposed project combine a range of technologies and process options to meet the remediation objectives. The alternatives to the proposed project are based largely on those identified in the Final CMS/FS (CH2M Hill 2009). The alternatives are comprised of a range of common components, including the construction and operation of a groundwater monitoring network, the construction and maintenance of water conveyance and utilities, the construction and maintenance of access roads, and the decommissioning of all alternative features once remediation has been achieved. Depending on the alternative, more or fewer wells, pipes, access roads, and electrical/communication line will be needed. Alternatives F, G and H require the construction of a new treatment plant in the project area, while Alternative I (No Project) requires the continued operation of IM-3. Despite variation in maximum extent, complexity, overall physical disturbance, and the relative number of facilities associated with each alternative, the types of labor and socioeconomic ROI is the same across all project alternatives (and of the proposed project). Table 9-17 presents the budget information for each alternative to the proposed project, by phase (construction, operations and maintenance, and decommissioning, where appropriate), in comparison with the proposed project. The table also presents a graphical indication of the anticipated socioeconomic effect in comparison to the proposed project.

[7] These figures assume that $1.5 million in contingency is spread proportionally among all major categories.

Table 9-16
Decommissioning of Proposed Project, Modeled Annual Output and Employment Impacts

Industry Sector	Output						Employment					
	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase	Existing	Direct	Indirect	Induced	Total Impact	Percent Increase
Agriculture, Forestry, Fishing, and Hunting	$3,119	$0.0	$0.0	$0.0	$0.0	0.0%	22,708	0	0	0	0	0.0%
Mining	$1,201	$5.2	$0.0	$0.0	$5.2	0.4%	3,460	20	0	0	20	0.6%
Utilities	$6,447	$0.0	$0.1	$0.0	$0.1	0.0%	8,927	0	0	0	0	0.0%
Construction	$37,337	$0.9	$0.0	$0.0	$0.9	0.0%	247,583	6	0	0	6	0.0%
Manufacturing	$52,802	$0.0	$0.3	$0.2	$0.5	0.0%	145,855	0	1	0	1	0.0%
Wholesale Trade	$15,240	$0.0	$0.2	$0.1	$0.3	0.0%	90,874	0	1	1	2	0.0%
Retail Trade	$25,058	$0.0	$0.0	$0.3	$0.3	0.0%	338,248	0	1	4	5	0.0%
Transportation and Warehousing	$14,824	$0.0	$0.2	$0.1	$0.2	0.0%	113,833	0	1	1	2	0.0%
Information	$11,756	$0.0	$0.1	$0.1	$0.2	0.0%	32,649	0	0	0	1	0.0%
Finance and Insurance	$17,247	$0.0	$0.4	$0.2	$0.5	0.0%	92,329	0	2	1	3	0.0%
Real Estate and Rental	$43,600	$0.0	$0.3	$0.5	$0.8	0.0%	179,728	0	1	1	3	0.0%
Professional, Scientific, and Technical Services	$16,306	$1.3	$0.6	$0.1	$2.0	0.0%	126,129	11	5	1	16	0.0%
Management	$5,570	$0.0	$0.2	$0.0	$0.2	0.0%	23,255	0	1	0	1	0.0%
Administrative and Waste Services	$12,358	$0.0	$0.2	$0.0	$0.2	0.0%	200,361	0	3	1	4	0.0%
Educational Services	$1,658	$0.0	$0.0	$0.0	$0.0	0.0%	28,516	0	0	1	1	0.0%
Health and Social Services	$20,089	$0.0	$0.0	$0.3	$0.3	0.0%	214,550	0	0	4	4	0.0%
Arts, Entertainment, and Recreation	$10,172	$0.0	$0.0	$0.1	$0.1	0.0%	91,865	0	0	1	1	0.0%
Accommodation and Food Services	$31,032	$0.0	$0.1	$0.1	$0.3	0.0%	343,650	0	1	2	4	0.0%
Other	$10,585	$0.0	$0.1	$0.1	$0.2	0.0%	152,738	0	1	2	3	0.0%
Government	$35,294	$0.0	$0.0	$0.1	$0.1	0.0%	396,852	0	0	0	0	0.0%
Total	**$371,697**	**$7.3**	**$2.9**	**$2.4**	**$12.6**	**0.0%**	**2,854,108**	**36**	**20**	**19**	**74**	**0.0%**

