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S.1 INTRODUCTION

This Environmental Impact Report (EIR) assesses the potential environmental impacts of the draft Basin Management Plan (BMP) Update proposed by the Pajaro Valley Water Management Agency (PVWMA). This document has been prepared in accordance with the California Environmental Quality Act (CEQA) statutes and guidelines. PVWMA is the lead agency for this CEQA process. Inquiries about the project and the CEQA process should be directed to:

Mary Bannister, General Manager
Pajaro Valley Water Management Agency
36 Brennan Street
Watsonville, California 95076
EIR@pvwater.org
(831) 722-9292

S.2 SUMMARY OF PROJECT DESCRIPTION

PVWMA has prepared the BMP Update to address water resources management issues in the Pajaro Valley. The BMP Update provides a review and update of previous water supply studies, summarizes the Pajaro Valley’s seawater intrusion problems, and recommends a suite of projects to stop seawater intrusion and basin overdraft. In 2010, PVWMA formed the Ad Hoc BMP Committee as a means to engage the community and encourage their participation in the development of an updated BMP to address the water issues discussed above. The BMP Update planning process began with the development of a comprehensive list of potential supplemental water supply projects, including some identified in previous BMPs that could help meet the goals of stopping seawater intrusion and basin overdraft. In total, 44 potential projects were screened, ranked, and prioritized for feasibility, cost, and other factors. Based on this analysis, seven components were selected for inclusion and recommended to the PVWMA Board of Directors for the BMP Update portfolio. The Board acted in January 2013 to include those seven components as the proposed BMP Update and in the EIR analysis. As a group, the seven components (or primary projects and programs) proposed by the BMP Update were simulated using the Pajaro Valley Hydrologic Model and were considered adequate to solve more than 90 percent of the seawater intrusion and basin overdraft problems. Additional projects were identified for potential future implementation should the selected portfolio not meet the planning-level expectations with respect to supply yield or demand offset using an adaptive management method of project implementation. The PVWMA Board of Directors accepted the recommendation by the committee and approved the Draft BMP which included the recommended programs and projects. The portfolio of recommended projects and programs in the BMP Update are summarized in Table S-1, including the seven component projects and programs selected for further review in this EIR and seven others (called “secondary components” that are described and evaluated in the EIR alternatives analysis).
Table S-1 BMP Update Summary of Projects and Programs

<table>
<thead>
<tr>
<th>Project or Program</th>
<th>Estimated Yield AFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-6 Increased Recycled Water Deliveries</td>
<td>1,250</td>
</tr>
<tr>
<td>D-7 Conservation</td>
<td>5,000</td>
</tr>
<tr>
<td>S-22 Harkins Slough Recharge Facilities Upgrades</td>
<td>1,000</td>
</tr>
<tr>
<td>R-6 Increased Recycled Water Storage at Treatment Plant</td>
<td>750</td>
</tr>
<tr>
<td>S-2 Watsonville Slough with Recharge Basins</td>
<td>1,200</td>
</tr>
<tr>
<td>S-3 College Lake with Inland Pipeline To CDS (See Note 2)</td>
<td>2,400¹</td>
</tr>
<tr>
<td>S-1 Murphy Crossing with Recharge Basins</td>
<td>500</td>
</tr>
<tr>
<td>I-1 CDS Expansion</td>
<td></td>
</tr>
<tr>
<td>R-11 Winter Recycled Water Deep Aquifer ASR</td>
<td>3,200</td>
</tr>
<tr>
<td>S-11 River Conveyance of Water for Recharge At Murphy Crossing</td>
<td>2,000</td>
</tr>
<tr>
<td>G-3 San Benito County Groundwater Demineralization at WWTP</td>
<td>3,000</td>
</tr>
<tr>
<td>S-4 Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and Aquifer Storage and Recovery</td>
<td>2,000</td>
</tr>
<tr>
<td>SEA-1 Seawater Desalination</td>
<td>7,500</td>
</tr>
<tr>
<td>S-5 Bolsa De San Cayetano with Pajaro River Diversion</td>
<td>3,500</td>
</tr>
</tbody>
</table>

**Key:**

*Bold = Could be implemented within the first 10 years of the BMP (by 2025)*

*Italic = Could be implemented after 2025, based on ongoing adaptive management assessment.*

*Dark-outlined box = Seven projects included in the proposed BMP Update*

*Outside the dark-outlined box = Seven projects potentially added in the future if needed*

**Notes:**

1. College Lake with Inland Pipeline to CDS yield changed to a range of 2,100 to 2,400 AFY based on RCD College Lake Study (2013, pending).
2. Since the project conveys water from other projects, it does not have a yield.
S.3 PROGRAM OBJECTIVES

The specific objectives of the BMP Update are as follows:

- To prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation;
- To manage existing and supplemental water supplies to control overdraft and to provide for present and future water needs;
- To create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley;
- To develop water conservation programs; and
- To recommend a program that is cost effective and environmentally sound.

Seawater intrusion in the Pajaro Valley groundwater basin was first documented in 1953 and has continued to become more severe. Overdraft conditions have caused groundwater levels to drop below sea level year round in some portions of the Pajaro Valley groundwater basin, and seasonally in others. On average more than 50% of the basin’s groundwater levels are below sea level for much of the year due to excessive pumping across the basin. Such conditions create a landward pressure gradient that causes seawater to flow inland. Seawater intrusion has elevated the chloride concentration in groundwater up to two and a half miles inland from the coast, in some areas contaminating the groundwater to the point that it is unsuitable for agricultural irrigation.

The PVWMA’s role is to manage existing and supplemental water supplies for its service area. The intent of PVWMA is to manage local groundwater resources in a manner to halt long-term overdraft of the groundwater basin and stop seawater intrusion, while ensuring sufficient water supplies for present and anticipated needs. To achieve this objective, PVWMA has prepared and periodically updates a basin-wide water management plan, the BMP, to serve as the guiding document for its major projects and programs. The BMP preparation process includes review of the existing basin conditions, evaluation of the results of implemented projects to reduce overdraft and seawater intrusion, as well as the identification of additional projects and management strategies to achieve its stated goals.

S.4 SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Table S-2 summarizes the impacts of the proposed BMP Update. For each impact considered to be significant or potentially significant, the table summarizes the recommended mitigations. Table S-2 is intended to provide a summary of the impacts and mitigation measures described in detail in Section 3.
S.5 SUMMARY OF ALTERNATIVES TO THE PROPOSED BMP UPDATE

CEQA Guidelines §15126.6 requires the consideration of a range of reasonable alternatives to the Proposed Project (in this case, the BMP Update) that could feasibly attain most of the basic objectives of the project. The CEQA Guidelines further require that the discussion focus on alternatives capable of eliminating significant adverse impacts of the project or reducing them to a less-than-significant level, even if the alternative would not fully attain the project objectives or would be more costly. The range of alternatives required in an EIR is governed by the “rule of reason,” which requires an EIR to evaluate only those alternatives necessary to permit a reasoned choice. An EIR need not consider alternatives that have effects that cannot be reasonably ascertained and/or are remote and speculative.

The Alternatives to the Proposed BMP Update section of the Draft EIR incorporates by reference all previous alternative analyses in past PVWMA’s BMPs and Local Water Supply Projects EIRs and summarizes the BMP team alternatives analysis process conducted in 2011 to 2012 that considered a wide variety of other projects, programs, and BMP components. For the BMP, project summary sheets and cost estimates were developed for 44 projects, then that list was narrowed to the 14 shown in Table S-1, above. As described above, the first seven are analyzed in detail in Section 3 of the EIR.

The following general alternatives or types of alternatives are described and comparatively analyzed at a programmatic level:

- "No Project" Alternative. This alternative was defined as no implementation of any plans, policies, programs, projects, or components by the PVWMA or others to meet the BMP objectives.
- Demand Management Only Alternative. This alternative assumes only mandatory basin-wide pumping controls to meet the BMP objectives.
- Water Supply Facilities Alternatives. In this category of alternatives, the last seven projects/programs in Table S-1 are described, and their impacts are compared qualitatively to the proposed BMP Update components.1
- Alternative Locations for BMP Update Component. This alternative analyzed the potential for each component to be located at a different site while still meeting the BMP objectives.

Based on the record of the alternatives analyses, the proposed BMP Update (including, the seven primary components) would best meet the BMP Update objectives. In addition, the proposed BMP Update components would likely result in fewer and less severe environmental impacts overall, despite relative environmental trade-offs in certain resource issues. Therefore, the proposed BMP Update is considered the Environmentally Superior Alternative.

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1 These seven secondary components may be pursued in the future if the selected portfolio does not meet the planning-level expectations with respect to supply yield or demand offset using an adaptive management method of project implementation; however, would require applicable CEQA compliance prior to future discretionary actions. Alternatives that were not recommended by the PVWMA Board for inclusion in the BMP Update (i.e., those not listed in Table S-1) due to feasibility (technical and cost), environmental impacts, and/or regulatory constraints, are not described nor analyzed in this EIR for these same reasons.
### Table S-2 Summary of Significant Impacts and Mitigation Measures

**KEY TO APPLICABLE COMPONENTS:** (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Mitigation Measures</th>
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<tbody>
<tr>
<td><strong>3.1 Aesthetics</strong></td>
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</table>
| Impact AE-1: Implementation of the BMP Update and future construction of identified BMP Update components would not generally alter the visual character of the sites or surrounding area, although some of the structural development may be visible. This represents a potentially significant impact that will be reduced to a less-than-significant level with the incorporation of mitigation measures. *(Applicable Components: A, D, and E)* | AE-1a: PVWMA shall use design elements to enhance visual integration of the proposed above-ground facilities with their surroundings. Proposed structures shall be painted low-glare earth-tone colors that blend with the surrounding terrain, unless colors otherwise specified by regulatory agencies, such as purple facilities for recycled water systems. *(Applicable Components: A, D, and E)*
AE-1b: PVWMA shall use design elements and landscaping to enhance visual integration of the College Lake pumping and filtration facilities with their surroundings. Proposed facilities shall be painted low-glare earth-tone colors that blend closely with the surrounding terrain. Vegetation shall be planted at proposed facilities to provide screening from views of the facilities from Highway 152. *(Applicable Component: D)*
AE-1c: PVWMA shall shield the weir with vegetation to minimize textural contrasts with the surrounding vegetation using grasses, shrubs and trees typical of the immediately surrounding area. *(Applicable Component: E)* |
| **3.2 Agriculture & Land Use** | |
| Impact AG-1: Implementation of BMP Update components would result in the permanent conversion of agricultural lands. This represents a significant and unavoidable impact. *(Applicable Components: B, C, D, and E)* | No feasible mitigation is available; this impact is significant and unavoidable. *(Applicable Components: B, C, D, and E)* |
| **3.3 Air Quality & Greenhouse Gas** | |
| Impact AQ-1: Implementation of the BMP Update components would temporarily generate criteria air pollutants, particularly PM10, and may expose sensitive receptors to substantial pollutant emissions during construction. This is a potentially significant impact. With mitigation measures identified in this EIR, the impact would be reduced to a less-than-significant level. *(Applicable Components: A, B, C, D, and E)* | Mitigation Measure AQ-1: The construction contractor shall implement a dust program that includes the following elements:
- Water all active construction sites at least twice daily
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites
- Sweep daily (with water sweepers) all paved access roads, paved parking areas and paved staging areas at construction sites
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets. |
Table S-2 Summary of Significant Impacts and Mitigation Measures

