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4.15 CULTURAL RESOURCES AND PALEONTOLOGY

This section discusses the Project impacts on cultural resources related to disturbance of archaeological, historical, architectural, and Native American/traditional heritage resources. The section also addresses disturbance of unknown archaeological resources, as well as paleontologic resources (fossils). To provide a basis for this evaluation, the setting section describes broad periods of cultural history in the Project area including the prehistoric period.

IMPACTS EVALUATED IN OTHER SECTIONS

All items pertinent to cultural resources and paleontology are included in this section.

AFFECTED ENVIRONMENT (SETTING)

Cultural Resources

The following is a summary of the broad periods of cultural history in central and southern Sonoma County and northern Marin County, including the Santa Rosa Plain and the geysers area. This information is based on field studies and archival research. An extended discussion of the cultural setting for the Project, as well as the results from the field surveys and sensitivity studies (see Methodology section), may be found in Gerike et al. (1996).

Prehistoric Period

Central Sonoma County

The earliest documented period of human use of California, known as the Paleoindian period, occurred between 10,000 and 6000 B.C., at a time of variable climate, rising sea levels, and other broad scale environmental change. Evidence of this early habitation is scarce in the Sonoma Archaeological District within central Sonoma County. It is assumed that people living in this early period were organized into small, highly mobile groups occupying broad areas. Because of this type of adaptation and the small populations involved, most occupations will not have been of sufficient intensity or duration to leave significant remains. The only clear evidence to date of Paleoindian use in Sonoma County is a cave on the Coast of Bodega Bay (CA-SON-348), with extensive deposits dating to ca. 7000 B.C. (Jones 1991). On the Laguna de Santa Rosa, distinctive artifacts suggest use at that time depth, but no dates have been obtained (Origer and Fredrickson 1980).

The gradual climatic warming of the Paleoindian period accelerated during the Lower Archaic period (6000 to 3000 B.C.), no doubt altering the extensive wetlands that will have characterized the Laguna during Paleoindian use. Adaptations to these more arid conditions, as available water decreased and grasses became more abundant, included relatively widespread use of the millingstone and handstone.

Within the Middle Archaic period (3000 to 1000 B.C.), the appearance of the first well-represented culture on the Santa Rosa Plain occurs, probably reflecting larger populations and a more sedentary settlement pattern.

Changes during the Upper Archaic period (1000 B.C. to A.D. 500) may represent either a local adaptation to changing (cooler, wetter) climatic conditions and/or the arrival of a new cultural group. Fredrickson has suggested that the appearance of a new artifact assemblage and mode of settlement may reflect Miwokan expansion from the San Francisco Bay - a response to intensified resource competition as a result of increasingly large, relatively sedentary populations focusing on the bayshore (Fredrickson 1974). In a cooler climatic regime, the string of marsh habitats along the Marin and Sonoma bayshore may have become more productive, while the Laguna de Santa Rosa's productivity may have been refreshed after the long, relatively arid Lower and Middle Archaic periods. The southern Project area contains lands that will have been targeted by such expanding populations. Tracking this hypothesized intrusion archaeologically is difficult, however, due to the lack of intensive investigations between the San Francisco Bay and the Laguna.

Locally, the Upper Archaic period is represented by the Laguna culture in which acorn-processing becomes a dominant subsistence trait.

Unsettled climatic activity and widespread population movements have been hypothesized throughout much of California and the western Great Basin at the transition from the Upper Archaic to the Lower Emergent period (A.D. 500 to 1500) (Moratto 1984). An important innovation in the artifactual assemblage is the introduction of the bow and arrow, replacing the earlier atlatl (spear thrower) and dart point. Mortars and pestles become especially abundant during this time period, attesting to a well-developed acorn economy.

Some sites also appear in previously little used areas, perhaps suggesting the firming up of tribal territories and, with it, a more formalized seasonal round that will result in regular reuse of outlying areas. At the geysers for example, most of the datable sites saw their initial use during this period.

The lifeways represented by the Upper Emergent period (A.D. 1500 to Historic period), also termed the Protohistoric period, are believed to be the same as they were at the time of historic contact. Clam disc beads were manufactured at Santa

Rosa Plain sites and used as a form of currency for exchange in a network that ranged throughout California and into the Great Basin.

In the Santa Rosa Plain, the Upper Emergent culture is typified by a settlement shift, a movement away from the Laguna in favor of more elevated, creekside locations, at the same time that a drastic reduction in the number of sites occurs. One of the Laguna sites excavated for an earlier phase of the Santa Rosa Wastewater Project in the late 1970s (Origer and Fredrickson 1980) evidenced site abandonment about 500 years ago. Some large occupation sites on the Laguna, however, continued in use, probably as permanent villages. At the southern edge of the Laguna, and within the current Project area, CA-SON-159 shows evidence of intensive occupation and bead manufacturing through both phases of the Emergent period. Excavation of nearby CA-SON-518 revealed the well-preserved remains of a large circular housefloor, radiocarbon-dated to ca. A.D. 1700 (Upson 1973). This latter site, mostly buried under one meter of soil, also possessed evidence of shell bead manufacturing.

Southern Sonoma/Northern Marin Counties

The Marin Archaeological District is located south of the Sonoma Archaeological District. The boundaries of these districts are unclear because of the lack of excavated sites in the northern Marin District. Excavations of eight sites along San Antonio Creek at the boundary between Sonoma and Marin counties were reported (King, Upson, and Milner 1966). Analysis of the remains at one of the sites (MRN-357) indicated an early dependence on bayshore molluscs during the Upper Archaic; the upper levels depicted a shift from shellfish to a greater emphasis on vegetal food.

At the ethnographic village of Olompoli (CA-MRN-193), substantial investigation has occurred on the extensive cultural deposits, as this was a major exchange center for the area. The deposits, covering some 320,000 square meters, make it the largest known Coast Miwok village site (Moratto 1984). The 1976 investigations near Nicasio, a few miles south of the Project area, focused on the historic-period Native American use of Halleck Creek Valley. Work focused on the study of acculturation at the ethnographic village of Echa-tamal. Inhabited for about 400 years, the site was finally abandoned in 1884.

The only archaeological studies within the southern Sonoma/northern Marin portion of the Project area occurred at Tolay Valley, currently a candidate storage reservoir site. The first report of the valley's prehistory was an article on CA-SON-371, "Charmstone site," at the location of an extinct lake estimated to have covered several hundred acres (Elsasser 1955). In the early 1960s, the Tolay Valley was repeatedly visited by avocational archaeologist George Phebus, Jr., who excavated and surface-collected nine prehistoric sites, recovering human burials and cremations and an abundant and diverse collection of artifacts (George Phebus Jr. 1990). The investigated Tolay sites, consisting of middens

and nonmidden lithic scatters, represent a long period of use from the Early period to the Late period.

The Geysers Area

The geysers area, located in the northernmost portion of the Project area, possesses a significantly different environment from the Santa Rosa Plain and deserves special attention. An area of no less than 64,000 acres has been intensively surveyed for archaeological remains, recording hundreds of sites in the process. The sites are primarily Lower Emergent phase (A.D. 500-1500) although some Middle Archaic period (3000-1000 B.C.) artifact assemblages have been identified (Fredrickson 1984). In the geysers area, some of the sites that exhibit Middle Archaic artifact assemblages may in fact represent a retention during the Upper Archaic period of earlier lifeways by the Wappo, an adaptation better suited to this mountainous landscape. Recently, however, sites have been identified in some well-watered areas of the geysers that date to the Upper Archaic and appear to be culturally affiliated with the hypothesized Miwokan expansion from San Francisco Bay (Gerike et al. 1996, Peak & Associates 1985, Stewart 1993). Of particular interest is CA-SON-1406, a single-component Upper Archaic period site with deep midden soil, milling equipment, and evidence of the site's use as a biface-manufacturing and distribution center.

Ethnography

At the time of historic contact, the Native Americans controlling the lands of the Project area spoke languages derived from three distinctly separate linguistic stocks: Yukian, Hokan, and Penutian. Within the Project area, these stocks were represented by the Wappo, the Southern Pomo, and Coast Miwok languages. The speakers of each of these languages were socio-politically organized into several tribelets that controlled specific territories and were distinct from each other. These people also shared similar cultural traits (Driver 1940, Kroeber 1925, Sawyer 1978), probably as a result of similar economies in similar environments, with centuries of contact with each other.

Within the Project area, tribelets of the Western and Central Wappo were situated in Alexander Valley and the adjacent eastern uplands; Southern Pomo tribelets were south of these people to about the Cotati area; and Coast Miwok tribelets were in southern Sonoma and Marin counties. These peoples' cultures were disrupted and their populations radically declined with the intrusion of foreigners beginning in the latter half of the eighteenth century. As such, there is a lack of information about their lifeways. The information that is available about these people and their lifeways comes from archaeological sites, historical and ethnographic accounts from the sixteenth century on, and continuing oral histories and traditions.

Historical Period

The primary historical period land uses of Sonoma County, as well as most of the County's environmental zones, are represented within the Project area. The Project area takes in portions of the lands controlled by two missions, more than one dozen Mexican land grants, and most of the County's population centers. Excluded from the Project area is the coastal zone and the mountainous timber region in the northwest. Despite this exclusion, even the early nineteenth-century Russian presence on coastal California is represented by farming outposts in and near the Project area.

Sonoma and Marin were among California's original 27 counties, indicative of cultural and political separateness as early as 1849. While the early history of the two counties was similarly shaped by Mexican events, they later diverged, with Sonoma focusing on agriculture while Marin was influenced by its proximity to San Francisco. The portion of Marin in the Project area is today a part of the North Bay Dairyshed, which straddles both sides of the Marin/Sonoma border.

Central and Southern Sonoma/Marin Counties

The Russians first explored Bodega Bay and vicinity with an eye for settlement in 1809. From 1812, for three decades, the Russians ran Fort Ross and a network of settlements, farms, and outposts stretching over 55 miles of coastline (Lightfoot, Wake, and Schiff 1991).

Containing the growth of Fort Ross was the primary impetus for the northern expansion of the Spanish mission system and the Mexican settlement of the North Bay. Father José Altamira founded Mission San Francisco Solano at the site of present-day Sonoma in 1823 with the express purpose of establishing a Mexican presence on the northern frontier. Altamira may have been the first non-native to visit Tolay Lake (site of the Tolay candidate storage reservoir); he found it shallow and choked with tules and therefore an unsuitable water source (Heig 1982).