Source: IMPLAN 2009

Table 9-17
Anticipated Budget (in $ millions) and Socioeconomics Effects by Alternative Compared to the Proposed Project

	Construction	Operation and Maintenance	Decommissioning
Proposed Project	$51.6	$4.0	$7.3
Socioeconomic Effect	Not Substantial	Not Substantial	Not Substantial
Alternatives			
B – Monitored National Attenuation	$7.2	$0.9	$7.3
Socioeconomic Effect	▼	▼	◄►
C – High-Volume In Situ	$79.3	$6.1*	$8.0
Socioeconomic Effect	▲	▲	◄►
D – Sequential In Situ	$106.0	$4.4*	$8.3
Socioeconomic Effect	▲	◄►	◄►
F – Pump and Treat	$72.9	$9.2	$21.3
Socioeconomic Effect	▲	▲	▲
G – Combined Floodplain In Situ/Pump and Treat	$94.5	$8.6*	$20.3
Socioeconomic Effect	▲	▲	▲
H – Combined Upland In Situ/Pump and Treat	$82.9	$6.5	$15.9
Socioeconomic Effect	▲	▲	▲
I – Continued Operation of IM-3/No Project	$0.0	$8.4	$11.0
Socioeconomic Effect	▼	▲	▲

▲ = Higher socioeconomic effect when compared to proposed project
▼ = Lower socioeconomic effect when compared to proposed project
◄► = Similar socioeconomic effect when compared to proposed project
* Denotes average of remediation phases; long-term monitoring not included.
Source: CH2M Hill 2009; effects determined by AECOM in 2010

While the anticipated budget for each stage of the alternatives can be considered a crude indicator of the socioeconomic effect each alternative may have, the figures presented in Table 9-17 do provide a basis from which qualitative differences between alternatives can be discussed. Since each alternative includes the same general span of professional services and commodity use, the effect that each alternative may have as alternative-specific economic output and employment multiplies through the ROI will likely be similar in type to the proposed project.

In terms of construction-phase socioeconomic effects, it is estimated that Alternatives B and I would have markedly fewer beneficial socioeconomic effects since very little new construction would take place under Alternative B, and no new construction would take place under Alternative I. The remainder of the Alternatives would all have higher construction costs than the proposed project, especially Alternative D, which would have construction costs over twice as high as the proposed project and would create a much higher amount of economic output and total employment. Considering that the construction phases for Alternatives C, D, F, G, and H would all take place between 3 and 4 years, the socioeconomic effect the construction of these alternatives would have on the ROI would be primarily beneficial and greater than the proposed project. However, since the proposed project had such modest socioeconomic effect on regional economic output, regional employment, population

growth, and housing, even doubling these numbers would not result in substantial changes to the region. Under the most extreme case, Alternatives D and G may create some localized effect in the areas immediately surrounding the project site, depending on how those people employed by the construction activities find housing in the area. For example, if all employees chose to reside in Bullhead City, some temporary adverse socioeconomic effects may occur as a result of hundreds of new people moving to the area. The possibility of these adverse effects occurring is slight, however, as it assumes that temporary construction personnel would bring dependents (1:2 ratio) and that the construction personnel would not utilize the ample temporary housing in the surrounding communities of Lake Havasu, Needles, Topock, and Golden Shores.

The socioeconomic effects during the operations and maintenance phase, for all alternatives, is not considered to be substantial, despite Alternatives C, F, G, H, and I having higher average annual budgets for operational years. In general, alternatives that include the operation of a treatment plant would require more annual budget, resulting in higher employment and more beneficial socioeconomic effects on the ROI. However, the differences are small between the proposed project and the alternatives in terms of absolute dollars, especially when the socioeconomic effects are anticipated to be absorbed by a five-county area. Alternatives that include the operation of a treatment plant would require more personnel than those alternatives that include the operation of well systems alone, but the difference in personnel would be minimal and would not substantially affect the socioeconomics of the region. The duration of operation varies greatly by alternative, with some alternatives projected to last for centuries. In these cases, the modest beneficial socioeconomic effects would seem permanent. With all alternatives projected to last at least 15–25 years, however, the socioeconomic effects of operations would be long-term.