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<tr>
<td>• Hydroseed or apply (non-toxic) soil binders to inactive construction areas. However, do not apply these measures in operating agricultural fields under cultivation unless requested by the grower</td>
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<tr>
<td>• Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).</td>
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<td>• Limit traffic on unpaved roads to 15 mph</td>
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<td>• Install sandbags or other erosion control measures to prevent silt runoff to public roadways</td>
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<tr>
<td>• Replant vegetation in disturbed areas as quickly as possible</td>
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<tr>
<td>• The contractor or builder shall designate a person or persons to monitor the fugitive dust emissions and enhance the implementation of the measures as necessary to minimize dust complaints. The name and telephone number of such persons shall be provided to the APCD Compliance Division prior to the start of any grading, earthwork or demolition. (Applicable Components: A, B, C, D, and E)</td>
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3.4 Biological Resources

**Impact BIO-1:** Construction of BMP Update components could result in impacts to potentially jurisdictional wetlands/waters of the U.S. and streambeds and banks under the jurisdiction of the U.S. Army Corps of Engineers, Department of Fish and Wildlife, Regional Water Quality Control Board, and/or California Coastal Commission. Potential direct impacts could occur from the loss of riparian or wetland vegetation and/or fill of wetlands or waters. Indirect impacts could occur due to sedimentation of rivers, creeks, or channels during or following construction activities, and impacts to and their function as wildlife and fishery habitat. This represents a potential significant impact which can be reduced to a less-than-significant level with the following mitigation measures. No operational impacts to wetlands or riparian

**BIO-1a:** Wetlands and riparian habitat will be avoided by project construction activities. All facilities and construction activities will be maintained outside the jurisdictional area defined by riparian or emergent wetland vegetation and applicable setbacks and buffers where feasible. Within the Coastal Zone, project improvements will be located 100 feet from coastal review wetlands. Within the City of Watsonville, development will be located 100 feet from riparian areas. Within the unincorporated areas of the County, yet outside the Coastal Zone, a setback of 30 feet and 50 feet will be established adjacent to intermittent and perennial streams, respectively. If complete avoidance of wetlands and riparian areas is infeasible and/or development occurs within a regulated buffer/setback area, impacts would be minimized through implementation of Mitigation Measures BIO-1b, BIO-1c BIO-1d, and BIO-1e. (Applicable Components: B, C, D, and E)

**BIO-1b:** Standard measures to maintain water quality and to control erosion and sedimentation will be implemented. These measures include:

- Restrict trenching across all waterways to low-flow periods.
- Exclude water from around the section of trench that is within the actively flowing channels. This will further reduce the potential for sediment or other pollutants to enter the waterways and impact downstream resources. The diversion will consist of water pillows, rock, sandbags, or other structural methods deemed most effective by the project engineer.
- Place sediment curtains downstream of the construction zone to prevent sediment disturbed during trenching activities from being transported and deposited outside of the construction zone.
**Table S-2 Summary of Significant Impacts and Mitigation Measures**

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<tr>
<th>Impacts</th>
<th>Mitigation Measures</th>
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| vegetation are anticipated due to the BMP Update. *(Applicable Components: B, C, D, and E)* | - Locate spoil sites so they do not drain directly into the waterways. If a spoil site drains into a channel, catch basins will be constructed to intercept sediment before it reaches the channels. Spoil sites will be graded to reduce the potential for erosion.  
- Prepare and implement a spill prevention plan for potentially hazardous materials. The plan will include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channels.  
- Store equipment and materials away from the waterways, outside existing levees or at least 50 feet from waterways, but within the pipeline right-of-way. No equipment or materials will be deposited within 100 feet of wetlands.  
- Provide proper and timely maintenance for vehicles and equipment used during construction to reduce the potential for mechanical breakdowns leading to a spill of materials into or around the creeks. Maintenance and fueling will be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from the creeks).  
- Prior to construction, install temporary construction fencing at the perimeter of the construction zone to prevent inadvertent equipment access or construction staging within adjacent riparian forest and/or coastal marsh habitats. This fencing will be signed in the field as “SENSITIVE HABITAT AREA — NO CONSTRUCTION ACCESS”. Monitor construction activities to verify compliance with the perimeter fencing and limits of construction access and staging and implement remedial action if non-compliance is noted.  
- Restrict limbing of riparian forest trees; if trees are limbed for construction access, document the impact and provide compensation as per Mitigation Measure BIO-1c. *(Applicable Components: B, C, D, and E)* |

**BIO-1c:** Where impacts to mixed riparian or willow riparian forest occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, and if applicable, USACE and/or California Coastal Commission, pursuant to regulatory agency permitting. The revegetation plan will include specific plans for the revegetation of impacted riparian forest, and for restoration of nearby creek riparian habitat, as appropriate. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required riparian revegetation, including providing funds to the RCD for their implementation of the revegetation. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met.
Table S-2 Summary of Significant Impacts and Mitigation Measures

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<tr>
<td>Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PVWMA and regulatory agencies) for all trees lost as result of the project to account for the reduced habitat values of smaller trees compared with mature vegetation. Success criteria for replanting will be less than 20 percent mortality of individual species yearly for 5 years. BIO-1d: Where impacts to coastal freshwater marsh occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required wetland revegetation, including providing funds to the RCD for their implementation of the revegetation. The revegetation plan will include specific plans for the revegetation of impacted coastal marsh, and for restoration of nearby wetland habitat, as appropriate. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PVWMA and regulatory agencies) for impacted wetlands. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50% should be attained after two growing seasons. Mitigation may occur via restoration, creation, or preservation of wetlands. Mitigation will occur at a site acceptable to permitting agencies and pursuant to Project permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts to wetlands and other waters. (Applicable Components: B, C, D, and E) BIO-1e: Where construction and/or facilities are placed within a riparian or wetland development setback area, indirect impacts to adjacent riparian and wetland vegetation will be minimized. Where feasible, buffer plantings of native trees and shrubs will be installed between the facility and the adjacent wetland or riparian resource to provide a vegetated buffer. A buffer planting plan will be prepared as part of a revegetation plan approved by CDFW, RWQCB, USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. The buffer planting plan will include specific revegetation measures, including the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PVWMA and regulatory agencies) for impacted wetlands. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50% should be attained after two growing seasons. Mitigation may occur via restoration, creation, or preservation of wetlands. Mitigation will occur at a site acceptable to permitting agencies and pursuant to Project permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts to wetlands and other waters. (Applicable Components: B, C, D, and E)</td>
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</table>
### Table S-2 Summary of Significant Impacts and Mitigation Measures

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<tbody>
<tr>
<td>obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. <em>(Applicable Components: B, C, D, and E)</em></td>
<td><strong>BIO-2: Mitigation Measure BIO-2:</strong> During the development of BMP Update components, PVWMA will implement conservation measures during construction activities to avoid and minimize incidental take and significant impacts on individuals, populations, or habitat of special-status wildlife species to the maximum extent practicable. The following general measures will be incorporated into the planning and construction of BMP Update components, as appropriate, to ensure that the effects of the BMP Update are avoided, minimized, and mitigated. Suggested species-specific measures for CA red-legged frog, WPT, and steelhead are included, as well, although BMP Update components that proposed to divert surface waters beyond existing entitlements would require future additional project-level CEQA analyses of specific diversion and operation plans to support water rights application and environmental permits. It is assumed that project-level biological studies and analysis for these BMP Update components will be required to support those future permits and biological opinions. BIO-2a: During project activities, all trash that may attract predators will be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris will be removed from work areas. <em>(Applicable Components: B, C, D, and E)</em> BIO-2b: All refueling, maintenance, and staging of equipment and vehicles will occur at least 65 feet from any riparian habitat or water body. The Agency will ensure contamination of habitat does not occur during such operations. Prior to the onset of work, the Agency will ensure that the contractor has prepared a plan to allow a prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur. <em>(Applicable Components: B, C, D, and E)</em> BIO-2c: The spread or introduction of invasive exotic plant species will be avoided to the extent practicable. When practicable, invasive exotic plants in the project areas will be removed. <em>(Applicable Components: B, C, D, and E)</em> BIO-2d: Prior to any on-site work in areas where special-status species may occur, a qualified biologist will conduct a tailgate training session in which all construction personnel will receive training regarding measures (below) that are to be implemented to avoid environmental impacts. This training will include a presentation of the potential for sensitive species to occur at the site and measures to protect habitat including aquatic habitat and avoid impacts to the species. All personnel working on the site will receive this training, and will...</td>
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### Table S-2 Summary of Significant Impacts and Mitigation Measures

**KEY TO APPLICABLE COMPONENTS:** (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<tr>
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<tr>
<td>sign a sign-in sheet showing they received the training. <strong>(Applicable Components: B, C, D, and E)</strong></td>
<td>BIO-2e: Prior to the commencement of work, the limits of the work area (including haul routes, access ramps, storage areas and material stockpiles) will be clearly marked with orange construction fencing to prevent workers from impacting habitat outside the work area. No work will occur outside the designated marked work areas. <strong>(Applicable Components: B, C, D, and E)</strong></td>
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<td></td>
<td>BIO-2f: Each morning before work begins on any components in or within 100 feet of a suitable habitat area (defined as: riparian habitat, USACE jurisdictional wetlands or &quot;other waters&quot; of the U.S., or sensitive habitats identified in subsequent USFWS Biological Opinions and CDFW 1600 Lake and Streambed Alteration Agreements), a qualified monitor will survey the work site and habitat immediately surrounding the active work site for conditions that could impact special-status species, and will remain on-site whenever work is occurring that may adversely impact special-status species and their habitats. No work will be allowed to begin each morning until the monitor has inspected the work site. <strong>(Applicable Components: B, C, D, and E)</strong></td>
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<td>BIO-2g: A USFWS-approved biologist or biological monitor will permanently remove from within the project area(s), any individuals of exotic species, such as bullfrogs, crayfish, and centrarchid fishes to the extent practicable. <strong>(Applicable Components: B, C, D, and E)</strong></td>
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<td></td>
<td>BIO-2h: Upon locating individuals of special-status species that are dead or injured as a direct result of activities conducted by the City, initial notification will be made to the USFWS’s Division of Law Enforcement at (916) 978-4861 (Sacramento) within three working days of its finding. The USFWS Field Office within whose area of responsibility the specimen is recovered will also be notified. Written notification will be made within five calendar days and include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information. <strong>(Applicable Components: B, C, D, and E)</strong></td>
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<td>BIO-2i: Nesting Bird Surveys. Prior to any project construction activities, the project proponent will take the following steps to avoid direct losses of nests, eggs, and nestlings and indirect impacts to avian breeding success:</td>
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<tr>
<td></td>
<td>• If construction activities occur only during the non-breeding season, between August 31 and February 1, no surveys will be required.</td>
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</table>
| | • During the breeding bird season (February 1 through August 31), a qualified biologist will survey construction areas in the vicinity of the project site for nesting raptors and passerine birds not more than 14 days prior to any ground-disturbing activity or vegetation removal. Surveys will include all potential habitats within 500 feet (for raptors) of activities and all on-site vegetation including bare ground within 250 feet of activities (for all other species). If results are positive for nesting birds, avoidance procedures will be adopted, if necessary, on a case-by-case basis. These may include implementation of buffer areas (minimum 50-foot

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*Denise Duffy & Associates, Inc.*

S-10

Pajaro Valley Water Management Agency

BMP Update Draft EIR
Table S-2 Summary of Significant Impacts and Mitigation Measures

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<td>buffer for passerines and 250-foot minimum buffer for raptors) or seasonal avoidance. <em>(Applicable Components: B, C, D, and E)</em></td>
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**BIO-2j (CRT):** The following measures for avoidance and minimization of adverse impacts to California Red-Legged Frog (*Rana draytonii*) (CRF) during construction of the BMP Update components are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on scheduling activities at certain times of year, keeping the disturbance footprint to a minimum, and monitoring. Consultation with the USFWS will be conducted and a Biological Opinion developed for each BMP Update component that requires a USACE Section 404 Wetland Permit. Ongoing and future CRF studies in the project area may result in site-specific conditions that would be integrated into the future project-level BMP Update component designs, permitting and operations.