Secularizing the missions between 1833 and 1835 was intended to result in returning half the lands of California back to the native peoples, with the remainder to be distributed to clerical authorities. In 1833, Mariano Guadalupe Vallejo was sent to establish a pueblo on the northern frontier. The new pueblo was sited at Sonoma.

Vallejo personally received the more than 66,000-acre Rancho Petaluma land grant, the largest grant in the North Bay and one of the largest in the entire state (Beck and Haase 1974). The center of the rancho, which served as Vallejo's country home, was his grand adobe, now the focal point of a state historic park east of Petaluma; the "several adobe houses" also built on his grant during the 1840s have not been relocated (Gebhardt 1963). The land containing the Adobe Road candidate storage reservoir, just over one mile northwest of the adobe, will

have been used during this period. The Tolay, Sears Point, and Lakeville Hillside candidate storage reservoirs are within the eastern extreme of the Petaluma grant; given their distinctive settings, they too will likely have been used during Vallejo's tenure. Twenty-five additional grants were made in the area to become Sonoma County during Mexican rule.

The Mexican thrust against Russian encroachment had resulted, by the mid-1840s, in the granting of virtually all arable land in the North Bay, more than half of what was to become Sonoma County. Meanwhile scores of foreigners, most from the U.S. and Great Britain, began arriving to settle on the Santa Rosa Plain and Alexander Valley in the early 1840s.

Up to the time of statehood, three primary land uses had prevailed in the North Bay: the hide-and-tallow trade on the Mexican ranchos; the timber production on the grants of the redwood region; and the small subsistence farms of the scattered foreign squatters and landless Californios. After the initial rush to the goldfields, Sonoma County's attraction shifted to its commercial agricultural potential. The area held expansive arable land in close proximity to the new city of San Francisco. It was also close to the shipping routes to the mines, which continued to have a seemingly limitless demand for food.

With the tremendous increase in population in the County, services began to appear. Way-stations for individual travelers, and later for formal stage routes, were built; the first-possibly within the Project area--was run by Guadalupe Vásquez West, who continued to run the Rancho Miguel after her husband's death in 1849 (LeBaron et al. 1985).

By July of 1852, Petaluma had become a bustling town with several hotels and an ever-growing population; in September 1853, there was a cluster of about 50 houses in the town (Heig 1982). In contrast, the town of Santa Rosa consisted of only a few shacks in 1853. In 1854, however, Santa Rosa was chosen by the county's population as the county seat as a result of a series of political maneuvers by a group of developers and local boosters.

By the mid-1850s nearly all of the present-day population centers were on the map. Sebastopol was founded in 1855. In 1853 the first house was built in Bloomfield, named for F.G. Blume, who had married the widow of grantee James Dawson and became the owner of the Rancho Cañada de Pogolimi grant. Within a few years, Bloomfield quickly surpassed the other small towns in the area; it had a population of several hundred residents (Clayborn 1976). North of Bloomfield, the village of Two Rock also got its start in the early 1850s, when farmer John Schwobeda chose the name of the local landmark (*Dos Piedras*) for the settlement. Just west of the Project area in Marin County, the town of Tomales was settled early due to its proximity to transportation on Tomales Bay.

Traffic between Sonoma County and San Francisco went not through Marin, as it does today, but by stage along the Petaluma River to the steamers docked at the town of Lakeville, in the vicinity of Tolay and Lakeville Hillside candidate storage reservoirs. Established in the early 1850s, Lakeville was the social and commercial center for several farming families who had purchased some of Vallejo's Rancho Petaluma holdings. One of the area's large landholders was German immigrant William Bihler, who bought the land containing 1,100-acre Lake Tolay in 1859, "dynamited the southern end of the lake, watched the water drain off toward San Pablo Bay and planted potatoes and corn in the lake bed" (LeBaron 1987). Just northeast of Lakeville, the town of Sonoma was said to have stagnated after it lost its role as the county seat; two decades later it was described as "the same old Mexican town it was in 1846" (Menefee 1873).

The southern terminus of the San Francisco & North Pacific Railroad, where the steamers met the tracks, was operating by January 1871, and was situated near the mouth of the Petaluma River about eight miles downstream from the City of Petaluma and one mile south of the town of Lakeville. As population increased in Marin County, the terminus was moved in 1882 to Tiburon (Heig 1982). Most of Sonoma County benefited from this move. Lakeville, however, lost not only the revenue from its commercial establishments for travelers but also the residents' own direct access to steamer traffic. Bloomfield was another town to lose with the coming of the railroad. When the railroad failed to connect with the town, the overnight trade diminished; soon the railroad eliminated most stagecoach travel as well. Bloomfield stabilized at a population of about 250 in 1877, the same figure reported a century later (Clayborn 1976).

The end of the national wheat boom in the 1880s and the rise of specialty agriculture in California coincided in the last decades of the nineteenth century. At the same time, a large commercial population of processors, packers, and distributors grew up around each industry. Crops grown within the County included potatoes, grains, wine-grapes, hops, apples, plums, and prunes. Hops were especially well-suited to the alluvial plains and terraces along the Russian River, the Laguna de Santa Rosa, and on the Santa Rosa Plain. The success of hops coincided with a drop in wheat prices, and most grain farmers with the right soils and climate switched to the new crop. By 1890, hops were the leading field crop in the County, and the Santa Rosa area became known as the hop capital of the nation (LeBaron et al. 1985).

Cattle were the mainstay of the California rancho hide-and-tallow trade. A series of factors in the 1860s led to a shift to sheep; first raised for mutton, sheep were later kept for wool, sparked by the need to clothe Civil War troops. A wool-growing boom occurred, with Sonoma County becoming one of the country's leading wool producers. In most of the Project area, small flocks of sheep were kept on many farmsteads; the Two Rock area was particularly known for its sheep.

The Project area includes much of the North Bay Dairyshed (Abbott 1986), which is focused on a wide belt running along the Marin-Sonoma County line. Other focal points for dairying also occur in the Project area: the Laguna de Santa Rosa region near Sebastopol; the southern Santa Rosa Plain; and the Lakeville area. While there were numerous small dairies operating early in the County's history, it was the establishment of the San Francisco & North Pacific Railroad in 1870 that vitalized the industry. Before the railroad, fluid milk could not be shipped for any distance, and most dairies sold milk to a local clientele, taking their cheese and butter for sale in town. With the refrigerator cars (introduced in 1888) and fast travel of the railroad, Sonoma ranchers began supplying milk to a ready market in San Francisco. In 1986 dairying was Sonoma County's largest industry.

Beginning with the invention of the chick incubator in 1879 in Petaluma and followed by nationwide promotion, thousands of outsiders moved to southern Sonoma County to take up egg production, while most of local farmers turned to that occupation by the turn of the century. In 1885, at least 50 farms in the Petaluma area had purchased incubators and were hatching chicks artificially (Johnson 1994); by 1904, a government report estimated that 90 percent of the people living near Petaluma were raising poultry (Heig 1982:111). Two Rock was the site of the world's first commercial hatchery, housed on the 100-acre property of Danish farmer Christopher Nisson; in 1898 he moved his Pioneer Hatchery to downtown Petaluma (Heig 1982). Two Rock later became known for blending dairies and sheep raising with chicken ranching, and for producing hatching eggs, not table eggs (Lowry 1993).

By the beginning of the twentieth century, the towns of the Project area had developed into industries in their own right, with hundreds of services and administrative and professional offices. Developers began promoting the rural subdivision that will provide clean, natural surroundings for growing families, while the head of household acquired an income in Santa Rosa or Petaluma.

The Geysers Area

The rugged country of the geysers portion of the Project area held important resources within relatively easy access of Sonoma County's towns. Thus the area became the site of considerable population, if only on a seasonal or intermittent basis.

While towns began growing up in the west and south, another kind of community developed early in Sonoma County history—the rural resort, which by definition was some distance from the growing population centers. The North Bay had numerous such resorts, but the geysers area was the first to be established and probably the most widely known. It offered a series of hot springs and spectacular scenery, less than a few hours from Healdsburg or Calistoga in Napa County. The area became a commercial resort soon after American settler William Elliot came across the hot springs in 1847. Initially, the area was visited

by an adventurous sporting crowd, who took the stage up the old Geysers-Healdsburg Road, partly following the proposed Project pipeline route along Pine Flat Road. By 1854, a broader clientele was attracted when an inn was constructed at the Geysers area. Later, the renowned stage-driver Clark Foss established his own hostelry at Fossville in Knights Valley, taking another route up the mountain. The resort eventually gained international attention, attracting political figures and celebrities from the entertainment and literary worlds, as well as vacationing California families. The resort continued in popularity into the twentieth century. But when the hotel was destroyed by fire in 1937 (Hoover et al. 1990), the attraction of hot-springs resorts had already declined and no replacement was erected.

Cinnabar was discovered in abundance near the geysers springs in the early 1850s. The mines were briefly worked in 1861, but they were not economically viable until 1872, when the price of quicksilver (mercury) doubled. The Socrates Mine, located along the Project's pipeline route, and the adjacent Rattlesnake Mine were the only sources of native quicksilver (i.e., quicksilver without the presence of sulphur) in the County. A prolonged period of mining activity occurred between 1888 and 1906, and again in conjunction with World War I. Sporadic mining continued in the twentieth century, with a productive spurt in the 1960s made possible by modern techniques and equipment (Peri, Patterson, and McMurray 1978). Despite the erratic operations, quicksilver mining was an important County industry.

Despite the remote location, the local community was involved with the mines; farmers supplied produce to the mines during the growing season and sometimes worked surface mines during the winter months. The mines also generated a voracious market for timber (Peri, Patterson, and McMurray 1978). Camps to accommodate single miners grew up around all the more established operations. Other miners lived in the area with their families, in Sonoma County within the towns of Pine Flat (within the Project area) and Mercury. Pine Flat had a permanent population of more than 100 residents in the 1870s (LeBaron et al. 1985).

The geysers area, functioning today as a geothermal steamfield, continues the extractive tradition of the historic mercury mines.