Decommissioning of the alternatives would happen decades in the future and the regional economy would likely look much different than what is present currently. Regardless, the alternatives to the proposed project would either create beneficial socioeconomic effects similar to, or slightly greater than, what is anticipated by the proposed project. These effects are likely to be short in duration, as decommissioning of all alternatives is anticipated to last approximately 1 year. Those alternatives with decommissioning phases with budgets substantially exceeding that of the proposed project (Alternatives F, G, H, and I) include the decommissioning of a treatment plant. This action is anticipated to require a larger workforce than if the decommissioning was solely focused on wells, pipelines, and associated facilities. The increase in employment associated with this aspect of decommissioning, however, is not expected to create a substantial amount of beneficial socioeconomic effects, even if the effects may be greater than what is experienced under the proposed project. All alternatives to the proposed project are expected to result in socioeconomic effects that are modest and beneficial.

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12 GLOSSARY

Acre-Foot: 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.

Aquifer: A water-bearing layer of rock or sediment that is capable of yielding useable amounts of water.

Aquifer Solid: Saturated geological materials, either unconsolidated sediments or fractured bedrock, that comprise the water-bearing zone.

Area of Concern: Areas in and around a project site that either have shown high levels of contamination or may have been contaminated from past operations, making them focus areas of the site investigation.

Berms: A curb, ledge, wall, or mound made of various materials, used to prevent the spread of contaminants.

Bollards: Protective steel posts.

California Department of Toxic Substances Control (DTSC): A department within the California Environmental Protection Agency in charge of regulating hazardous waste from generation to final disposal and overseeing the investigation and cleanup of hazardous waste sites.

California Environmental Quality Act (CEQA): Enacted in 1970 to provide long-term environmental protection, this law requires that governmental decision makers and public agencies study the environmental effects of proposed activities and that significant adverse effects be avoided or reduced where feasible.

Chemicals of Potential Concern: Chemical elements or compounds (e.g., chromium) that may or may not be present at a project area.

Clarifier: A process in which solids are separated from liquids.

Community Survey: A survey prepared by DTSC and distributed to the community surrounding a project site. The survey is a tool to gather information about the community's level of awareness and interest in a project site, understand specific concerns about a project site and to gather project specific c public involvement questions or concerns.

Corrective Action Process: A process designed to evaluate the nature and extent of a release of a hazardous substance and implement appropriate measures to protect public health and the environment.

Corrective Measure Study/Feasibility Study (CMS/FS): A study conducted by the facility owner/operator to identify and evaluate alternative cleanup options to address contamination at a project site.

Environmental Impact Report (EIR): A report designed to examine the potential environmental impacts of proposed activities as required by the California Environmental Quality Act.

Extraction Wells: Wells that are used primarily to remove contaminated groundwater from the ground. Water level measurements and water samples can also be collected from extraction wells.

Final Remedy: The final cleanup action proposed for dealing with contaminants at a site.

Groundwater: Water beneath the earth's surface that flows through soil and rock openings.

Hexavalent Chromium: A form of chromium, which is a metal naturally found in rocks, soil, and the tissue of plants and animals. Hexavalent chromium is also used in industrial products and processes and is a known carcinogen when inhaled (i.e., through breathing).

Hydrogeology: The geology of groundwater, with particular emphasis on the chemistry and movement of water.

In Situ Treatment: Technology that treats contaminants in place within the soil or in groundwater. It typically involves injection of a material such as air, gases, chemical or biological reagents, or solid material (e.g., molasses or lactose) to chemically alter the contaminant or to encourage bacteria in the soil to aid in the treatment.

Interim Measures: Cleanup actions taken to protect public health and the environment while long-term solutions are being developed.

Lead Agency: A public agency with the principal responsibility for ordering and overseeing site investigation and cleanup.