**CRF-1.** The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until the Agency receives approval from the Service that the biologist(s) is qualified to conduct the work.

**CRF-2.** A USFWS-approved biologist will survey the work site 48 hours prior to the onset of activities. If CRF, tadpoles, or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only USFWS-approved biologists will participate in activities associated with the capture, handling, and moving of CRF.

**CRF-3.** Before any activities begin on a project, a USFWS-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the CRF and its habitat, the importance of the CRF and its habitat, general measures that are being implemented to conserve the CRF as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

**CRF-4.** A USFWS-approved biologist will be present at the work site until such time as all removal of CRF, instruction of workers, and disturbance of habitat have been completed. After this time, the biologist will designate a person to monitor on-site compliance with all minimization measures and any future staff training. The USFWS-approved biologist will ensure that this individual receives training outlined in measure WPT-2 and in the identification of CRF. The monitor and the USFWS-approved biologist will have the authority to stop work if CRF are in harm’s way.

**CRF-5.** The number of access routes, number and size of staging areas, and the total area of the activity will
Table S-2 Summary of Significant Impacts and Mitigation Measures

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<td>be limited to the minimum necessary to achieve the project goal. Routes and boundaries will be clearly demarcated, and these areas will be outside of riparian and wetland areas to the extent practicable.</td>
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<tr>
<td>CRF-6. Work activities will be completed between April 1 and November 1 to the extent practicable. Should the Agency demonstrate a need to conduct activities outside this period, the Agency may conduct such activities after obtaining the Service's approval.</td>
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<tr>
<td>CRF-7. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than five millimeters (mm) to prevent CRF from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.</td>
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<tr>
<td>CRF-8. The Declining Amphibian Populations Task Force’s Fieldwork Code of Practice will be followed to minimize the possible spread of chytrid fungus or other amphibian pathogens and parasites.</td>
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<tr>
<td>BIO-2k (WPT): The following measures for avoidance and minimization of adverse impacts to western pond turtle (Actinemys marmorata) (WPT) during construction of the BMP Update project elements are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on keeping the disturbance footprint to a minimum and aggressive monitoring of WPTs before vegetation removal and during the construction and revegetation phase.</td>
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</tr>
<tr>
<td>WPT-1. The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until proponents have received approval from CDFW that the biologist(s) is qualified to conduct the work.</td>
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<tr>
<td>WPT-2. A CDFW-approved biologist will survey the work site 48 hours prior to the onset of activities. If WPT adults, juveniles or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only CDFW-approved biologists will participate in activities associated with the capture, handling, and moving of WPT.</td>
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<tr>
<td>WPT-3. Before any activities begin on a project, a CDFW-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the WPT and its habitat, the importance of the WPT and its habitat, general measures that are being implemented to conserve the WPT as they relate to the project, and the boundaries within which the project may be accomplished.</td>
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<tr>
<td>Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.</td>
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<tr>
<td>WPT-4. A CDFW-approved biologist will be present at the work site until such time as all removal of WPT, instruction of workers, and disturbance of habitat have been completed.</td>
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<tr>
<td>WPT-5. The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the project plans. Routes and boundaries will be clearly demarcated. Where impacts occur in these staging areas and access routes, restoration will occur as identified in the general BMP Update components above. <strong>(Applicable Components: B, C, D, and E)</strong></td>
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<tr>
<td>BIO-2l (FISH): The following measures are required to reduce impacts to special status fisheries, including steelhead and resident rainbow trout, to a less-than-significant level:</td>
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<tr>
<td>FISH-1. A NOAA Fisheries-approved, qualified fisheries biologist would be onsite to provide preconstruction training on steelhead life-history to construction crews and to provide daily monitoring during construction activities.</td>
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<td>FISH-2. If the preliminary construction concept proposes the use of temporary coffer dams for isolating the work areas at the upstream and downstream extent of the project, installation and removal of the temporary coffer dams would be monitored by the qualified fisheries biologist.</td>
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<td>FISH-3. Following initial construction of the coffer dam bypass system, isolated standing water would be pumped from the work area to adjacent vegetated terraces, settling tanks or back into the river, if turbidity is not elevated more than 10% of background turbidity levels.</td>
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<tr>
<td>FISH-4. If a work site is to be temporarily de-watered by pumping, intakes will be completely screened with wire mesh not larger than 0.2 inch to prevent steelhead or other native fish from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.</td>
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<tr>
<td>FISH-5. The installation and removal of the coffer dam structures would be controlled to minimize turbidity in the water.</td>
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<tr>
<td>FISH-6. The use of best management practices would be implemented to reduce the probability of sediment and/or contaminated material from entering the creek. <strong>(Applicable Components: D, and E)</strong></td>
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<td>BIO-2m: No water shall be diverted from College Lake from the time the lake begins filling in late fall/early winter through the end of the smolt outmigration period (approximately May 31 or June 15) unless sufficient</td>
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<td>bypass flows are provided at the dam for unimpeded adult upstream migration through March 31, and sufficient bypass flows are provided at the dam for unimpeded smolt outmigration through May 31. The precise bypass flow levels required to achieve unimpeded migrations are not known at this time. After May 31 or June 15, the entire storage of College Lake could potentially be diverted. College Lake would likely be too warm to allow summer rearing by steelhead, especially in the presence of warm water predatory fishes. <strong>(Applicable Component: D)</strong></td>
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<tr>
<td>BIO-2n: Protection of Steelhead Migratory Habitat - Impacts to steelhead migration passage shall be minimized by carrying out construction in College Lake/Casserly Creek/Salsipuedes Creek after June 1 and prior to November 1, during which time adults and smolts do not migrate through the area. <strong>(Applicable Component: D)</strong></td>
<td>BIO-2o: Protection of Steelhead Migratory Habitat - The proposed College Lake with Inland Pipeline to Coastal Distribution System component shall be operated such that it complies with all minimum required bypass flow requirements during the steelhead migration period, including those developed through a new bypass flow study to be conducted by a qualified fisheries biologist in consultation with the relevant regulatory agencies. <strong>(Applicable Component: D)</strong></td>
</tr>
<tr>
<td>BIO-2p: The PVWMA shall install and operate surface-water streamflow gaging stations on Casserly Creek upstream and on Salsipuedes Creek downstream of the proposed College Lake diversion structure to monitor available diversion inflows and to provide and document future Biological Opinion-required fish bypass flows. <strong>(Applicable Component: D)</strong></td>
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<tr>
<td>BIO-2q: Protection of Steelhead Migratory Habitat - Impacts to steelhead migration passage shall be minimized by carrying out construction in the Pajaro River after June 1 and prior to November 1, during which time adults and smolts do not migrate through the area. <strong>(Applicable Component: E)</strong></td>
<td>BIO-2r: Protection of Steelhead Migratory Habitat - The proposed Murphy Crossing with Recharge Basins component shall be operated such that it complies with all minimum required bypass flow requirements during the steelhead migration period. <strong>(Applicable Component: E)</strong></td>
</tr>
<tr>
<td>BIO-2s: The PVWMA shall install and operate surface-water streamflow gaging stations on the Pajaro River both upstream and downstream of the proposed Murphy Crossing infiltration gallery to monitor available diversion inflows and to provide and document future Biological Opinion-required fish bypass flows. <strong>(Applicable Component: E)</strong></td>
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**Impact BIO-3:** Construction of BMP Update component facilities could adversely affect special status plant species, either directly or

| BIO-3a: Occurrences of special status plant species shall be avoided by project construction activities to the extent feasible. All facilities and construction activities will be maintained outside habitats supporting special status plant species where feasible. Prior to construction, a qualified biologist will conduct a survey of the |  |
### Table S-2 Summary of Significant Impacts and Mitigation Measures

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<td>through habitat modifications on; or substantially reduce the number or restrict the range of any plant species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service, if species are found to be present within the component-specific construction areas. This represents a potential significant impact that can be reduced to a less-than-significant level with mitigation identified in this EIR. No operational impacts to special status plant species are anticipated from the project. ([Applicable Components: A, B, C, D, and E])</td>
<td>project area to ascertain the presence or absence of special status plant species. If no species are encountered, no mitigation is required. If a special status species is found within a BMP Update component project area, a setback of 50 feet will be established between the occurrence and the BMP Update construction activities. Prior to construction, PVWMA will install temporary construction fencing at the 50-foot setback line to prevent inadvertent equipment access or construction staging within the special status plant habitat. This fencing will be signed in the field as “SENSITIVE HABITAT AREA — NO CONSTRUCTION ACCESS”. A qualified biologist will inspect the temporary construction barrier fence and monitor the contractor’s compliance with this avoidance measure. If complete avoidance of special status plant species is infeasible, impacts would be minimized through implementation of Mitigation Measure BIO-3b ([Applicable Components: A, B, C, D, and E]) BIO-3b: Prior to clearing and grubbing in areas where impacts to special status plant species cannot be avoided, PVWMA will consult with applicable resource agencies (i.e., CDFW and/or USFWS) prior to implementing salvage and revegetation actions. A qualified biologist will collect any available above-ground seed pods/seed heads for their use in future revegetation efforts. During construction, the upper 6 inches of topsoil from areas supporting the plant species will be stripped from the construction area and stored for later use. The topsoil will be used in future revegetation efforts which may be on-site (if feasible) or at an off-site location approved by permitting agencies (i.e., USFWS, CDFW). At the designated revegetation area, all stockpiled topsoil will be placed on site and finish graded to blend with surrounding topography. Under direction of a qualified biologist, the areas will be revegetated with locally native herbaceous plant species compatible with natural regeneration of the special status plant species. The qualified biologist will hand broadcast any seeds collected from the special status plant species into the appropriate habitat areas. The revegetation will achieve a minimum of 2:1 plant replacement (i.e., re-establish two plants for every plant impacted). The qualified biologist will monitor the revegetation areas for two years after construction to ascertain if the special status plant species re-established within the revegetation area. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the revegetation measures, for a period of 5 years. ([Applicable Components: A, B, C, D, and E])</td>
</tr>
<tr>
<td>Impact BIO-4: Construction and operation of BMP Update components may interfere substantially with the movement of native resident or migratory fish or wildlife species or with established native resident or migratory species</td>
<td>See Component Specific Mitigation Measures referenced above and provided in the previous section.</td>
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**EIR Summary**