Paleontology

Paleontologic resources include fossil specimens, fossil sites, and fossil-bearing rock units. Vertebrate fossils are generally considered to be significant because their occurrence is relatively rare. Invertebrate and plant fossils and microfossils tend to occur in much greater abundance than vertebrate fossils. Non-vertebrate fossils are generally ranked with low significance unless they are in short supply, they are age-diagnostic, or the paleoenvironmental framework is unique (EIP 1990). Generally, fossils are not

considered to be significant if they are found in large numbers and/or over a large geographic area (Reynolds 1988).

The Project area contains the following six main geologic units: Franciscan Complex, Wilson Grove Formation (previously the Merced Formation), Petaluma Formation, Sonoma Volcanics, Glen Ellen Formation, and Pliocene and Quaternary alluvial/colluvial deposits (Rust Environment and Infrastructure 1995). The Franciscan Complex contains a variety of rock types, including shale, clay, graywacke, sandstone, greenstone, and chert. The majority of these rocks are not fossiliferous (fossil-bearing). Chert within the Franciscan Complex may contain marine microfossils which are abundant and widespread throughout coastal northern California and are therefore not considered to be a significant paleontologic resource (Reynolds 1988).

The Wilson Grove Formation comprises marine sediments, including sandstone, conglomerate, and tuff. It is fossiliferous and contains many marine invertebrate species such as clams, snails, brachiopods, sand dollars, sea urchins, crabs, and polychaete tubes. Vertebrate fossils have also been identified in the Wilson Grove Formation, but museum collections are from few localities and there is very little published information regarding these sites.

A wide range of species of invertebrate and vertebrate fossils, including bison, horse, deer, turtle, and birds, have been recovered from the Petaluma Formation. The Petaluma Formation consists primarily of non-marine claystone, siltstone, sandstone, and mudstone. The Sonoma Volcanics which consist of basalt, andesite, rhyolite, ruff, and other pyroclastic rocks are not considered to be fossiliferous.

The Glen Ellen Formation consists of fluvial gravel, silt, sand, and clays eroded from the adjacent highlands. Recent fossils have been recovered from Quaternary alluvial/colluvial deposits in the Glen Ellen Formation within Sonoma County.

Cultural Resources and Paleontology Goals, Objectives, and Policies

Table 4.15-1 identifies goals, objectives, and policies which provide guidance for development in relation to cultural resources in the Project area. The table also indicates which evaluation criteria are responsive to each set of policies. There are no goals, objectives, and policies related to Paleontology in the Project area.

Table 4.15-1

General Plan Goals, Objectives, and Policies - Cultural Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Sonoma County General Plan	Open Space Element	Goal OS-9 Objective OS-9.3 Policy OS-9f	Preserve significant archaeological and historical sites which represent the ethnic, cultural and economic groups of the county	1,2
Marin Countywide Plan	Environmental Quality Element	Policy EQ-3.30 Policy EQ-3.31	Development sites identified as having potential for the presence of archaeological resources shall be evaluated to ascertain if a site is present and development shall be situated or designed to avoid impact on such resources	1,2
Santa Rosa General Plan	Historic Preservation Element	Goal HP-2 Objective HP-2a	Preserve Santa Rosa's historic, architectural and cultural heritage using the widest possible array of public and private mechanisms	1
Santa Rosa General Plan	Historic Preservation Element	Goal HP-3 Objective HP-3a	Identify and conserve Native American archaeological resources	1,2
Petaluma General Plan	Community Character Element	Objective (q)	Promote greater sensitivity toward Petaluma's archaeological heritage and take all possible precautions to insure that no action results in the loss of the irreplaceable archaeological record	1,2
Sebastopol General Plan	Community Identity Element	Goal 11 Policy 38	Preserve archaeological and historic resources.	1,2
Windsor General Plan	Environmental Resources Element	Policy E.1 Policy E.1.1	Identify and preserve significant cultural or historical sites or structures within the Town	1,2

Source: Harland Bartholomew and Associates, Inc., 1995

¹ The evaluation criteria can be found on Table 4.15.2.

EVALUATION CRITERIA WITH POINT OF SIGNIFICANCE

Cultural Resources

The significance of cultural resources is evaluated under the criteria for inclusion on the National Register of Historic Places (National Register), authorized under the National Historic Preservation Act of 1966, as amended. The criteria defined at 36 CFR 60.4 are as follows:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, association, and

- a. that are associated with events that have made a significant contribution to the broad patterns of our history; or
- b. that are associated with the lives of persons significant in our past; or
- c. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- d. that have yielded, or may be likely to yield, information important to prehistory or history.

Since the process for actually listing a site on the National Register can be a lengthy one, federal agencies and the California State Office of Historic Preservation can determine a site as eligible for listing on the National Register, which has the same effect as regards the treatment of the property. Unless a resource is of exceptional importance or value, sites younger than 50 years are not considered eligible for the National Register. However, it is recommended that sites 45 years old or older be considered during the evaluation process to allow for potential delays between evaluation and Project construction periods. For the purposes of this Project, all cultural resources identified within the Project's area of potential effects are considered to be potentially eligible for inclusion to the National Register of Historic Places. Once a preferred alternative is chosen, the cultural resources affected by that alternative will be formally evaluated for inclusion to the National Register. This approach has been approved by the State Historic Preservation Officer. "Unknown archaeological resources," referred to in the Evaluation Criteria below, means previously undiscovered and/or buried archaeological resources.

Paleontology

The significance of paleontologic resources is evaluated using state and federal guidelines. CEQA guidelines indicate that a Project could have a significant effect on

the environment if Project activities disrupt or adversely affect a paleontologic site (CEQA, Appendix G).

The California Public Resources Code, Section 5097.5, prohibits the excavation or removal of any “vertebrate paleontological site, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands.” Public lands are defined as lands owned by or under the jurisdiction of the state or any city, county, district, authority, or public corporation. Any unauthorized disturbance or removal of archaeological, historic, or paleontologic materials or sites located on public lands is considered a misdemeanor.

The Archaeological and Historic Data Preservation Act of 1974, as amended, provides for the survey, recovery, and preservation of significant scientific, prehistoric, historic, archaeological, or paleontologic data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded Project.

According to standard procedures published by the Society of Vertebrate Paleontology (1991), sedimentary rock units with a high potential for containing significant nonrenewable paleontologic resources are those within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present (Society of Vertebrate Paleontology 1991). Significant paleontologic resources are fossils or assemblages of fossils which are unique, unusual, rare, uncommon, diagnostically or stratigraphically important, and those which add to an existing body of knowledge in specific areas, stratigraphically, taxonomically, or regionally (Reynolds 1988).

The Wilson Grove Formation, the Petaluma Formation, and the Glen Ellen Formation are sedimentary rock units in which vertebrate paleontologic resources have been documented, although no known sites are in the Project area. A Project effect on any of these units is considered a potentially significant impact (Table 4.15-2).

Table 4.15-2

**Evaluation Criteria with Point of Significance -
Cultural Resources and Paleontology**

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project disturb known, potentially-eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Number of sites affected by Project facilities	Greater than 0 sites	National Historic Preservation Act, Section 106; CEQA, Appendix K; PRC Section 5020-5024, 21084.1

Table 4.15-2

Evaluation Criteria with Point of Significance -
Cultural Resources and Paleontology

Evaluation Criteria	As Measured by	Point of Significance	Justification
2. Will the Project disturb unknown archaeological resources?	Sensitivity analysis	Greater than 0 Projected locations	National Historic Preservation Act, Section 106; CEQA, Appendix K; PRC Section 5020-5024, 21084.1
3. Will the Project disturb unknown vertebrate paleontologic resources.	Underground construction within geologic units with the potential to contain vertebrate fossils, i.e., Wilson Grove, Petaluma, or Glen Ellen Formation	Greater than 0 occurrences	CEQA, Appendix G; PRC Section 5097.5 The Archeological and Historic Data Preservation Act of 1974

Source: Harland Bartholomew & Associates, Inc. 1996

METHODOLOGY

Cultural Resources

The goal of the cultural resources study for this Project is to identify prehistoric and historic archaeological sites, architectural and historical sites, historic landscapes, traditional cultural properties (including Native American heritage resources), and heritage trees that might be affected by implementation of the Project. The study was performed by the Anthropological Studies Center, Sonoma State University, Academic Foundation, Inc.

The study used the definitions for prehistoric and historic archaeological sites in National Register Bulletin 15 (*How to Apply the National Register Criteria for Evaluation*, National Park Service 1991), for historic landscapes in Preservation Briefs 36 (*Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes*, Birnbaum 1994), for traditional cultural properties in Bulletin 38 (*Guidelines for Evaluating and Documenting Traditional Cultural Properties*) and CRM 16 (*Traditional Cultural Properties: What You Do and How We Think*, Parker 1993), and Heritage and/or Landmark Trees as stated in Chapter 26D of the Sonoma County Code.

Records and literature searches were conducted at the Northwest Information Center of the California Historic Resources Information System for all components of the Project area. In addition, the following local, state, and federal cultural resource inventories were reviewed: *National Register of Historic Places Index* (March 31, 1995); *Directory of Properties in the Historic Property Data File for Sonoma County* (March 31, 1995); *Directory of Properties in the Historic Property Data File for Marin County* June 6, 1995); *California Inventory of Historic Resources* (1976); *Five Views: An Ethnic Sites Survey for California* (1988); *California Historical Landmarks* (1990); *Points of Historic Interest* (1992); *Sonoma County Landmarks Listing* (1993); and *Historic Civil Engineering Landmarks of San Francisco and Northern California* (1977). Historical maps were reviewed in order to identify architectural and historical archaeological properties and to provide context in documenting architectural properties.

Interested parties were contacted by letter or were personally addressed for any comments that they might have concerning cultural resources that might be affected by the Project. Interested parties included professional archaeologists familiar with the Project area, local residents and landowners, historical societies, local Native American individuals and recognized groups, local agencies, the State Office of Historic Preservation, and the State Native American Heritage Commission.