Mitigation Measures: Actions designed to minimize significant impacts from activities.

Molybdenum: A metallic element widely distributed in the Earth's crust and is used in industrial products and processes.

Monitoring Wells: Specially constructed wells used exclusively for testing water quality.

Nitrate: Nitrates and nitrites are nitrogen-oxygen chemical compounds that combine with various organic and inorganic compounds. Once taken into the body, nitrates are converted into nitrites.

Notice of Determination (NOD): A formal notice filed with the California State Clearinghouse after the final EIR has been certified and a project approved.

Notice of Preparation (NOP): A CEQA document to be sent by the lead agency to notify the public, responsible agencies, trustee agencies, and involved federal agencies that the EIR is being prepared.

Parts per Billion (ppb): A unit of measure used to describe levels or concentrations of contamination. A measure of concentration, equaling 0.0000001%. Most drinking water standards are expressed in ppb concentrations.

Percolation: The downward flow or filtering of water or other liquids through subsurface rock or soil layers, usually continuing to groundwater.

Percolation Bed: An unlined bed with built-up sides constructed of soil that collects discharged wastewater and allows it to soak into the ground and/or evaporate.

Pilot Study: A mini version of a full-scale study used to assess the feasibility of a particular cleanup technology in a specific location.

Plume: A body of contaminated groundwater. The movement of a plume in groundwater can be influenced by such factors as local groundwater flow patterns, the character of the aquifer in which the groundwater is contained, and the density of contaminants.

Pore Water: Water located within pore spaces between the grains of sediment beneath the bottom of the river.

Precipitate: A substance separated from a solution or suspension by chemical or physical change usually as an insoluble amorphous or crystalline solid.

Regional Water Quality Control Board (RWQCB): A California agency that maintains water quality standards for a specific geographic jurisdiction and enforces state water quality laws.

Remediation: Cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a site.

Resource Conservation and Recovery Act (RCRA): A federal law that establishes a regulatory system to track and provide safe procedures for management of hazardous wastes from the time of generation to final disposal.

Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI): An investigation that occurs in the corrective action process following a RCRA Facility Assessment. It is an in-depth study designed to gather data needed to determine the nature and extent of contamination at site.

Reverse Osmosis: A treatment process used in water and wastewater systems by adding pressure to force water through a semi-permeable membrane. Reverse osmosis removes most drinking water contaminants, including salts.

Risk Assessment: Qualitative and quantitative evaluation of the risk posed to human health and/or the environment by the actual or potential presence and/or use of specific pollutants.

Scoping: A process to gain input from agencies and the public regarding the content of the EIR.

Scoping Meeting: Meeting to gain input from the public, the local community, government agencies, and tribal government agencies regarding selection of the final remedy.

Sediments: The soil, sand, and minerals at the bottom of surface waters, such as streams, lakes, and rivers. The term may also refer to solids that settle out of any liquid.

Selenium: A nonmetallic element abundant in the Earth's crust that is used in industrial products and processes.

Solid Waste Management Unit (SWMU): Any discernable unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released (Title 40 of the Code of Federal Regulations, Section 265.501).

Statement of Basis: A document that describes the basis for DTSC's proposed remedy and cleanup standards.

Subsurface Containment Barrier: Barriers used to contain or control the flow of contaminated groundwater or subsurface liquids. They are constructed by digging a trench around a contaminated area and filling the trench with a material that tends not to allow water to pass through it.

Surface Water: All water naturally open to the atmosphere such as rivers, lakes, reservoirs, ponds, streams, impoundments, seas, and estuaries.

Total Chromium: The additive of concentrations from all forms of chromium, mainly comprising hexavalent and trivalent forms. The California drinking water standard for total chromium is 50 micrograms per liter (or parts per billion), while the federal standard is 100 micrograms per liter.

Trivalent Chromium: A form of chromium and a metal naturally found in rocks, soil, and the tissue of plants and animals. Trivalent chromium is considered an essential nutrient and is relatively harmless. It does not dissolve in groundwater and tends to bind to soil; thus it does not travel readily in the environment.

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