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*Denise Duffy & Associates, Inc.*  

S-15  

Pajaro Valley Water Management Agency  

BMP Update Draft EIR
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<td>wildlife corridors, or impede the use of native wildlife nursery site.</td>
<td>Specifically, the College Lake with Inland Pipeline to Coastal Distribution System and the Murphy Crossing with Recharge Basin components may reduce streamflows for steelhead passage, particularly for down-migrating smolts in spring months. This is a significant impact that can be reduced to a less than significant level with implementation of the following mitigation. <em>(Applicable Components: D and E)</em></td>
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### 3.5 Cultural Resources

Impact CR-1: Construction activities associated with implementation of BMP Update components may result in the alteration or destruction of recorded archaeological sites or encounter unknown, buried resources during ground disturbing activities, which is a potentially significant impact. With mitigation identified in this EIR, the impacts would be reduced to less-than-significant levels. *(Applicable Components: B, C, D, and E)*

CR-1a: Final pipeline and facility plans shall locate facilities and pipeline alignments away from identified and recorded archaeological sites in each component area based on a site reconnaissance and archaeological investigation conducted by a qualified archaeologist at the time site-specific construction plans are developed. The archaeologist shall identify the areal extent of potential recorded sites, assess potential significance to identified resources, recommend adjustment to siting of improvements, facilities and/or pipeline alignments, if necessary, and provide other recommendations to avoid impacts to identified significant resources. If a significant or potentially significant archaeological or historic resource is identified pursuant to the definitions in the State CEQA Guidelines as identified above, the consulting archaeologist shall develop an appropriate mitigation plan for the cultural resource. Possible mitigation measures for important cultural resources may include monitoring by a qualified archaeologist during construction at identified sensitive sites, documentation and recordation of the resource, recovery and relocation, or stabilization of the resource. *(Applicable Components: B, C, D, and E)*

CR-1b: The cultural resource boundaries of potentially significant sites shall be marked as exclusion zones both on ground and on construction maps prior to the commencement of construction activities on component sites. Construction supervisory personnel shall be notified of the existence of cultural resources in each component area and will be required to keep personnel and equipment away from these cultural resources sites. During construction and operational phases, personnel and equipment will be restricted to each surveyed corridor for each component. *(Applicable Components: B, C, D, and E)*

CR-1c: Should any as yet undiscovered cultural resources be uncovered at any component site, such as structural features, or unusual amounts of bone or shell, artifacts, human remains, or architectural remains be
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<td>encountered during any development activities, work will be suspended and PVWMA staff will be contacted. A qualified professional archaeologist shall be retained and will perform any necessary investigations to determine the significance of the find. PVWMA will then implement any mitigation deemed necessary for the recordation and/or protection of the cultural resources. In addition, pursuant to Sections 5097.97 and 5097.98 of the State Public Resources Code and Section 7050.5 of the State Health and Safety Code, in the event of the discovery of human remains, all work must be halted and the County Coroner shall be immediately notified. If the remains are determined to be Native American, guidelines of the Native American Heritage Commission shall be adhered to in the treatment and disposition of the remains. (Applicable Components: B, C, D, and E)</td>
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3.6 Energy Utilities & Services

Impact ES-1: Construction of the BMP Update components could result in temporary, planned or accidental disruption to utility services provided by underground lines. This potentially significant impact can be reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR. (Applicable Components: A, B, C, D, and E)

ES-1: A study to identify utilities along proposed alignments will be conducted by PVWMA during pre-design states of projects. The following mitigation measures are required for segments identified in final design as having potential conflicts with significant utilities:

a. Utility excavation and encroachment permits would be required from the appropriate agencies, including the Public Works Departments of Santa Cruz County, City of Watsonville, Caltrans, and Union Pacific Railroad. These permits include measures to minimize utility disruption. PVWMA and its contractors shall comply with permit conditions. Permit requirements shall be included in construction contract specifications.

b. Utility locations would be verified through field survey (potholing) and use of an underground locating service.

c. A detailed engineering and construction plan shall be prepared as part of the design plans and specifications. This plan shall include procedures for the excavation, support, and fill of areas around utility cables and pipes. All affected utility services would be notified of PVWMA’s construction plans and schedule. Arrangements would be made with these entities regarding protection, relocation, or temporary disconnection of services.

d. In areas where the pipeline would parallel wastewater mains, engineering and construction plans shall include trench wall support measures to guard against trench wall failure, and possible resulting loss of structural support for the wastewater main.

e. Residents and businesses in the project area shall be notified in writing by the contractor of planned utility service disruption two to four days in advance, in conformance with state and County standards. (Applicable Components: B, C, D, and E)
### Table S-2 Summary of Significant Impacts and Mitigation Measures

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<td><strong>Impact ES-2:</strong> Construction of the BMP Update components could potentially impact solid waste landfill capacity, since the County’s Buena Vista Landfill is approaching capacity. Although the BMP Update improvements are expected to generate a relatively small amount of construction waste to be disposed of at the landfill, this is considered a significant impact due to limited landfill capacity. Mitigation is identified below to reduce the impact to a less-than-significant level. <em>(Applicable Components: A, B, C, D, and E)</em></td>
<td>ES-2: PVWMA shall include in its construction specifications a requirement for the contractor to provide plans for recovering, reusing, and recycling construction, demolition, and excavation wastes and providing for composting of plant material, where feasible. <em>(Applicable Components: B, C, D, and E)</em></td>
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<td><strong>3.7 Geology &amp; Soils</strong></td>
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<td><strong>Impact GS-1:</strong> Seismic groundshaking and its secondary effects, including localized liquefaction and related ground failure from a major earthquake in Santa Cruz County or Monterey Bay region could cause structural damage to associated facilities of each of the BMP Update components. With mitigation identified in this EIR, the impacts would be limited to less-than-significant levels. <em>(Applicable Components: A, B, C, D, and E)</em></td>
<td>GS-1: Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of groundshaking and liquefaction. Construction shall be in accordance with applicable City and County ordinances and policies regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted. <em>(Applicable Components: B, C, D, and E)</em></td>
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<tr>
<td><strong>Impact GS-2:</strong> Construction of BMP Update components would result in erosion and discharge of sediment in water bodies. With mitigation identified in this EIR, the impact would be reduced to a less-than-significant level. <em>(Applicable Components: A, B, C, D, and E)</em></td>
<td>GS-2: Construction of future BMP Update facilities shall include preparation and implementation of erosion control plans to minimize erosion and inadvertent transport of sediments into water bodies during installation of facilities. Measures shall include, but not be limited to: limiting the area of ground disturbance and vegetation removal at any one time during construction; conducting work prior to the rainy season if possible and protecting disturbed areas during the rainy season; installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses; immediately revegetating disturbed areas; and other Best Management Practices during construction to protect water quality. All grading and construction shall conform to requirements of the Santa Cruz County Grading Ordinance. To the extent possible, grading activities in non-cropped areas shall be limited to the period between April 15 and...</td>
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<td><strong>October 31. (Applicable Components: B, C, D, and E)</strong></td>
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<td><strong>Impact GS-3:</strong> Proposed pipeline, diversion facilities and water filtration systems associated with BMP Update components could incur damage as a result of underlying soils properties (subsidence, high shrink-swell potential, and corrosivity). With mitigation identified in this EIR, the impacts would be limited to less-than-significant levels.** (Applicable Components: A, B, C, D, and E)**</td>
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<tr>
<td>GS-3: All diversion and pipeline facilities shall be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the potential detrimental effects of expansive soils, corrosivity, and/or other identified soils constraints. A licensed geotechnical engineer shall prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site-specific, adverse soil and bedrock conditions that could hinder development. Project engineers shall implement the recommendations. Geotechnical design and design criteria will comply with applicable codes and requirements of the California Building Code with California additions (CCR Title 24), applicable City and County construction and grading ordinances. <strong>(Applicable Components: B, C, D, and E)</strong></td>
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#### 3.8 Hazards and Hazardous Material

| Impact HM-1: Construction of the BMP Update components could potentially release hazardous materials from the disturbance/removal of soils used for agricultural purposes that may contain pesticide residuals. In addition, Construction of the BMP Update components (i.e., excavation for pipelines) could potentially release hazardous materials in areas of potential soil contamination such as those identified by DTSC. This is a potentially significant impact that would be reduced to a less-than-significant level with mitigation identified below. (Applicable Components: A, B, C, D, and E) |
| HM-1: Prior to initiation of earthwork activities, PVWMA shall perform soil testing on agricultural sites proposed for development and analytically test for pesticide residuals and pesticide-related metals arsenic, lead, and mercury. If contamination is identified in the soil samples above applicable levels, PVWMA shall prepare a Site Management Plan (SMP) to establish protocols/guidelines for the contractor including: identification of appropriate health and safety measures while working in contaminated areas; soil reuse; handling, and disposal of any contaminated soils; and agency notification requirements. The SMP shall be subject to the review and approval of the appropriate regulatory agency. **(Applicable Components: B, C, D, and E)** |
| HM-2: During the design phase of the proposed pipeline alignment from College Lake to Coastal Distribution System (CDS), PVWMA shall perform a Phase I Environmental Site Assessment for the alignment to determine the potential for encountering hazardous materials contamination in soils to be excavated and identify appropriate recommendations. Appropriate health and safety measures shall be identified as needed for worker safety, soil handling, and disposal of contaminated soils. **(Applicable Component: D)** |

#### 3.9 Surface Water, Groundwater, and Water Quality

| Impact HWQ-1: Construction of proposed BMP Update components could result in increased erosion and sedimentation with adverse impacts to water quality. Temporary |
| HWQ-1: PVWMA shall require contractors to apply for all applicable NPDES permits, including dewatering permits, develop a SWPPP for construction of proposed facilities, and comply with conditions of the permit(s), as required by the CCRWQCB. The objectives of the SWPPP are to identify pollutant sources that may affect the quality of stormwater discharge and to implement BMPs to reduce pollutants in stormwater discharges. |
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| dewatering of shallow groundwater during construction could also result in increased erosion and sedimentation with adverse impacts to water quality. Additionally, accidental release of fuels or other hazardous materials associated with construction activities could degrade water quality. This potentially significant impact can be reduced to a less-than-significant level with mitigation measures identified in this EIR. *(Applicable Components: A, B, C, D, and E)* | The SWPPP for this proposed action would include the implementation, at a minimum, of the following elements:  
- Source identification  
- Preparation of a site map  
- Description of construction materials, practices, and equipment storage and maintenance  
- List of pollutants likely to contact stormwater  
- Estimate of the construction site area and percent impervious area  
- Erosion and sedimentation control practices, including soils stabilization, revegetation, and runoff control to limit increases in sediment in stormwater runoff, such as detention basins, straw bales, silt fences, check dams, geofabrics, drainage swales, and sandbag dikes  
- Proposed construction dewatering plans  
- Provisions to eliminate or reduce discharge of materials to stormwater  
- Description of waste management practices  
- Maintenance and training practices *(Applicable Components: A, B, C, D, and E)* |
| **Impact HWQ-2:** Operation of proposed BMP Update components could result in increased erosion and subsequent sedimentation, with adverse impacts to surface water quality. Diversions from Watsonville and Harkins Sloughs resulting in chronic imposed water-level fluctuations may result in increased erosion and sedimentation, including potential bank collapse. College Lake and Murphy Crossing diversions may result in erosion and downstream sedimentation depending upon operations and pump design. This potentially significant impact can be reduced to a less-than-significant level the following mitigation measures. *(Applicable Components: B, C, D, and E)* | HWQ-2: Rapid, imposed water-level fluctuations shall be avoided within the sloughs, Salsipuedes Creek, and the Pajaro River to minimize erosion and failure of exposed (or unvegetated), susceptible banks. This can be accomplished by operating the pumps at an appropriate flow rate, in conjunction with commencing operation of the pumps only when suitable water levels or flow rates are measured in the water body. Criteria for minimizing fluctuations and/or protecting banks from related erosion will need to be developed, as some banks presently are stable and others are not. Control is important, as the mobilized sediment also impairs in-slough habitat values, and potentially exacerbates bacterial levels in the slough system. It may be that water-level fluctuations may be controlled as well to minimize other impacts, such as desiccation of amphibian eggs or waterlogging of agricultural soils adjacent to the sloughs. *(Applicable Components: B, D, and E)* |
| **Impact HWQ-3:** Overall, the BMP Update will raise groundwater levels in the basin. Higher | HWQ-3. If pumping rates in existing wells fall below levels that can support existing or planned land uses, and the reduction in pumping can be attributed to one or many of the project components, then one of several *
Table S-2 Summary of Significant Impacts and Mitigation Measures