All 10 storage reservoir locations were subjected to field survey by a crew consisting of qualified archaeologists, historians, and architectural historians. A cultural resource “buffer zone” of 100 feet outside the construction zone for each of the storage reservoir locations was used in order to more adequately ensure the identification of cultural resources that might be impacted by the Project. On flat and gently sloping land, 10 to 15 meter zig-zag transects were walked. On moderately steep slopes, 30 to 40 meter transects were used. On slopes over 30 percent, the best possible visual observations were made. Areas receiving special attention were cut banks, stream sides, level ground, both valleys and ridgetops, springs, landform and vegetation anomalies, rock outcrops, and creekbeds. Each crew member maintained a Project field notebook to document observations on topography, soil type and color, water sources, bedrock outcroppings, field methods, personal communications, and constraints. Individual crew members depicted their transects on a topographic map. A master map of surveyed areas and crew member’s transects was maintained.

Newly identified archaeological, historical, and historic architectural sites were recorded to State of California standards on Department of Parks and Recreation forms (DPR 523 series). Previously located resources (identified during the record search at the Northwest Information Center) were relocated and examined. If necessary, supplements to the existing resource records were prepared to provide additional information about the resource (e.g., additional features, further disturbance to the resource).

An area consisting of a one-mile radius around each storage reservoir site was reviewed for historic buildings that might have their setting affected by reservoir and/or dam construction. Determination of affected setting was based on the possibility that elements of the reservoir or dam could be seen as part of the resource or part of its

background. Field review of potentially affected settings was conducted, if the property was accessible, upon completion of the record and literature search.

The Project components other than the storage reservoirs were subjected to a sensitivity study that, based on previously identified resources in the component area and the type of environment in the Project component vicinity, provides an estimate of the number of cultural resources that could be expected to occur within the impact area of the specific component. A 300-foot buffer zone was plotted around the Project component areas to ensure that resources on or near the boundary will be identified. Estimates for numbers of expected cultural resources in each area were made.

An archaeological monitor was present during the groundwater well and geologic testing studies to ensure that the drill locations did not affect known archaeological sites and that buried resources were identified immediately upon drilling so that the work could cease until evaluation of the resource by the archaeologist. A records search was done prior to field monitoring in order to avoid the location of recorded sites.

The methodology, findings, and results were incorporated in a cultural resources technical report prepared by the Anthropological Studies Center at Sonoma State University.

Once a preferred alternative is chosen, it will be necessary for field surveys to occur in the areas not previously surveyed for cultural resources, including pipelines and irrigation areas. All cultural resources affected by the Project will be formally evaluated for inclusion to the National Register before commencement of construction. Those resources determined to be eligible will require a program of mitigation in order to bring the impacts to a less than significant level, if they cannot be avoided.

In the following impact, analysis, and mitigation discussion, the evaluation criteria refer in general terms to “archaeological, historical, architectural, and Native American/traditional heritage resources.” Within each Impact analysis, the discussion is divided into more specific subheadings that pertain to specific types of resources. Some examples are “known prehistoric and historic archaeological sites,” “historic architectural resources,” “historic architectural resource settings” and “historic districts.” Subheadings fall under one or more of the general terms used in the evaluation criteria.

Paleontology

Existing paleontologic and geological sources were reviewed (EIP 1990, Rust Environment and Infrastructure 1995, Society for Vertebrate Paleontology 1991). To identify Project components that might affect vertebrate paleontologic resources in fossiliferous rocks, the Project maps were compared with geologic maps for Sonoma, Marin, and Napa counties. The geologic base maps, Figures 9-1 and 9-2 from the *Geotechnical Assessment of Alternative Reservoir Sites and Pipeline Routes, Volume I*, delineate the occurrence of surface rock of the various rock units within the Project area (Rust Environment and Infrastructure 1995).

ENVIRONMENTAL CONSEQUENCES (IMPACTS) AND RECOMMENDED MITIGATION

No Action (No Project) Alternative

Impact: 15.1.1-2. Will the No Action Alternative impact cultural resources based on evaluation criteria 1 and 2?

Analysis: *No Impact; Alternative 1.*

The No Action Alternative will not involve any construction and therefore will not result in an impact to cultural resources.

Mitigation: No mitigation is needed.

Impact: 15.1.3. Will the No Action (No Project) Alternative disturb unknown vertebrate paleontologic resources?

Analysis: *No Impact*

The No Action Alternative does not involve underground construction, therefore there will be no impact on paleontologic resources.

Mitigation: No mitigation is needed.

Headworks Expansion Component

Impact: 15.2.1-3. Will the headworks expansion component impact cultural and paleontologic resources based on evaluation criteria 1 through 3?

Analysis: *No Impact; All Alternatives.*

The expansion of the headworks will not result in an impact to cultural or paleontologic resources because all of the expanded facilities will be contained within the existing Laguna Plant site. No ground disturbance is expected. The recommendations presented in previous cultural resource studies for the original Laguna Plant construction and improvements should be followed.

Alternative 1 does not have a headworks expansion component.

Mitigation: No mitigation is needed.

Urban Irrigation Component

Impact: 15.3.1-3. Will the urban irrigation component impact cultural and paleontological resources based on evaluation criteria 1 through 3?

Analysis: *No Impact; All Alternatives.*

No cultural resources field survey has been conducted for the urban irrigation component; the analysis was based on records on file at the

Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park.

The Fountaingrove and Bennett Valley urban irrigation components will not result in additional impacts to cultural resources because the reclaimed water will be piped through already existing irrigation facilities and the resources are already subjected to the effects of irrigation from existing activity. Although eight archaeological sites and four historical resources are located within the irrigation areas, no ground disturbance is expected that might impact archaeological sites, nor will any historical resources be impacted by the Project

The Fountaingrove and Bennett Valley urban irrigation components will not result in an impact to fossiliferous rocks because the reclaimed water will be piped through already existing irrigation and watering facilities. Although the Petaluma Formation is present within the urban irrigation component, no ground disturbance is expected that might impact a paleontologic site.

Alternatives 1, 4, and 5 do not have an urban irrigation component.

Mitigation: No mitigation is needed.

Pipeline Component

Construction of the pipelines will potentially disturb cultural resources, specifically prehistoric and historic archaeological sites, historic architectural resources, and historic districts. The resources enumerated under the impact column in Table 4.15-3 include those known archaeological sites within 300 feet of the pipeline route, and historic architectural resources that are immediately adjacent to the pipelines and might, therefore, be impacted by construction vibration and noise. No cultural resources field survey has been conducted for the pipeline component; number of resources per alternative was derived from records on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park. The information is presented by alternative rather than by specific pipeline section in order to protect the sensitive nature of cultural resource locations.

Table 4.15-3

Cultural Resources and Paleontology Component Impacts - Pipelines

Evaluation Criteria	Point of Significance	Impact	Type of Impact¹	Level of Significance²
15.4.1. Will the pipeline component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Alt 2A - Tolay Extended		97	C, O&M	⊙
• Alt 2B - Adobe Road		97	C, O&M	⊙
• Alt 2C - Tolay Confined		97	C, O&M	⊙
• Alt 2D - Lakeville/Sears Point		100	C, O&M	⊙
• Alt 3A - Two Rock		97	C, O&M	⊙
• Alt 3B - Bloomfield		98	C, O&M	⊙
• Alt 3C - Carroll Road		95	C, O&M	⊙
• Alt 3D - Valley Ford		95	C, O&M	⊙
• Alt 3E - Huntley		96	C, O&M	⊙
• Alt 4 - Geysers		19	C, O&M	⊙
• Alt 5A - Russian River Discharge		2	C, O&M	⊙
• Alt 5B - Laguna Discharge		--	C, O&M	--
15.4.2. Will the pipeline component disturb unknown archaeological resources?	Greater than 0 Projected locations	Greater than 0	C, O&M	⊙
15.4.3. Will the pipeline component disturb unknown vertebrate paleontologic resources?	Greater than 0 occurrences	Greater than 0	C	⊙

Source: Harland Bartholomew & Associates, Inc., 1996

- Notes: 1. Type of Impact:
- C Construction
- O&M Operation and Maintenance
- P Permanent
2. Level of Significance codes:
- ⊙ Significant impact before mitigation; less than significant impact after mitigation

Impact: 15.4.1. Will the pipeline component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?

Analysis: *Prehistoric and Historic Archaeological Sites*

Significant; Alternatives 2, 3, 4, and 5A.

Construction of the reclaimed water transmission pipelines could result in impacts to cultural resources. Ground disturbance associated with the placement of the pipelines, including the effects of heavy equipment activity and possibly ongoing maintenance activities, will result in the destruction or alteration of known prehistoric and historic archaeological sites. Table 4.15-4 shows the number of prehistoric and historic archaeological sites occurring within each alternative.

No Impact; Alternatives 1 and 5B.

These alternatives do not have a pipeline component.

Table 4.15-4

Number of Prehistoric and Historic Archaeological Sites - Pipelines

Alternative	Prehistoric ¹	Historic ²	Architectural ³	Prehistoric/ Historic ⁴	Total
2A	9	6	81	1	97
2B	9	6	81	1	97
2C	9	6	81	1	97
2D	12	6	81	1	100
2E	10	6	81	1	98
3A	8	2	86	1	97
3B	8	2	87	1	98
3C	6	2	86	1	95
3D	6	2	86	1	95
3E	6	3	86	1	96
3F	8	2	86	1	97
4	5	1	9	0	19
5A	1	1	0	0	2
5B	0	0	0	0	0

Source: Harland Bartholomew & Associates, Inc. March 1996

Notes: 1 - Prehistoric archaeological site
2 - Historic archaeological site
3 - Historic architectural site
4 - Site with both prehistoric and historic components

Historic Architectural Sites

Significant; Alternatives 2, 3, and 4.

Construction of the reclaimed water transmission pipelines could result in impacts to known historic architectural resources. The effect on the historic architectural resources may consist of disturbance or alteration by the effects of vibration from construction earth-moving and associated heavy equipment or the disturbance or destruction of small-scale features associated with the historic architectural resource, i.e., fencelines, outbuildings, roads, and buried features and artifacts. In addition, the operation and maintenance of the pipelines might lead to such activities as ground disturbance, access to cultural resources by personnel, heavy equipment activity, and repairs to pipelines, all of which can result in the damage to or destruction of the historic architectural resources.

Table 4.15-4 shows the number of historic architectural resources occurring within each alternative. The Petaluma Adobe, a National Register listed historic property as well as a California Historic Landmark, occurs adjacent to the pipeline alignment for Alternative 2, South County Reclamation, and might be affected by vibration from construction of the pipeline. The Llano Road Roadhouse, a National Register listed historic property and Sonoma County Landmark, is adjacent to the pipeline alignment for Alternative 3, West County Reclamation. The pipelines for Alternative 2 pass through the Olive Park, West Third, and Westside historic districts of the City of Santa Rosa, potentially affecting many buildings that are recognized as contributors to the districts. In addition, two Sonoma County Landmarks on Bennett Valley Road and the Peterson Dairy might be impacted by pipeline construction for alternatives 2 and 3.

No Impact; Alternatives 1 and 5.

Alternative 5A does not have any impacts to historic architectural sites. Alternatives 1 and 5B do not have a pipeline component.

Mitigation: *Alternatives 2, 3, 4 and 5A.*

2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.

Alternatives 1 and 5B. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, 4, and 5A.*

The Memorandum of Agreement, developed under the federal guidelines and regulations of Section 106 of the national Historic Preservation Act, will present measures to avoid, reduce, or mitigate Project impacts to cultural resources. These measures may consist of Project redesign and/or a data recovery work plan requiring extensive archival research, documentation, subsurface testing, full excavation, and/or data analysis and reporting, dependent on the resource. These measures will fulfill the

lead agency obligation under Section 106 to take into account the effects to historic properties (cultural resources) for a federal undertaking. Following these measures will reduce impacts to a less than significant level.

Impact: 15.4.2. Will the pipeline component disturb unknown archaeological resources?

Analysis: *Significant; Alternatives 2, 3, 4, and 5A.*

There is the possibility that surface or subsurface cultural resources not identified during the field survey of the pipeline routes or from the review of records at the Northwest Information Center will be encountered during construction or operation/management of the pipelines, or that there are unexpected effects on known cultural resources. There is the possibility of unknown resources occurring along the pipeline components for each of the alternatives.

No Impact; Alternatives 1 and 5B.

These alternatives do not have a pipeline component.

Mitigation: *Alternative 2, 3, 4, and 5A.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternative 1 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, 4, and 5B.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.4.3. Will the pipeline component disturb unknown vertebrate paleontologic resources?

Analysis: *Significant; Alternatives 2, 3, 4, and 5A.*

Pipeline construction for Alternatives 2, 4 and 5A may result in disturbance to paleontologic resources because trenching could disturb vertebrate fossil-bearing rock units (Petaluma, Wilson Grove, and/or Glen Ellen formations). The pipeline component for Alternative 2 traverses the Petaluma Formation in the southern part of Sonoma County, while the pipeline component for Alternative 3 passes through the Wilson Grove Formation in the western portion of the county. The Geysers (Alternative 4) pipeline component will disturb potential fossiliferous deposits (Glen Ellen Formation).

The Russian River pipeline (Alternative 5A) briefly traverses Wilson Grove Formation deposits.

No Impact; Alternatives 1 and 5B.

These alternatives do not have a pipeline component.

Mitigation: *Alternatives 2, 3, 4, and 5A.*

2.4.13 Protect Vertebrate Paleontologic Resources.

Alternatives 1 and 5B. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, 4, and 5A.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Storage Reservoir Component

Table 4.15-5

Cultural Resources and Paleontology Component Impacts - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact (sites)	Type of Impact ¹	Level of Significance ²
15.5.1. Will the storage reservoir component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Tolay Extended		34	C, P, O&M	⊙
• Adobe Road		23	C, P, O&M	⊙
• Tolay Confined		21	C, P, O&M	⊙
• Lakeville Hillside		10	C, P, O&M	⊙
• Sears Point		18	C, P, O&M	⊙
• Two Rock		46	C, P, O&M	⊙
• Bloomfield		16	C, P, O&M	⊙
• Carroll Road		13	C, P, O&M	⊙
• Valley Ford		7	C, P, O&M	⊙
• Huntley		11	C, P, O&M	⊙

Table 4.15-5

Cultural Resources and Paleontology Component Impacts - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact (sites)	Type of Impact ¹	Level of Significance ²
15.5.2. Will the storage reservoir component disturb unknown archaeological resources? All Reservoirs.	Greater than 0 projected locations	Greater than 0	C, P, O&M	⊙
15.5.3. Will the storage reservoir component disturb unknown paleontologic resources?	Greater than 0 occurrences	Greater than 0	C	⊙

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
C Construction
O&M Operation and Maintenance
P Permanent

2. Level of Significance codes:
⊙ Significant impact before mitigation; less than significant impact after mitigation

Impact: 15.5.1. Will the storage reservoir component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, or Native American/traditional heritage resources?

Analysis: *Prehistoric and Historic Archaeological Sites*
Significant; Alternatives 2, 3A, 3B, 3C, and 3E.

Construction and operation and maintenance of the storage reservoirs and associated dam, spillway, riprap, and diversion channel facilities will result in disturbance to known prehistoric and historic archaeological sites at all of the storage reservoir locations, except for Valley Ford. The effect on the cultural resources may consist of destruction or alteration of archaeological sites and components by construction earth-moving and associated heavy equipment or physical and chemical alterations of faunal, botanical, and lithic remains as a result of inundation by the storage waters. In addition, the operation and maintenance of the reservoirs might lead to such activities as ground disturbance, access to cultural resources by personnel, heavy equipment activity, filling and drawdowns of reservoirs, and repairs to pipelines, all of which can result in damage to or destruction of prehistoric and historic archaeological sites. Table 4.15-6 shows the number of prehistoric and historic archaeological sites occurring within each reservoir site.

There are at least four prehistoric archeological sites at Tolay Extended and three at Tolay Confined that are known to have human remains.

Table 4.15-6

Number of Prehistoric and Historic Archaeological Sites - Reservoirs

Reservoir	Prehistoric ¹	Historic ²	Architectural ³	Prehistoric /Historic ⁴	Historic Architectural ⁵	Architectural Historic Setting ⁶	Historic Vernacular Landscape ⁷	Total
Tolay Extended	12	1	3	1	0	16	1	34
Adobe Road	2	1	1	0	0	19	1	23
Tolay Confined	9	0	2	0	0	9	1	21
Lakeville Hillside	0	1	0	0	0	8	1	10
Sears Point	3	0	2	0	0	12	1	18
Two Rock	7	3	0	0	0	35	1	46
Bloomfield	0	1	0	0	0	14	1	16
Carroll Road	0	0	2	1	0	9	1	13
Valley Ford	0	0	1	0	0	5	1	7
Huntley	0	0	0	0	2	8	1	11

Source: Harland Bartholomew & Associates, Inc., March 1996

Notes:

- 1 - Prehistoric archaeological site
- 2 - Historic archaeological site
- 3 - Architectural historical site
- 4 - A site with both a prehistoric and historic component
- 5 - A site with both a historic and architectural component
- 6 - Architectural historical setting
- 7 - Historic vernacular landscape

No Impact; Alternatives 1, 3, 4, and 5.

There are no known prehistoric or historic archaeological sites identified at the Valley Ford reservoir site.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Historic Architectural Sites

Significant; Alternatives 2, 3C, 3D, and 3E.

Operation and maintenance of the storage reservoir component will result in disturbance to historic architectural resources at 7 of the 10 reservoir sites. The effect on the historic architectural resources may consist of destruction or alteration by construction earth-moving and associated heavy equipment or physical and chemical alterations of faunal, botanical, and historic remains as a result of inundation by the storage waters. In addition, the operation and maintenance of the reservoirs might lead to such activities as ground disturbance, access to cultural resources by personnel, heavy equipment activity, filling and drawdowns of reservoirs, repairs to pipelines, and installation of new facilities, all of which can result in the damage to or destruction the historic architectural resources. Table 4.15-6 shows the number of historic architectural resources occurring within each proposed storage reservoir.

No Impact; Alternatives 1, 3A, 3B, 4, and 5.

No historic architectural sites have been identified at the Lakeville Hillside, Two Rock, and Bloomfield reservoir sites.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Historic Architectural Settings

Significant; Alternatives 2 and 3.

Construction, operation, and maintenance of the storage reservoirs may introduce visual, audible, or atmospheric elements that alter the setting, integrity of locations, or feeling associated with cultural resources. The introduction of such features as dams and reservoirs can affect the integrity of architectural sites by altering the setting in which such cultural resources are situated and by altering cultural landscapes themselves. For example, large dams and bodies of water that dominate the landscape will be at a scale not in keeping with the elements of the architectural sites or cultural landscapes.

An estimate for the numbers of historic architectural settings that might be affected by each storage reservoir location was made using historic data, maps, field checks, or a combination of the techniques. Table 4.15-5 shows the number of historic architectural site settings that may be affected for each proposed storage reservoir. In particular, the Two Rock

storage reservoir might impact the setting of a Sonoma County Landmark on Roblar Road.

Historic Districts

Significant; Alternatives 2A, 2C, 2D, and 3A.

A cultural resource may possess significance in and of itself, and/or it may possess significance by being a contributing element to a historic district. Preliminary evaluation of cultural resources in the Tolay Extended and Confined, Sears Point, and Two Rock storage reservoir locations indicates that such resources may form a portion of a historic district. *National Register Bulletin 15*, "How to Apply the National Register Criteria for Evaluation," states that "A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development." In addition, the bulletin states "A district derives its importance from being a unified entity, even though it is often composed of a wide variety of resources. The identity of a district results from the interrelationship of its resources, which can be an arrangement of historically or functionally related properties into a grouping of archaeological sites related primarily by their common components; these types of districts often will not visually represent a specific historic environment" (Andrus 1991).

As a whole, twenty prehistoric archaeological sites have been identified to date within the Tolay Creek watershed (including parcels outside the Project area), which provides a unifying element to these sites. The cultural resources within this watershed appear to represent a continuum from initial occupation to the historical period. These sites include substantial and minor midden deposits, lithic scatters, bedrock mortars, petroglyphs, and deposits containing numerous charmstones. The sites represent a variety of major and minor habitation, resource processing, and ceremonial sites. They represent occupation or use from 5,000 years before the present to the 1850s. Of the twenty known prehistoric sites in the Tolay Creek watershed, 11 are within the Tolay Extended reservoir site, eight are within the Tolay Confined reservoir site, and three are within the Sears Point reservoir site.