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<th>Impacts</th>
<th>Mitigation Measures</th>
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<td>groundwater levels will result in reduced pumping costs and marginally greater pumping rates from existing pumps in wells. Therefore, the BMP Update has an overall beneficial impact on groundwater levels. The College Lake component of the BMP Update, however, may seasonally reduce groundwater levels from their baseline elevations at localized areas downstream of the lake. In these areas, project operation could decrease the annual production rate of existing nearby irrigation wells due to localized drawdown. Under extreme conditions, existing or planned land use(s) may not be fully supported. If pumping rates are reduced to the extent that land uses cannot be fully supported, this would represent a potentially significant impact that can be reduced to a less-than-significant level with mitigation. This impact, however, is unlikely; and would only occur locally only in some years and seasons. (Applicable Component: D)</td>
<td>measures may be undertaken to mitigate the loss of pumping. These mitigation measures may include: 1. Improving irrigation efficiency 2. Modifying irrigation and agricultural operations 3. Lowering the pump in the irrigation well 4. Lowering and changing the pump in the irrigation well 5. Adding storage capacity for irrigation supply 6. Replacing the irrigation well 7. Replacing the irrigation water source</td>
</tr>
<tr>
<td>Impact HWQ-4: Development of BMP Update components may expose people and structures to flood hazards or impede or redirect flood flows because many of the BMP Update facilities are located within the FEMA 100-year flood hazard zones. This potentially significant impact can be reduced to a less-</td>
<td>HWQ-4: Facilities shall be designated to comply with FEMA and County of Santa Cruz requirements to floodproof the facilities and shall not exacerbate upstream or downstream flood hazards on other properties. The FEMA process will require identification of the FEMA floodway zone and may require no increase water elevations for a one percent chance annual flood. The FEMA process will require identification of the FEMA zone type and may require no increase water elevations for a one percent chance annual flood. To meet the specific FEMA requirements for the component, substantial modifications to the facility design and additional mitigation may be required. (Applicable Components: A, B, C, D, and E)</td>
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Denise Duffy & Associates, Inc.

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Pajaro Valley Water Management Agency

BMP Update Draft EIR
Table S-2 Summary of Significant Impacts and Mitigation Measures

KEY TO APPLICABLE COMPONENTS: (A) Increased Recycled Water Storage at Treatment Plant, (B) Harkins Slough Recharge Facilities Upgrades, (C) Watsonville Slough with Recharge Basins, (D) College Lake with Inland Pipeline to Coastal Distribution System (CDS), (E) Murphy Crossing with Recharge Basins

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<th>Impacts</th>
<th>Mitigation Measures</th>
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<td>than-significant level with mitigation measures identified in this EIR. In addition, these impacts may be exacerbated by climate change in the cumulative. <em>(Applicable Components: A, B, C, D, and E)</em></td>
<td></td>
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<tr>
<td><strong>3.10 Noise and Vibration</strong></td>
<td>There are no impacts to noise and vibration that require mitigation (see Section 3.10 for additional detail).</td>
</tr>
<tr>
<td><strong>3.11 Transportation/Traffic</strong></td>
<td>TR-1: Conduct a preconstruction survey of road conditions on key access routes to the project sites (e.g., San Andreas Road). The pavement conditions of local streets judged to be in good condition for use by heavy truck traffic shall be monitored. Roads damaged by construction shall be repaired to a structural condition equal to, or better than, that which existed prior to construction activity. <em>(Applicable Components: A, B, C, D, and E)</em></td>
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*(Applicable Components: A, B, C, D) and E)
INTRODUCTION TO THE EIR

1.1 PURPOSE OF THE EIR

The Pajaro Valley Water Management Agency (PVWMA or the Agency) has prepared this Draft Environmental Impact Report (DEIR) to provide the public, as well as responsible and trustee agencies reviewing this project, with information on the potential environmental effects of implementation of the Pajaro Valley Basin Management Plan Update (BMP Update) on the local and regional environment. This Environmental Impact Report (EIR) was prepared in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended), the CEQA Guidelines, and California Administrative Code, Title 14, Chapter 3.

The EIR addresses the environmental impacts of the BMP Update, the “proposed project” under CEQA. The following priority or primary components were selected for the BMP Update portfolio based upon recommendations of the Ad Hoc BMP Committee to the PVWMA Board: 1) Conservation; 2) Increased Recycled Water Storage at Treatment Plant; 3) Increased Recycled Water Deliveries; 4) Harkins Slough Recharge Facilities Upgrades; 5) Watsonville Slough with Recharge Basins; 6) College Lake with Inland Pipeline to Coastal Distribution System (CDS); and 7) Murphy Crossing with Recharge Basins. The EIR also addresses a suite of secondary BMP Update component alternatives, several alternative locations, and a “No Project” alternative.

The impact analyses in this report are based on a variety of sources, including agency consultation, the PVWMA’s Local Water Supply and Distribution Project EIR, the previous Basin Management Plans and associated EIRs, technical and scientific reports covering the BMP Update area and issues, and field surveys completed by the EIR Team, PVWMA staff, and its consultants. The EIR Team includes Denise Duffy & Associates, Inc., with subconsultants Balance Hydrologics, Inc., Biotic Resources Group, and Kittleson Environmental Consulting. The General Plans for Monterey County, Santa Cruz County and the City of Watsonville were also consulted.¹

1.2 CEQA PROCESS

1.2.1 Background

PVWMA adopted its first Basin Management Plan in 1994. This plan described and evaluated a wide variety of options for water supply and its management. Through the analysis of the BMP and the development of a Programmatic EIR (PEIR) on the BMP, a preferred Water Supply Project was identified and adopted by the PVWMA Board of Directors (Resolution No. 93-18) for further consideration and development. The Local Water Supply and Distribution Project (evaluated in 1999 in the Local Water Supply and Distribution EIR) was developed as part of the recommended program of the 1993 BMP. A subsequent BMP revision, the 2002 Revised

¹ Because all proposed BMP Update components are located within Santa Cruz County and City of Watsonville jurisdictional areas, with the exception of a portion of one BMP component in the Pajaro River riparian area, the analysis of the Proposed BMP Update generally relies only on the Santa Cruz County and City of Watsonville General Plans.
BMP, has since been the guiding framework for the PVWMA. The 2002 Revised BMP EIR\(^2\) provided program-
level analysis of the environmental impacts of two primary alternatives (Local-Only Alternative and BMP 2000
Alternative), and project-level analysis of additional local projects not evaluated in the 1999 Local Water Supply
and Distribution EIR.

As described above, many components of the BMP Update have been evaluated in the previous 1999 Local Water
Supply and Distribution EIR and/or the 2002 Revised BMP EIR. The proposed approach to the BMP Update is to
build upon the previous analyses, supplemented with current site information and regulatory requirements
obtained from readily available public information. The BMP Update Draft EIR will provide a program-level
evaluation of the BMP Update. Following adoption of the BMP Update, PVWMA will conduct additional
project-level CEQA review, as needed, on the specific projects it proposes to implement.

The PVWMA serves as the lead agency for development of the EIR for the project, with input and coordination
provided by other responsible agencies and local jurisdictions.

1.2.2 Notice of Preparation

In accordance with Sections 15063 and 15082 of the CEQA Guidelines, the PVWMA, as Lead Agency, prepared
a Notice of Preparation (NOP) for this EIR (see Appendix A). The NOP was circulated to local, state, and federal
agencies and other interested parties from February 8, 2013 through March 11, 2013 (more than the minimum
CEQA-required 30-day review period). The NOP provided a general description of the proposed project and a
preliminary list of potential environmental impacts proposed for inclusion in the EIR. PVWMA and its
consultants conducted additional coordination with public agencies using informal consultation and telephone
interviews throughout the EIR process.

PVWMA held two public scoping meetings for PVWMA’s BMP EIR in Watsonville (both on February 27, 2013)
to present the proposed project to interested parties and to solicit their input on the scope and content of the EIR.
Public notices were placed in local newspapers informing the general public of the scoping meetings and the NOP
and associated notices contained information about the meetings, also. Verbal comments received during the
public scoping meeting and the complete written comments received on the NOP are presented in Appendix A.
After the public review period closed several comment letters were received from regulatory agencies with
jurisdiction over resources potentially affected by the BMP Update.

1.2.3 Draft EIR

The Draft EIR focuses on the potentially significant environmental effects of the project (in this case, the
Proposed BMP Update). Significance criteria (indicating what constitutes a significant impact) have been
developed for each environmental issue analyzed in this EIR. The significance criteria are consistent with
previous environmental impact reports and updated agency guidance and professional standards, and are defined
prior to each impact analysis section. Impacts are categorized with one of the following determinations:

1. significant, unavoidable
2. significant, but can be mitigated to a less-than-significant level

\(^2\) PVWMA, 2002. Revised BMP Final EIR (SCH#2000062030).
3. less than significant (mitigation is not required under CEQA but may be recommended)
4. no impact

CEQA requires that a lead agency shall neither approve nor carry out a project as proposed unless the significant environmental effects have been reduced to an acceptable level (CEQA Sections 15091 and 15092) or the project objectives outweigh the unavoidable significant impacts (requiring the Lead Agency to make a Statement of Overriding Considerations) (CEQA Section 15093). An acceptable level is defined as eliminating, avoiding, or substantially lessening the significant effects (in practice, to below the threshold of significance).

The mitigation measures in this EIR (see EIR Summary) are measures identified during the EIR process that could be implemented to reduce or avoid project impacts. At the discretion of the PVWMA Board, these mitigation measures may or may not be incorporated into the project’s design, construction, and/or operation. However, if certain mitigation measures are required to reduce an impact to a less-than-significant level and those mitigation measures are not incorporated into the project or otherwise implemented by the Agency through a commitment, the impact may be considered to be significant and unavoidable. In this case, the agency must state in writing the reasons for approving the project in spite of the significant impact, termed Statement of Overriding Considerations (see CEQA Section 15093).