The Two Rock storage reservoir is within a unique watershed whose distinctive setting provides a unifying element for the cultural resources within it. This protected valley has its own water source and contains an abundance and diversity of vegetational resources not found in other drainages in the general vicinity. The cultural resources within this watershed may represent a single continuum from initial use through historical occupation, or there may be two distinct phases of occupation represented by the prehistoric and historical sites. The seven prehistoric sites appear to represent a long period of occupation, with interrelated

function. Considering the overall lack of information about the prehistoric settlement and use of the West County area, the Two Rock prehistoric sites provide a unique data potential. The three historical sites of the Two Rock storage reservoir location provide an excellent opportunity to research not only the three farm/ranches located within the drainage itself but also use of the area by other farms/ranches that used portions of the valley as part of their agricultural operations. The manner in which the occupants of these sites interacted with each other and the land they held is of general historic interest.

No Impact; Alternatives 1, 2B, 3B, 3C, 3D, 3E, 4, and 5.

There are no potential historic districts at the Adobe Road, Lakeville Hillside, Bloomfield, Carroll Road, Valley Ford, and Huntley reservoir sites.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Historic Vernacular Landscape

Significant; Alternatives 2 and 3.

Originally, the natural landscape of the reservoir sites in South County consisted of coastal prairie-scrub mosaic and mixed hardwood forest. As a result of historical use of the land, the environment was altered to its present condition. Character-defining features of the current landscape include cypress and eucalyptus tree rows, clusters, and windbreaks, heavily grazed, grassy, rolling hills; and ranch complexes with associated small-scale elements such as fences, feed and water troughs, windmills, roads, orchards, and farm machinery. The historic vernacular (common or local) landscape is an example of a rural landscape that “gradually took form when people moved into a place, did what they could to survive and prosper with the resources at hand” (Jackson 1980). This historic vernacular landscape represents an important trend in Sonoma County history in which land was initially occupied and farmed to meet the individual needs of its settlers. As populations grew, technological advancements occurred, and transportation methods improved, specialized farming gradually came to replace subsistence and general farming. The current landscape is a by-product of this history.

The historic vernacular landscapes at all the reservoir locations convey a strong sense of the area’s agriculturally based history. For the most part, the agricultural activity of the late-19th century continues to the present. The cultural aspects of these landscapes indicate how space was organized, boundaries drawn, land divided, and communal facilities developed (see Jackson 1980). These landscapes are potentially eligible for listing to the National Register of Historic Places under Criteria A.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.

Alternatives 1, 4 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

The Memorandum of Agreement, developed under the federal guidelines and regulations of Section 106 of the national Historic Preservation Act, will present measures to avoid, reduce, or mitigate Project impacts to cultural resources. These measures may consist of Project redesign and/or a data recovery work plan requiring extensive archival research, documentation, subsurface testing, full excavation, and/or data analysis and reporting, dependent on the resource. These measures will fulfill the lead agency obligation under Section 106 to take into account the effects to historic properties (cultural resources) for a federal undertaking. Following these measures will reduce impacts to a less than significant level.

Impact: 15.5.2. Will the storage reservoir component disturb unknown archaeological resources?

Analysis: *Significant; Alternatives 2 and 3.*

There is the possibility that surface or subsurface cultural resources not identified during the field survey or subsequent additional studies of the access roads, pump stations, and pipelines, will be encountered during construction or operation and maintenance of the reservoirs, or that there are unexpected effects on known cultural resources.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternatives 1, 4, and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.5.3. Will the storage reservoir component disturb unknown vertebrate paleontologic resources?

Analysis: *Significant; Alternatives 2 and 3.*

Storage Reservoir construction under Alternatives 2 and 3 may result in disturbance to paleontologic resources because the grading and trenching required for construction of the reservoirs, access roads, and diversion ditches could disturb vertebrate fossil-bearing rock units (Petaluma and/or Wilson Grove formations). The storage reservoirs in South County (Tolay, Adobe Road, Lakeville, and Sear Point) are underlain by rocks of the Petaluma Formation, which is common in the southern part of Sonoma County. Within all of the West County storage reservoir sites (Two Rock, Bloomfield, Carroll Road, Valley Ford, and Huntley), the Wilson Grove Formation, common in the western portion of the County, is present.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.4.13. Protect Vertebrate Paleontologic Resources.

Alternatives 1, 4 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Pump Station Component

Construction of the intermediate pump stations along the transmission lines will potentially disturb cultural and paleontological resources, specifically buried resources and the setting of historic architectural resources. No cultural resources field survey has been conducted for the pump station component; number of resources per alternative was derived from records on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park. The information is presented by alternative rather than by specific pump station in order to protect the sensitive nature of cultural resource locations.

Table 4.15-7

Cultural Resources and Paleontology Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact¹	Level of Significance²
15.6.1. Will the pump station component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Alt 2 - South County		33	C, P, O&M	⊙
• Alt 3 - West County		18	C, P, O&M	⊙
• Alt 4 - Geysers Recharge		24	C, P, O&M	⊙
15.6.2. Will the pump station component disturb unknown archaeological resources?	Greater than 0 projected locations	Greater than 0	C, P, O&M	⊙
15.6.3. Will the pump station component disturb unknown vertebrate paleontologic resources?	Greater than 0 occurrences			
• Alternative 2A		3	C	⊙
• Alternative 2B		3	C	⊙
• Alternative 2C		3	C	⊙
• Alternative 2D		4	C	⊙
• Alternative 3A		4	C	⊙
• Alternative 3B		4	C	⊙
• Alternative 3C		4	C	⊙
• Alternative 3D		4	C	⊙
• Alternative 3E		4	C	⊙
• Alternative 4		0	C	==

Source: Harland Bartholomew & Associates, Inc., 1995

Notes:	1. Type of Impact:	2. Level of Significance:
	C Construction	⊙ Significant impact before mitigation; less than significant impact after mitigation
	O&M Operation and Maintenance	== No impact
	P Permanent	

Impact: 15.6.1. Will the pump station component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, or Native American/traditional heritage resources?

Analysis: *Prehistoric and Historic Archaeological Sites*

Significant; Alternatives 2, 3, and 4.

Construction and operation of the proposed pump stations will result in disturbance to known prehistoric and historic archaeological sites for Alternatives 2, 3, and 4. Table 4.15-8 shows the number of prehistoric and historic archaeological sites known to occur within the pump station sites of each alternative. The effect on the cultural resources may consist of the destruction or alteration of archaeological sites and components by construction earth-moving and associated heavy equipment.

Table 4.15-8

Number of Prehistoric and Historic Archaeological Sites - Pump Stations

Alternative	Prehistoric ¹	Historic ²	Prehistoric/ Historic ³	Historic Architectural Setting ⁴	Total
2A	2	0	1	30	33
2B	2	0	1	30	33
2C	2	0	1	30	33
2D	2	0	1	30	33
2E	2	0	1	30	33
3A	2	0	1	15	18
3B	2	0	1	15	18
3C	2	0	1	15	18
3D	2	0	1	15	18
3E	2	0	1	15	18
3F	2	0	1	15	18
4	1	2	0	21	28

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

- 1 - Prehistoric archaeological site
- 2 - Historic archaeological site
- 3 - Site with both a prehistoric and historic component
- 4 - Historical architectural setting

Historic Architectural Settings

Significant; Alternatives 2, 3, and 4.

Construction and operation of the pump stations may introduce visual, audible, or atmospheric elements that alter the setting, integrity of locations, or feeling associated with cultural resources. The introduction of such features as pump stations can affect the integrity of architectural sites by altering the setting in which such cultural resources are situated.

No Impact; Alternatives 1 and 5.

These alternatives do not have a pump station component.

Mitigation: *Alternatives 2, 3 and 4.*

2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.

Alternatives 1 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, and 4.*

The Memorandum of Agreement, developed under the federal guidelines and regulations of Section 106 of the national Historic Preservation Act, will present measures to avoid, reduce, or mitigate Project impacts to cultural resources. These measures may consist of Project redesign and/or a data recovery work plan requiring extensive archival research, documentation, subsurface testing, full excavation, and/or data analysis and reporting, dependent on the resource. These measures will fulfill the lead agency obligation under Section 106 to take into account the effects to historic properties (cultural resources) for a federal undertaking. Following these measures will reduce impacts to a less than significant level.

Impact: 15.6.2. Will the pump station component cause disturbance of unknown archaeological resources?

Analysis: *Significant; Alternatives 2, 3, and 4.*

There is the possibility that surface or subsurface cultural resources not identified during the field survey of the pump station sites or from the review of records at the Northwest Information Center will be encountered during construction or operation/maintenance of the pump stations, or that there are unexpected effects on known cultural resources. There is the possibility of unknown resources occurring at each of the alternatives.

No Impact; Alternatives 1 and 5.

These alternatives do not have a pump station component.

Mitigation: *Alternatives 2, 3 and 4.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternatives 1 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, and 4.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.6.3. Will the pump station component disturb unknown vertebrate paleontologic resources?

Analysis: *Significant; Alternatives 2 and 3.*

Pump station construction for Alternatives 2 and 3 may result in disturbance to paleontologic resources because the ground disturbance required for the construction of the pump stations and installation of the pumps could disturb vertebrate fossil-bearing rock units (Petaluma and/or Wilson Grove formations). Table 4.15-9 lists each of the pump stations that might impact fossiliferous deposits.

Table 4.15-9

Fossiliferous Rock Units Affected by Pump Stations

Pump Station	Alternative	Affected Rock Unit
FGB	2, 3	Petaluma Formation
SBPS-9	2D	Petaluma Formation
SBPS-10	2	Petaluma Formation
LBPS-1	2, 3	Wilson Grove Formation
LBPS-2	2, 3	Wilson Grove Formation
LBPS-3	2, 3	Wilson Grove Formation
LBPS-4	2, 3	Wilson Grove Formation

Source: Harland Bartholomew & Associates, Inc., 1996

No Impact; Alternatives 1, 4, and 5.

Pump stations for the geysers alternative are not located on fossil bearing rock formations.

Alternatives 1 and 5 do not have a pump station component.

Mitigation: *Alternatives 2 and 3.*

2.4.13. Protect Vertebrate Paleontologic Resources.

Alternatives 1, 4 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Agricultural Irrigation Component

No cultural resources field survey has been conducted for the agricultural irrigation component; Number of resources per area was derived from records on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park and are listed under criterion #1. A sensitivity model was used to predict the number and kinds of cultural resources present on previously unsurveyed parcels of each irrigation area and they are listed under criterion #2.

Table 4.15-10

Cultural Resources and Paleontology Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
15.7.1. Will the agricultural irrigation component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Adobe Road		4	C, P, O&M	⊙
• Lakeville		29	C, P, O&M	⊙
• Bay Flats		4	C, P, O&M	⊙
• East of Rohnert Park		13	C, P, O&M	⊙
• North Petaluma Valley		20	C, P, O&M	⊙
• Americano		49	C, P, O&M	⊙

Table 4.15-10

Cultural Resources and Paleontology Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
• Stemple		4	C, P, O&M	⊙
• Sebastopol		14	C, P, O&M	⊙
• Miscellaneous		4	C, P, O&M	⊙
15.7.2. Will the agricultural irrigation component disturb unknown archaeological resources?	Greater than 0 projected locations			
• Adobe Road		Greater than 19	C, P, O&M	⊙
• Lakeville		Greater than 34	C, P, O&M	⊙
• Bay Flats		Greater than 6	C, P, O&M	⊙
• East of Rohnert Park		Greater than 15	C, P, O&M	⊙
• North Petaluma Valley		Greater than 6	C, P, O&M	⊙
• Americano		Greater than 52	C, P, O&M	⊙
• Stemple		Greater than 72	C, P, O&M	⊙
• Sebastopol		Greater than 28	C, P, O&M	⊙
• Miscellaneous		Greater than 0	C, P, O&M	⊙
15.7.3. Will the agricultural component disturb unknown vertebrate paleontologic resources?	Greater than 0 occurrences	Greater than 0	C	⊙

Source: Harland Bartholomew & Associates, 1995

Notes: 1. Type of Impact:
C Construction

O&M Operation and Maintenance
P Permanent

2. Level of Significance codes:
⊙ Significant impact before mitigation; less than significant impact after mitigation

Impact: 15.7.1. Will the agricultural irrigation component disturb known potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources?

Analysis: *Significant; Alternatives 2 and 3.*

Prehistoric and Historic Archaeological Sites

Construction and operation/maintenance of the agricultural irrigation areas will result in disturbance to known prehistoric and historic archaeological sites at all of the agricultural irrigation areas in the West and South County. The effect on the cultural resources may consist of destruction or alteration of archaeological sites by the construction of the irrigation pipelines, the effects of new crop types, and the cycles of wetting and drying by irrigation. In addition, the operation and maintenance of the agricultural irrigation areas might lead to such activities as ground disturbance, access to cultural resources by personnel, heavy equipment activity, repairs to pipelines, and installation of new facilities, all of which can result in the damage to or destruction of prehistoric and historic archaeological sites. Table 4.15-11 shows the number of prehistoric and historic archaeological sites occurring within each area.

Table 4.15-11

Number of Prehistoric and Historic Archaeological Sites - Agricultural Irrigation

Irrigation Area	Prehistoric¹	Historic²	Architectural³	Prehistoric /Historic⁴	Historic Vernacular Landscape⁵	Total
Adobe Road	3	0	0	0	1	4
Lakeville	18	3	6	1	1	29
Bay Flats	3	0	0	0	1	4
East of Rohnert Park	6	3	3	0	1	13
North Petaluma	4	3	12	0	1	20
Americano	4	1	42	1	1	49
Stemple	2	1	0	0	1	4
Sebastopol	10	1	1	1	1	14
Miscellaneous	1	0	1	0	1	3

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

- 1 - Prehistoric Archaeological Site
- 2 - Historic Archaeological Site
- 3 - Architectural Historical Site
- 4 - Site with both prehistoric and historic components
- 5 - Historic Vernacular Landscape

Historic Architectural Settings

Construction and operation/maintenance of the agricultural irrigation areas may introduce visual, audible, or atmospheric elements that alter the setting, integrity of locations, or feeling associated with cultural resources. The introduction of irrigation techniques to previously uncultivated lands may affect the integrity of architectural sites by altering the setting in which such cultural resources are situated and by altering cultural landscapes themselves.

An estimate for the numbers of historical architectural site settings that might be affected by each agricultural irrigation location was made using historic data, maps, field checks, or a combination of the techniques. Within the Lakeville irrigation area, specific historical architectural properties are Donahue's Landing and the Bordessa Dairy. The Edwin Merritt Farm and the John T. Merritt Residence are historical architectural properties within the North Petaluma irrigation area, and the Americano irrigation area encompasses many historical architectural properties, including six Sonoma County Landmarks (three buildings, a bridge, a dairy/creamery, and a school).

Table 4.15-11 shows the number of historic architectural resource settings affected within each irrigation area.

No known cultural resource sites have been identified in the Adobe Road, Bay flats, and Stemple agricultural irrigation Areas.

Historic Vernacular Landscape

The historic vernacular landscapes at each of the agricultural irrigation areas could be changed as a result of proposed irrigation procedures and the addition of currently uncultivated parcels to irrigation. Although irrigation will not change the landscape to a non-agricultural use, the type of agriculture could change, for example from dry pasture to vineyard. For the most part, the agricultural activity of the late-19th century continues to the present. The cultural aspects of these landscapes indicate how space was organized, boundaries drawn, land divided, and communal facilities developed (Jackson 1980). These landscapes are potentially eligible for listing to the National Register of Historic Places under Criteria A.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: *Alternatives 2 and 3.*

2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.

Alternatives 1, 4, and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

The Memorandum of Agreement, developed under the federal guidelines and regulations of Section 106 of the national Historic Preservation Act, will present measures to avoid, reduce, or mitigate Project impacts to cultural resources. These measures may consist of Project redesign and/or a data recovery work plan requiring extensive archival research, documentation, subsurface testing, full excavation, and/or data analysis and reporting, dependent on the resource. These measures will fulfill the lead agency obligation under Section 106 to take into account the effects to historic properties (cultural resources) for a federal undertaking. Following these measures will reduce impacts to a less than significant level.

Impact: 15.7.2. Will the agricultural irrigation component disturb unknown archaeological resources?

Analysis: *Significant; Alternatives 2 and 3.*

There is the possibility that surface or subsurface cultural resources not identified during the required future field survey of the agricultural irrigation areas, will be encountered during construction or operation/maintenance of the agricultural irrigation areas, or that there are unexpected effects on known cultural resources. Based on the sensitivity study conducted by the Anthropological Studies Center, Sonoma State University, the possibility of unknown resource locations occurs at all the agricultural irrigation areas.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: *Alternatives 2 and 3.*

2.4.12. Protect undiscovered cultural resource sites.

Alternatives 1, 4, and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.7.3. Will the agricultural irrigation component disturb unknown vertebrate paleontologic resources?

Analysis: *Significant; Alternatives 2 and 3.*

Within Alternative 2, the Petaluma Formation occurs, as does a small area of the Wilson Grove Formation near Sebastopol. Alternative 3 agricultural irrigation areas contain Wilson Grove Formation rock units as well. Typically, a 6-inch-diameter main pipe may be installed in the agricultural areas and some ground disturbance will occur. Such disturbance will be minimal and occur within the top 2 feet of the ground surface. The lateral lines leading off the main line will be laid on the surface. There are, however, larger pipelines placed at depth leading from the distribution pipelines in public rights-of-way to individual parcels.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: *Alternatives 2 and 3.*

2.4.13. Protect Vertebrate Paleontologic Resources.

Alternatives 1, 4 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Geysers Steamfield Component

No cultural resources field survey has been conducted for the geysers steamfield component; number of resources was derived from records on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park.

Table 4.15-12

Cultural Resources and Paleontology Impacts by Component - Geysers Steamfield

Evaluation Criteria	Point of Significance	Impact	Type of Impact¹	Level of Significance²
15.8.1. Will the geysers steamfield component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites	9	C, P, O&M	⊙
15.8.2. Will the geysers steamfield component disturb unknown archaeological resources?	Greater than 0 projected locations	Greater than 0	C, P, O&M	⊙
15.8.3. Will the geysers steamfield component disturb unknown vertebrate paleontologic resources?	Greater than 0 occurrences	0	C	==

Source: Harland Bartholomew & Associates, Inc.,
October, 1995

Notes:	1. Type of Impact:	2. Level of Significance codes:
	C Construction	⊙ Significant impact before mitigation; less than significant impact after mitigation
	O&M Operation and Maintenance	== No impact
	P Permanent	

Impact: **15.8.1. Will the geysers steamfield component disturb known potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources?**

Analysis: ***Prehistoric and Historic Archaeological Sites***

Significant; Alternative 4.

Construction, operation and maintenance of the pipelines in the geysers steamfield component will result in disturbance to known prehistoric and historic archaeological sites. The effect on the cultural resources may consist of destruction or alteration of archaeological sites and components by construction earth-moving and associated heavy equipment. In addition, the operation and maintenance of the component might lead to such activities as ground disturbance, access to cultural resources by personnel, heavy equipment activity, and repairs to pipelines, all of which can result in damage to or destruction of prehistoric and historic archaeological sites. Table 4.15-13 shows the number of prehistoric and

historic archaeological sites occurring within each alternative, based on archival records.

No Impact; Alternatives 1, 2, 3, and 5.

These alternatives do not have a geyser steamfield component.

Mitigation: *Alternative 4.*

2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.

Alternative 1, 2, 3, and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternative 4.*

The Memorandum of Agreement, developed under the federal guidelines and regulations of Section 106 of the national Historic Preservation Act, will present measures to avoid, reduce, or mitigate Project impacts to cultural resources. These measures may consist of Project redesign and/or a data recovery work plan requiring extensive archival research, documentation, subsurface testing, full excavation, and/or data analysis and reporting, dependent on the resource. These measures will fulfill the lead agency obligation under Section 106 to take into account the effects to historic properties (cultural resources) for a federal undertaking. Following these measures will reduce impacts to a less than significant level.

Table 4.15-13

Number of Prehistoric and Historic Archaeological Sites - Geysers Steamfield

Geysers	Prehistoric ¹	Historic ²	Total
Alt 4	7	2	9

Source: Harland Bartholomew & Associates, Inc.,
March 1996

Notes:

1 - Prehistoric Archaeological Site

2 - Historic Archaeological Site

Impact: 15.8.2. Will the geysers steamfield component disturb unknown archaeological resources?