The scope of the EIR was determined by preliminary screening of possible environmental impacts based on previous relevant EIRs, the written responses to the NOPs, and issues raised at the public scoping meetings. The Draft EIR does not address issues that were found not to result in a significant environmental impact by previous BMP EIRs. These issues were identified in the NOP based on previous EIR analysis, initial project review, and public scoping to include the following: forest and timber resources, wildland fire hazards, airport hazards, mineral resources, non-applicable public services (fire, police, schools, parks), and population/housing.

1.2.4 Public Review of the Draft EIR

This document is being circulated to local, state and federal agencies, and interested organizations and individuals that may wish to comment on the EIR. Publication of this Draft EIR marks the beginning of a 45-day public review period, during which written comments may be sent to PVWMA at: PVWMA, ATTN: Mary Bannister, 36 Brennan Street, Watsonville, California, 95076 or emailed to EIR@pvwater.org.

During the 45-day Draft EIR review period, the PVWMA will hold a formal public meeting on the Draft EIR to receive oral comments on the contents of the EIR. Comments should be focused on the adequacy and accuracy of the content of the EIR.

1.2.5 Final EIR Circulation

Written and public hearing comments received in response to the Draft EIR will be addressed in a Response to Comments document that, together with the Draft EIR, will constitute the Final EIR. The Final EIR will contain responses to comments solely on the content of the Draft EIR. The Final EIR will be circulated for public review, and the PVWMA will hold a public hearing on the Final EIR to consider EIR certification. The PVWMA Board of Directors will then consider a resolution for EIR certification (i.e., a finding that the EIR complies with the requirements of CEQA). Following EIR certification, the PVWMA may proceed with consideration of project approval actions, including selection of one of the alternatives evaluated in this EIR or a combination thereof, and adoption of any environmental mitigation requirements.
1.2.6 Mitigation Monitoring and Reporting

CEQA requires lead agencies to adopt a Mitigation Monitoring and Reporting Program when mitigation is required to reduce significant impacts to a less than significant level or to avoid significant effects on the environment. A specific Mitigation Monitoring and Reporting Program will be developed at the time PVWMA is preparing findings on the project.

1.3 Project Approval and Permitting Process

Prior to project-level design and environmental review, PVWMA proposes to certify this EIR, approve the BMP Update, and file a Notice of Determination (NOD) on the approval action. PVWMA can commence project-level design at any time; however, prior to any future discretionary approval of a component or components of the BMP Update that are not exempt from CEQA and/or that may have significant impacts, PVWMA must comply with CEQA. Potential project-level CEQA processes/documents that may be deemed necessary for CEQA compliance by subsequent project-level discretionary actions on one or more components of this BMP Update, include preparation of an Addendum to this EIR (supported, if necessary by an Initial Study), an Initial Study and adoption of a Mitigated Negative Declaration or Negative Declaration or conducting a subsequent EIR process that would involve the steps described above for the current programmatic EIR process being conducted for the BMP Update. Implementation of certain individual components would also require PVWMA to secure permits and approvals from several local, regional, state, and federal agencies. Depending on final design, permits may be required from various agencies. These potential permits and approvals are presented in Section 2, Project Description.

1.4 Organization of the Draft EIR

This Draft EIR includes the following sections:

Summary. This section summarizes the contents of the Draft EIR.
1. Introduction. This section describes the EIR process and organization of this document.
2. Project Description. This section provides an overview of the project, describes the need for and objectives of the project, and provides detail on the characteristics of the BMP Update.
3. Environmental Setting, Impacts and Mitigation Measures. This section presents a description of the physical and regulatory setting of the project by environmental issue area (land use, geology, etc.), the significance criteria, including thresholds of significance, an analysis of the significance of impacts, and recommended mitigation measures to reduce any significant impacts.
4. Other CEQA Considerations. This section analyzes the potential for combined effects of the proposed BMP Update along with past, present, and reasonably foreseeable future projects or plans for the geographic area. This chapter also describes the potential for the project to induce growth and the anticipated indirect effects of growth, if applicable.
5. Alternatives to the BMP Update. This section presents an overview of the alternatives development process and describes other alternatives considered, including the Modified BMP Update.
6. Report Preparers. This section identifies individuals involved in preparing this Draft EIR.
7. References. This section lists the references cited in this Draft EIR.
2  PROJECT DESCRIPTION

2.1  PROGRAM BACKGROUND

2.1.1  Pajaro Valley Water Management Agency

The Pajaro Valley Water Management Agency (PVWMA or the Agency) is a state-chartered water management district, formed in 1984 to manage groundwater resources and supplemental water supplies in its service area. The service area encompasses approximately 79,000 acres in the Pajaro Valley, located in southern Santa Cruz County, northern Monterey County, and a small portion of San Benito County (Figure 2-1). The PVWMA is governed by a seven-member board of Directors: four directors are elected by the divisions shown in Figure 2-1; Santa Cruz County, Monterey County, and the City of Watsonville each appoint one. Seawater intrusion in the Pajaro Valley groundwater basin was first documented in 1953 and has progressively become more severe. Overdraft conditions have caused groundwater levels to drop below sea level year round in some portions of the Pajaro Valley groundwater basin, and seasonally in others. On average, more than 50% of the basin’s groundwater levels are below sea level for much of the year due to excessive pumping across the basin. Such conditions create a landward pressure gradient that causes seawater to flow inland. Seawater intrusion has elevated the chloride concentration in groundwater up to two and a half miles inland from the coast, in some areas contaminating the groundwater to the point that it is unsuitable for agricultural irrigation.

The PVWMA’s role is to manage existing and supplemental water supplies within its service area. The intent of the Agency is to manage local groundwater resources in a manner that halts long-term overdraft of the groundwater basin and stops seawater intrusion, while ensuring sufficient water supplies for present and future needs. To achieve this objective, PVWMA has prepared and periodically updates a basin-wide water management plan, the BMP, to serve as the guiding document for its major projects and programs. The BMP preparation process includes review of the existing basin conditions, evaluation of implemented projects to reduce overdraft and seawater intrusion, and the identification of additional projects and management strategies to achieve the Agency’s stated goals.

2.1.2  Previous Basin Planning Efforts

The PVWMA adopted its first BMP in 1994. That BMP, developed in conjunction with the US Bureau of Reclamation, identified a preferred alternative that called for importing a surface water supply to the region via the federal Central Valley Project through an import pipeline to substantially augment the use of local surface water supplies. A Program Environmental Impact Report (BMP PEIR) was prepared for the first BMP to analyze, at a program-level, these concepts – both the importation of surface water supplies and development of additional local surface water supplies.  

In March 1994, PVWMA initiated investigations to identify specific local water supply projects. The 1999 Local Water Supply and Distribution EIR evaluated the following projects at a project-level:

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2 PVWMA, 1999. Local Water Supply and Distribution Final EIR.
Harkins Slough, College Lake, Murphy Crossing/Inland Distribution System, and the Coastal Distribution System (CDS). A separate project-level EIR was prepared to analyze the import pipeline (1999 Import Pipeline EIR)\(^3\). Starting in 1999, PVWMA constructed the Harkins Slough Project and a portion of the CDS.

A subsequent BMP revision, the 2002 Revised BMP, has been the guiding framework for the PVWMA since 2002. The 2002 Revised BMP EIR\(^4\) provided program-level analysis of the environmental impacts of two alternatives (Local-Only Alternative and BMP 2000 Alternative), and project-level analysis of additional local projects not evaluated in the 1999 Local Water Supply and Distribution EIR. Out of the 2002 Revised BMP process, the Board ultimately adopted the Modified BMP 2000 Alternative and included the following six major projects and programs: Harkins Slough Recharge Project, Coastal Distribution System (CDS) Project, Import Pipeline, Recycled Water Project, supplemental wells, and conservation. Subsequently, PVWMA constructed additional portions of the CDS, the supplemental wells and, in cooperation with the City of Watsonville, the Recycled Water Project.

Even with implementation of the Harkins Slough project, the Recycled Water Project, supplemental wells and the CDS, the groundwater overdraft problem persists and seawater continues to intrude into the freshwater aquifer system. The PVWMA contracted with the United States Geological Survey (USGS) in 2005 to develop the Pajaro Valley Hydrologic Model or PVHM. The PVHM is a robust hydrologic model of the groundwater basin that incorporates past and current land use and groundwater pumping data (available as a result of PVWMA’s monitoring programs) to estimate the water budget of the basin and to compare the effectiveness of various proposed water management scenarios. Based on the hydrologic modeling results of a “base case” scenario, PVWMA established a target: the reduction of groundwater production in the Pajaro Valley groundwater basin by approximately 12,000 acre-feet per year (AFY).\(^5\)

The current proposed BMP Update (developed in 2012) was initiated due to the PVWMA Board of Directors’ commitment to solving the basin-wide overdraft problems. In early 2010, the PVWMA Board of Directors removed the Import Pipeline Project from further consideration for a variety of reasons, including feasibility and cost. Further, legal issues regarding planned increases in augmentation fees curtailed the Agency’s budget and indicated that development of community consensus, including development of a Proposition 218-compliant process, must precede approval of any significant new water supply project. Without the Import Pipeline Project supplies, the PVWMA needed to identify additional surface water supplies and/or reductions in groundwater pumping to meet its objectives and, accordingly, reinitiated the process of updating/revising the BMP.

In 2010, PVWMA formed the Ad Hoc BMP Committee to allow the Pajaro Valley community to help guide the Board in the development of an updated BMP to address the water resource issues discussed above. The BMP Update planning process began with the development of a comprehensive list of supplemental water supply projects, including some identified in previous BMPs that could help meet the goal of stopping seawater intrusion and basin overdraft. In total, 44 potential projects were screened,

\(^3\) PVWMA, 1999. Pajaro Import Pipeline EIR.
\(^4\) PVWMA, 2002. Revised BMP Final EIR (SCH#2000062030).
\(^5\) The previous BMP identified target replacement supplies of between 14,400 – 18,500 AFY (PVWMA, 2002); however since 2002, PVWMA has implemented supplemental water supply projects including the Recycled Water Project, supplemental inland wells, and the Harkins Slough Diversion and Recharge Project, and conservation efforts have increased.
ranked and prioritized for feasibility, cost, and other factors. Based on this analysis, seven components were recommended, and ultimately selected by the Board of Directors, for inclusion in the BMP Update portfolio. As a group, the seven components of the BMP Update were simulated using the PVHM and were considered adequate to solve more than 90 percent of the seawater intrusion and basin overdraft problems. Additional components were identified as potential future projects should the selected portfolio not meet the planning-level expectations with respect to supply yield or demand offset. An adaptive management method of addressing seawater intrusion is proposed to be implemented, wherein PVWMA will monitor actual groundwater conditions to determine the extent that existing plus proposed projects and programs are mitigating the overdraft conditions of the basin. The portfolio of recommended projects and programs (called “components” or “primary components” herein) in the BMP Update and their relationship to previous environmental documents is presented in Table 2-1. The Proposed BMP Update components are described in detail below.
### Table 2-1 BMP Update Components – Previous EIR Analyses