Analysis: *Significant; Alternative 4.*

There is the possibility that surface or subsurface cultural resources not identified during the field survey of the Geysers steamfield component or from the review of records at the Northwest Information Center will be

encountered during construction or operation/maintenance of the component, or that there are unexpected effects on known cultural resources. There is the possibility of unknown resources occurring within this component.

No Impact; Alternatives 1, 2, 3, and 5.

These alternatives do not have a geyser steamfield component.

Mitigation: *Alternative 4.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternatives 1, 2, 3, and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternative 4.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.8.3. Will the geysers steamfield component disturb unknown vertebrate paleontologic resources?

Analysis: *No Impact; All Alternatives.*

No known paleontologic site is present in the geysers steamfield component. In addition, the geysers steamfield area is located in its entirety within the Franciscan Complex of rocks, of which the majority are not fossiliferous. Chert within the Franciscan Complex may contain marine microfossils, but these are not considered to be a significant paleontologic resource.

Alternatives 1, 2, 3 and 5 do not have a geyser steamfield component.

Mitigation: No mitigation is needed.

Discharge Component

No cultural resources field survey has been conducted for the discharge component; number of resources was derived from records on file at the Northwest Information Center (Northwest Information Center) of the California Historical Resources Information System, Sonoma State University, Rohnert Park.

Table 4.15-14

Cultural Resources and Paleontology Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact¹	Level of Significance²
15.9.1. Will the discharge component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Russian River		0	C, P, O&M	==
• Laguna		--	--	--
15.9.2. Will the discharge component disturb unknown archaeological resources?	Greater than 0 projected locations			
• Russian River		Greater than 0	C, P, O&M	⊙
• Laguna		--	--	--
15.9.3. Will the discharge component disturb unknown vertebrate paleontologic resources?	Greater than 0 occurrences			
• Russian River Discharge		Greater than 0	C	⊙
• Laguna Discharge		None	C	==

Source: Harland Bartholomew & Associates, Inc., October, 1995

- Notes:
- | | |
|-------------------------------|---|
| 1. Type of Impact: | 2. Level of Significance codes: |
| C Construction | ⊙ Significant impact before mitigation; less than significant impact after mitigation |
| O&M Operation and Maintenance | == No impact |
| -- Not Applicable | |
| P Permanent | |

Impact: **15.9.1. Will the discharge component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?**

Analysis: *No Impact; All Alternatives.*

No cultural resource sites have been identified near the discharge outfall on the Russian River. No construction is proposed for alternatives 1, 2, 3, 4, and 5B, and therefore no impacts will result.

Mitigation: No mitigation is needed.

Impact: 15.9.2. Will the discharge component cause disturbance of unknown archaeological resources?

Analysis: *Significant; Alternative 5A.*

There is the possibility that surface or subsurface cultural resources not identified during the archival research for the Russian River discharge component will be encountered during construction or operation/maintenance of the component, or that there are unexpected effects on known cultural resources.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

The use of the existing facilities for the Laguna discharge will not result in an impact to cultural resources because no ground disturbance is expected and existing pipelines and connections will be used.

Mitigation: *Alternative 5A.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternatives 1, 2, 3, 4, and 5B. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternative 5A.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.9.3. Will the discharge component disturb unknown vertebrate paleontologic resources?

Analysis: *Significant; Alternative 5A.*

The discharge of treated water into the Russian River will not result in an impact to paleontologic resources. However, the outfall structure will be constructed in the Wilson Grove Formation and it is possible that fossiliferous deposits might be disturbed by this construction.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

Because the Laguna Discharge involves no construction, it will not impact paleontologic resources.

Mitigation: *Alternative 5A.*

2.4.13. Protect Vertebrate Paleontologic Resources.

Alternatives 1, 2, 3, 4, and 5B. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternative 5A.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

CUMULATIVE IMPACTS

There are three significant impacts identified in the Cultural Resources and Paleontology section:

Impact: 15.1C. Will the Project plus cumulative projects disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?

Analysis: Project impacts are for pipelines for alternatives 1, 2, 3, 4, and 5A; all storage reservoirs; pump stations for alternatives 2, 3, and 4; agricultural irrigation areas; and geysers steamfield.

Extensive cultural resources of all types have been identified throughout the Project area, both within urban and rural areas. Significant impacts to known resources could result from many different sources, for example, construction, demolition, or rehabilitation, and many of the cumulative projects identified could impact known cultural resources. For example, there is a trend in the Project area, irrespective of the Long-Term Project, to convert grazing land to vineyards. This conversion process will significantly impact the Historical Vernacular Landscapes present throughout the rural portions of both South County and West County. Although there are many cumulative projects which will increase the impacts identified in the Cultural Resources section, all Project impacts on known cultural resources have already been listed as significant and have been avoided or fully mitigated. The cumulative projects will not warrant a change in either the finding of significance or the mitigation proposed.

Impact: 15.2C. Will the Project plus cumulative projects disturb unknown archaeological resources?

Project impacts are for pipelines for alternatives 2, 3, 4 and 5B; storage reservoirs; pump stations; all agricultural irrigation areas; geysers steamfield; Russian River discharge outfall.

The discussion of cumulative impacts to unknown cultural resources is similar to that for undiscovered resources. Disturbance of unknown vertebrate paleontologic resources. Pipelines for all alternatives except Laguna Discharge; all storage reservoirs; pump stations for all alternatives except Discharge; all agricultural irrigation areas; Russian River discharge outfall.

The potential for vertebrate fossils exists throughout much of the Project area. The fossils could be disturbed whenever construction occurs at a depth to bedrock. Large scale construction to bedrock which might affect vertebrate fossils may occur, for example, at the Petaluma reclaimed water reservoir or the City's of Healdsburg proposed potable water reservoir. However, all Project impacts have already been listed as significant, and are fully mitigated. Even if vertebrate fossils were found on adjacent properties, no further mitigation will be required of the Project.

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION

Table 4.15-15

Summary of Significant Impacts and Mitigation Measures- Cultural Resources
and Paleontology

Impact	Level of Significance	Mitigation Measure
Pipeline Component		
15.4.1. The pipeline component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 2 - ◎ Alt 3 - ◎ Alt 4 - ◎ Alt 5A - ◎	2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.
15.4.2. The pipeline component may disturb unknown archaeological resources.	Alt 2 - ◎ Alt 3 - ◎ Alt 4 - ◎ Alt 5A - ◎	2.4.12. Protect Undiscovered Cultural Resource Sites.

Table 4.15-15

Summary of Significant Impacts and Mitigation Measures- Cultural Resources and Paleontology

Impact	Level of Significance	Mitigation Measure
15.4.3. The pipeline component may disturb unknown vertebrate paleontologic resources.	Alt 2 - ☉ Alt 3 - ☉ Alt 4 - ☉ Alt 5A - ☉	2.4.13 Protect Vertebrate Paleontologic Resources.
Storage Reservoir Component		
15.5.1. The storage reservoir component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 2 - ☉ Alt 3 - ☉	2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.
15.5.2. The storage reservoir component may disturb unknown archaeological resources.	Alt 2 - ☉ Alt 3 - ☉	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.5.3. The storage reservoir component may disturb unknown vertebrate paleontologic resources.	Alt 2 - ☉ Alt 3 - ☉	2.4.13. Protect Vertebrate Paleontologic Resources.
Pump Station Component		
15.6.1. The pump station component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 2 - ☉ Alt 3 - ☉ Alt 4 - ☉	2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.
15.6.2. The pump station component may disturb unknown archaeological resources.	Alt 2 - ☉ Alt 3 - ☉ Alt 4 - ☉	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.6.3. The pump station component may disturb unknown vertebrate paleontologic resources.	Alt 2 - ☉ Alt 3 - ☉	2.4.13. Protect Vertebrate Paleontologic Resources.

Table 4.15-15

Summary of Significant Impacts and Mitigation Measures- Cultural Resources and Paleontology

Impact	Level of Significance	Mitigation Measure
Agricultural Irrigation Component		
15.7.1. The agricultural irrigation component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 2 - ☉ Alt 3 - ☉	2.3.18. Identification, evaluation, and Avoidance of Cultural Resources.
15.7.2. The agricultural irrigation component may disturb unknown archaeological resources.	Alt 2 - ☉ Alt 3 - ☉	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.7.3. The agricultural irrigation component may disturb unknown vertebrate paleontologic resources.	Alt 2 - ☉ Alt 3 - ☉	2.4.13. Protect Vertebrate Paleontologic Resources.
Geysers Steamfield Component		
15.8.1. The geysers steamfield component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 4 - ☉	2.3.18. Identification, Evaluation and Avoidance of Cultural Resources.
15.8.2. The geysers steamfield component may disturb unknown archaeological resources.	Alt 4 - ☉	2.4.12. Protect Undiscovered Cultural Resource Sites.
Discharge Component		
15.9.2. The discharge component may disturb unknown archaeological resources.	Alt 5A - ☉	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.9.3. The discharge component construction may disturb unknown vertebrate paleontologic resources.	Alt 5A - ☉	2.4.13. Protect Vertebrate Paleontologic Resources.

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

☉ Significant impact before mitigation; less than significant after mitigation.

SUMMARY OF IMPACTS BY ALTERNATIVE

Table 4.15-16

Summary of Impacts by Alternative -Cultural Resources and Paleontology

Component	Alt 1	Alt 2A	Alt 2B	Alt 2C	Alt 2D	Alt 3A	Alt 3B	Alt 3C	Alt 3D	Alt 3E	Alt 4	Alt 5A	Alt 5B
No Action (No Project) Alternative	==	--	--	--	--	--	--	--	--	--	--	--	--
Headworks Expansion	--	==	==	==	==	==	==	==	==	==	==	==	==
Urban Irrigation	--	==	==	==	==	==	==	==	==	==	--	--	--
Pipelines	--	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	--
Storage Reservoirs	--	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	--	--	--
Pump Stations	--	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	--	--
Agricultural Irrigation	--	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	--	--	--
Geysers Steamfield	--	--	--	--	--	--	--	--	--	--	⊙	--	--
Discharge	--	==	==	==	==	==	==	==	==	==	==	⊙	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: Level of Significance Codes

-- Not applicable

== No impact

⊙ Significant impact; less than significant after mitigation

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