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<td><strong>Conservation</strong> (5,000 AFY)</td>
<td>Occurring outside the EIR scope</td>
<td>Conservation: 10,000 AFY</td>
<td>Conservation: 5,000 AFY</td>
</tr>
<tr>
<td><strong>Increased Recycled Water Storage at Treatment Plant</strong> (750 AFY). Two 1-MG storage tanks, additional pumps at the RWF, and 500 feet of parallel pipe to CDS,</td>
<td>Watsonville Wastewater Reclamation/Treatment Plant evaluated; however, the basis for approval of the project was the 2002 EIR. Coastal Distribution System portion of the project was approved and constructed.</td>
<td>Recycled Water Project: 7,700 AFY. Included tertiary treatment facility with year-round operation, storage tanks, pipelines, and excess recycled water storage in Harkins Slough and North Dunes recharge basins. Analysis included two proposed storage tanks that were not constructed at the time of RWF construction.</td>
<td>Recycled Water Project: 4,000 AFY. Included tertiary treatment facility (irrigation period operation only), storage tanks, and pipelines. Analysis included the two proposed storage tanks (although not constructed with RWF).</td>
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<td><strong>Increased Recycled Water Deliveries</strong> (1,250 AFY). Increase irrigation season blended water deliveries at night and during shoulder months to fully utilize the 4,000 AFY available from the RWF (in conjunction with proposed recycled water storage tanks).</td>
<td>Watsonville/Harks Slough (2,000 AFY). Project included existing pumps on Harks Slough; filtration facility; pipeline; Harks Slough Recharge Basin; extraction and monitoring wells. Project approved and constructed.</td>
<td>A component of Aquifer Storage and Recovery Project that included Harks and Watsonville Slough diversion structures (no design provided) and 7,500 gpm pump station to occupy approximately 1/2 -acre on north bank of Watsonville Slough. Diverted water to be conveyed to College Lake in a new pipeline and for treatment and subsequent aquifer storage and recovery along the pipeline.</td>
<td>Harks Slough Project (1,100 AFY) included in BMP 2000 Alternative. No CEQA analysis (refers to 1999 EIR).</td>
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<td><strong>Harks Slough Recharge Facilities Upgrades</strong> (1,000 AFY). Upgrade Harks Slough Pump Station, upgrade existing filtration plant, new pipeline to sanitary sewer, additional extraction wells, and additional recharge basin (two potential locations).</td>
<td>College Lake (1,800 AFY) project analyzed was similar to current proposed project, although pipeline routes may differ. Project was not approved.</td>
<td>Expanded College Lake: (6,700 AFY) with additional surface water diversions from Harks Slough, Watsonville Slough, Corralitos Creek and Pinto Creek and aquifer storage and recovery. Project was not approved.</td>
<td>Not part of BMP 2000 or Revised BMP 2000 alternatives.</td>
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<td><strong>Watsonville Slough with Recharge Basins</strong> (1,200 AFY). Watsonville Slough intake structure and pumping station, additional filters at existing Harks Slough filter plant, additional storage in recharge basins (three potential locations), and pipelines.</td>
<td>Murphy Crossing (1,500 AFY), yield reduced by 1,000 AFY, diversion facilities now proposed to include only infiltration gallery, whereas the 1999 EIR evaluated vertical wells and an infiltration gallery and connection to import pipeline. BMP Update proposes only one phase versus 1999 EIR with two. Project was not approved.</td>
<td>Not part of Local Only Alternative.</td>
<td>Murphy Crossing (1,600 AFY) Project same as 1999 EIR. No CEQA analysis (refers to 1999 EIR).</td>
</tr>
<tr>
<td><strong>College Lake with Inland Pipeline to Coastal Distribution System (CDS)</strong> (2,400 AFY). Raise headgate (dam) elevation to 62.5 ft to increase lake capacity, increasing the maximum inundated area from 234 acres to 272 acres. Pump station, treatment plant, six mile (approximate distance) water main to RWF and/or CDS.</td>
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<td><strong>Murphy Crossing with Recharge Basins</strong> (500 AFY). Diversion of water from Pajaro River through infiltration gallery, conveyance pipeline. Pumping station, nine acre recharge basin.</td>
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Denise Duffy & Associates, Inc.

2-4

Pajaro Valley Water Management Agency
BMP Update Draft EIR
2.2 NEED FOR THE PROGRAM

2.2.1 Overdraft and Seawater Intrusion

The State Water Resources Control Board Bulletin 5 first documented the need to augment Pajaro Valley water supplies in 1953. A 1964 United States Bureau of Reclamation San Felipe Division feasibility study confirmed water supply concerns, primarily groundwater overdraft and seawater intrusion problems in the PVWMA service area along Monterey Bay. Overdraft occurs when the amount of groundwater withdrawn from a basin exceeds the volume of fresh water replenishing the basin, resulting in the groundwater storage depletion. In the Pajaro Valley Basin, groundwater levels have declined as a result of long-term groundwater overdraft. These overdraft conditions result in increased pumping costs, decreased water quality, seawater intrusion and, potentially, can lead to land subsidence, which can cause building settlement and increased flooding. \(^6\)

Overdraft conditions have caused groundwater levels in the basin to drop below sea level, creating a landward pressure gradient causing seawater to flow inland and mix with fresh groundwater. The density difference between seawater and fresh water causes the fresh water to stratify above the seawater. As seawater encroaches into the fresh groundwater basin, water quality degrades, limiting the usability of groundwater for irrigation and domestic purposes. Intrusion of freshwater aquifers also results in a loss of fresh water storage capacity. Intruded wells often have to be abandoned. Seawater intrusion creates a progressive increase in the concentrations of chloride, boron, magnesium, and/or other constituents in groundwater. Chloride is used as an indicator constituent for seawater intrusion; increasing chloride concentrations in well water samples are an indication of seawater intrusion. The average concentration of chloride in seawater is 19,000 milligrams per liter (mg/L). The actual process of seawater intrusion is irregular, with seawater flowing into different freshwater aquifers at different rates and times. These conditions are not expected to improve without the following:

- reduction of coastal groundwater pumping, \(^7\) and
- development and delivery of supplemental water supplies.

The extent of landward seawater intrusion has increased along the coastal region of the basin, as shown in Figure 2-2 that uses a chloride concentration of 100 mg/L as an indicator for seawater intrusion. The area south of the Pajaro River has experienced the highest extent of intrusion since 1998, and the intruded area continues to expand. A comparison of the total intruded area between the analyzed datasets (1951-2011) shows a 218% increase in intruded area between 1955 and 1966, an 88% increase between 1966 and 1998, and a 12% increase between 1998 and 2011. The total intruded area has increased almost sevenfold since 1951.

\(^6\) USGS investigated occurrences of land subsidence in the BMP area as part of the Pajaro Valley Hydrogeologic Model and did not find evidence of this condition occurring (Lockwood, personal communication, March 2013).

\(^7\) Elimination of groundwater pumping within PVWMA’s Delivered Water Zone (see Figure 2-4) is considered the most effective method of reducing seawater intrusion.
A number of coastal wells have shown substantial increases in chloride concentrations over the last couple of decades, indicating that the volume of freshwater displaced in the intruded area is continuing to increase. Chloride concentrations are generally highest in the deeper confined aquifers consisting of Aromas Red Sands and the Purisima Formation. The concentration of chloride in the groundwater basin has been measured, with values ranging from less than 5 mg/L to 14,600 mg/L. Historically, an increase in agricultural acreage, a switch to more water-intensive crops, and urban population growth has driven the rise in demand for water. Given that over 95% of the water used in the Pajaro Valley is pumped groundwater, these trends have led to a greater cumulative overdraft in the Pajaro Valley basin. Seawater intrusion rates accelerate in response to growing cumulative overdraft. The largest increases in seawater intrusion rates in the Pajaro Basin correspond with periods of drought and the concomitant rise in demand for water and reductions in natural recharge.

### 2.2.2 Historic Water Use

Pajaro Valley water use for 2001 to 2012 is shown in Table 2-2. The table identifies groundwater, surface water, and delivered water separately. The metered wells category represents 95% of agricultural wells, with the remaining wells including mutual wells and a number of wells used for non-agricultural purposes. The five-year average for groundwater use from 2007-2011 is approximately 53,000 acre-feet (AF). The five-year average from 2007-2011 for total water use, including delivered water and City of Watsonville surface water use, is 55,605 AF.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metered Wells</td>
<td>44,189</td>
<td>43,896</td>
<td>45,010</td>
<td>48,024</td>
<td>41,177</td>
<td>41,482</td>
<td>47,275</td>
<td>50,015</td>
<td>43,620</td>
<td>37,642</td>
<td>36,129</td>
<td>42,026</td>
</tr>
<tr>
<td>Non-metered Wells (estimated)</td>
<td>568</td>
<td>595</td>
<td>600</td>
<td>574</td>
<td>606</td>
<td>490</td>
<td>331</td>
<td>309</td>
<td>344</td>
<td>302</td>
<td>290</td>
<td>331</td>
</tr>
<tr>
<td>Delivered Water</td>
<td>0</td>
<td>158</td>
<td>139</td>
<td>207</td>
<td>603</td>
<td>990</td>
<td>1,337</td>
<td>1,665</td>
<td>2,405</td>
<td>2,680</td>
<td>2,630</td>
<td>3,788</td>
</tr>
<tr>
<td>City of Watsonville (Groundwater)</td>
<td>6,527</td>
<td>6,617</td>
<td>6,794</td>
<td>7,055</td>
<td>6,575</td>
<td>6,215</td>
<td>7,014</td>
<td>7,559</td>
<td>7,009</td>
<td>6,182</td>
<td>6,054</td>
<td>6,383</td>
</tr>
<tr>
<td>City of Watsonville (Surface Water)</td>
<td>1,093</td>
<td>1,066</td>
<td>843</td>
<td>752</td>
<td>1,002</td>
<td>913</td>
<td>991</td>
<td>340</td>
<td>372</td>
<td>733</td>
<td>905</td>
<td>633</td>
</tr>
<tr>
<td>Other Municipal (excl. Watsonville)</td>
<td>1,245</td>
<td>1,256</td>
<td>1,261</td>
<td>1,289</td>
<td>1,226</td>
<td>572</td>
<td>1,285</td>
<td>1,223</td>
<td>2,167</td>
<td>1,034</td>
<td>1,058</td>
<td>1,104</td>
</tr>
<tr>
<td>Rural residential (estimated)</td>
<td>1,691</td>
<td>1,695</td>
<td>1,695</td>
<td>1,577</td>
<td>1,492</td>
<td>1,466</td>
<td>1,494</td>
<td>1,495</td>
<td>1,486</td>
<td>1,474</td>
<td>1,127</td>
<td>1,133</td>
</tr>
<tr>
<td>Sum of Groundwater Usage (AF)</td>
<td>54,220</td>
<td>54,059</td>
<td>55,361</td>
<td>58,639</td>
<td>51,555</td>
<td>51,038</td>
<td>58,545</td>
<td>62,054</td>
<td>55,575</td>
<td>47,525</td>
<td>45,098</td>
<td>52,009</td>
</tr>
<tr>
<td>Sum of Water Usage (AF)</td>
<td>55,313</td>
<td>55,283</td>
<td>56,343</td>
<td>59,478</td>
<td>52,682</td>
<td>52,129</td>
<td>59,726</td>
<td>62,606</td>
<td>57,404</td>
<td>50,047</td>
<td>48,192</td>
<td>55,397</td>
</tr>
</tbody>
</table>

Source: PVWMA Data

The City of Watsonville’s (City) goal is to have no net increase in groundwater use (Board of Directors/Ad Hoc BMP Committee Joint Meeting, August 2012). Although population growth has continued to increase over the past fifteen years, urban water use has remained relatively constant due to water conservation programs, as shown in Figure 2-3. The City plans to continue no net increase in groundwater use in the future through a combination of expanded water conservation and increased surface water supply.
2.2.3 Existing Supplemental Water Supply Infrastructure

PVWMA has implemented several projects to provide supplemental water supply, as shown in Figure 2-3. These projects consist of the following:

The Coastal Distribution System (CDS). The CDS is a distribution system used to deliver supplemental water supplies to farms in coastal areas in portions of Santa Cruz and Monterey Counties within the PVWMA service area. The supplemental supplies include recycled water, stored water from the Harkins Slough Managed Aquifer Recharge and Recovery Facility (described below), groundwater from blend wells and City potable supplies. Water delivered through the CDS replaces groundwater that would otherwise be pumped from coastal wells. In this sense, delivered water provides “in lieu recharge” to the aquifer.

The Recycled Water Treatment Facility. The PVWMA partnered with the City of Watsonville to build a water recycling plant that can deliver up to 4,000 AF per year of tertiary treated, disinfected, recycled water through the CDS during the irrigation season. The plant came online in 2009. In 2012, the plant provided 2,516 AF of recycled water to the CDS. This recycled water was mixed with approximately 1,272 AF of blend water from three sources: 1) the City of Watsonville potable system; 2) recovered Harkins Slough water; and 3) supplemental wells operated by PVWMA.

The Harkins Slough Managed Aquifer Recharge and Recovery (MAR) Facilities. The Harkins Slough MAR Facilities seasonally store wet weather flows from Harkins Slough in the surficial (or shallower) aquifers of the San Andreas Terrace, located near the coast. Stored water is pumped from a series of wells and delivered to coastal farms through the CDS. In its first ten years of operation, between 2002 and 2012, the facility recharged nearly 7,000 AF of diverted Harkins Slough water, 1,928 AF of which was recovered for delivery and use by coastal farms; the balance was left in storage. In 2012, the Harkins Slough Recharge Facilities delivered 239 AF of water to the CDS.

The water supplied by PVWMA through the CDS is referred to as delivered water. Table 2-3 summarizes quantities of delivered water supplied by PVWMA from 2009 through 2012.

| Table 2-3 Summary of Delivered Water by Calendar Year (AFY) |
|-----------------|----|-----|-----|-----|
|                 | 2009 | 2010 | 2011 | 2012 |
| Harkins Slough Project Recovery Wells¹ | 159 | 160 | 232 | 239 |
| Recycled Water  | 1,298 | 1,630 | 1,958 | 2,516 |
| City of Watsonville Potable Blend Supply¹ | 517 | 517 | 348 | 792 |
| PVWMA Blend Wells¹ | 431 | 374 | 92 | 240 |
| **Total**       | **2,406** | **2,681** | **2,630** | **3,788** |

¹ Improves the quality of the delivered water product as a whole by reducing the concentration of salts.

Figure 2-4 shows the annual and cumulative volumes of water delivered through the Coastal Distribution System and the diverted and recovered water by the Harkins Slough Recharge Facilities, respectively, from 2001 through 2012.
2.2.4 Land Use

Historical Land Use

Land use within the Pajaro Valley is predominantly native vegetation, agriculture, and urban/rural residential areas. Department of Water Resources land use datasets documenting historical land use within the valley were compiled in the 2002 BMP. At that time, for the previous hydrologic flow model (the Pajaro Valley Integrated Groundwater and Surface Water Model or “PVIGSM”), land use was summarized by the model area, which, as for the current model, was greater than the PVWMA service area. (For example, in 1997, approximately 30,200 acres of irrigated agricultural land were within the PVWMA service area and approximately 34,650 acres were in the model area.) For this BMP Update, these data have been supplemented to include land use data within the PVWMA service area collected by PVWMA in 2009, 2011, and 2012. The total acreages for general land use type within the PVWMA boundaries are presented in Table 2-4, below. Due to the different areas analyzed (model area and service area), only trends are discussed.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total agricultural acreage</td>
<td>30,448</td>
<td>33,409</td>
<td>31,516</td>
<td>34,463</td>
<td>34,650</td>
<td>28,299</td>
<td>28,264</td>
<td>28,367</td>
<td></td>
</tr>
<tr>
<td>Urban acreage</td>
<td>4,757</td>
<td>6,688</td>
<td>8,018</td>
<td>8,384</td>
<td>12,860</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Native vegetation</td>
<td>61,301</td>
<td>56,409</td>
<td>56,972</td>
<td>53,659</td>
<td>48,996</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>


Urban and Rural Residential land use has been steadily increasing, from approximately 5% of the total service area in 1966 to 17% of the total service area in 2006 (PVWMA, personal communication). Department of Water Resources land use data were analyzed to determine historical agricultural land use changes in the basin. As shown in Table 2-4, between 1966 and 1975, agricultural land use increased by approximately 3,000 acres (about 10%) in the Pajaro Basin. From 1975 to 1989, agricultural land use in the basin increased by approximately 1,100 acres (3%). However, from 1989 to 1997, agricultural land use in the Pajaro Basin increased by less than 200 acres (0.5%; Montgomery Watson/AT Associates 1999-2000). From 2009 to 2012, agricultural acreage has stayed stable, with less than a 100-acre increase between 2009 and 2012.

An understanding of the historical land use conditions and cropping patterns is necessary to develop an understanding of the historic water use patterns. These data are also utilized by the Pajaro Valley Hydrologic Model (PVHM) Farm Process (Schmid and Hanson 2009), which allows for detailed and realistic simulations of agricultural pumping based on simulated crop water demand. Table 2-7 shows the relative breakdown by crop type and the changes in crop types planted in the Pajaro Valley and simulated in the PVHM over the last 46 years.
Table 2-5 Current Land Use and Crop Value

<table>
<thead>
<tr>
<th>Crop Land Use Type (in Acres)</th>
<th>2009</th>
<th>2011</th>
<th>2012</th>
<th>Dollar Value Per Acre</th>
<th>2012 Total Crop Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fallow</td>
<td>2,767</td>
<td>2,364</td>
<td>2,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable Row Crops (Lettuce, Celery, Zucchini, Artichokes, etc.)</td>
<td>6,498</td>
<td>7,679</td>
<td>8,914</td>
<td>$7,690</td>
<td>$68,575,461</td>
</tr>
<tr>
<td>Strawberries</td>
<td>7,068</td>
<td>9,120</td>
<td>7,251</td>
<td>$51,058</td>
<td>$370,207,734</td>
</tr>
<tr>
<td>Raspberries, Blackberries</td>
<td>3,655</td>
<td>4,295</td>
<td>4,888</td>
<td>$47,116</td>
<td>$230,303,765</td>
</tr>
<tr>
<td>Blueberries</td>
<td>Not applicable</td>
<td>39</td>
<td>41</td>
<td>$38,188</td>
<td>$1,566,292</td>
</tr>
<tr>
<td>Vines/Grapes</td>
<td>27</td>
<td>147</td>
<td>129</td>
<td>$2,495</td>
<td>$321,189</td>
</tr>
<tr>
<td>Deciduous (Apple Orchards)</td>
<td>1,530</td>
<td>2,318</td>
<td>2,128</td>
<td>$5,282</td>
<td>$11,239,654</td>
</tr>
<tr>
<td>Nurseries/Flower/Subtropical Plants</td>
<td>1,397</td>
<td>1,378</td>
<td>1,404</td>
<td>$93,873</td>
<td>$131,789,364</td>
</tr>
<tr>
<td>Other</td>
<td>788</td>
<td>918</td>
<td>997</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Uncategorized Agricultural Use</td>
<td>4,569</td>
<td>6</td>
<td>11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Acreage</td>
<td>28,299</td>
<td>28,264</td>
<td>28,367</td>
<td>$814,003,459</td>
<td></td>
</tr>
</tbody>
</table>

Source: PVWMA 2012 land use data and crop values from the Santa Cruz County Agricultural Commissioner 2011 Crop Report

Note: Although the Pajaro Valley includes portions of both Santa Cruz and Monterey Counties, Santa Cruz County crop values were assumed to be more reflective of the Pajaro Valley since Monterey County crop values may be heavily influenced by those of the Salinas Valley.

Current Land Use

Land use within the Pajaro Valley is primarily agricultural. Table 2-5 and Figures 3.2-1A to 3.2-1E in Section 3.2 show the land uses within the PVWMA service area. Table 2-5 also shows current land use acreages and estimated crop values. Most notably, there has been a steady increase in caneberries, with raspberries and blackberries being grown on over 17% of the agricultural land within the PVWMA service area in 2012 (up from 13% in 2009). These types of crops are more water intensive than some of the crops that have been replaced, such as apples. A continuation of this trend has implications for future water use.

Future Land Use

Urban. As shown in Table 2-4, urban land use in the Pajaro Valley increased from approximately 4,800 acres in 1966 to 12,900 acres in 1997 and 13,373 acres in 2006 (PVWMA, personal communication). Native vegetation, however, remains the predominant land use, and some of the native vegetation represents potential land for urban development. Urban population growth may affect the Pajaro Valley by causing the conversion of more native vegetation or agricultural land to urban land (expansion of urban areas for new development) and/or by increasing population density within existing urban areas (infill development and redevelopment). Table 2-6 projects future population growth for urban water users within the City of Watsonville.

Table 2-6 Watsonville Estimated Population Growth

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watsonville Population</td>
<td>65,739</td>
<td>66,826</td>
<td>68,759</td>
<td>71,318</td>
<td>73,691</td>
<td>75,073</td>
</tr>
</tbody>
</table>

Agricultural. Based on the historical data in Table 2-4, the total irrigated agricultural land area has remained relatively constant since 1989. For the purposes of land use projections, it is assumed that agricultural land use will remain constant. Though crop rotation creates annual shifts in crop related land use, there have been significant long-term shifts in the types of crops grown in the valley, as shown in Table 2-7. Most apparent are the increases in berry and decrease in row crops. Detailed economic and marketing surveys have not been conducted in recent years, and therefore it is not certain whether the shift to high-water-use crops will continue. However, the trend of replacing low-water-use apple orchards with higher value, more-water-intensive crops may continue.

Table 2-7 Historical Agricultural Land Use

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberry</td>
<td>5.8</td>
<td>13.1</td>
<td>19.0</td>
<td>18.9</td>
<td>20.2</td>
<td>25.0</td>
<td>32.3</td>
<td>25.6</td>
</tr>
<tr>
<td>Irrigated Fallow</td>
<td>14.4</td>
<td>11.7</td>
<td>9.9</td>
<td>11.3</td>
<td>12.1</td>
<td>9.8</td>
<td>8.4</td>
<td>9.2</td>
</tr>
<tr>
<td>Vine (Caneberries, grape, etc.)</td>
<td>0.1</td>
<td>0.0</td>
<td>1.6</td>
<td>4.4</td>
<td>4.8</td>
<td>13.0</td>
<td>15.9</td>
<td>17.8</td>
</tr>
<tr>
<td>Vegetable Row Crops</td>
<td>48.0</td>
<td>39.0</td>
<td>33.1</td>
<td>37.8</td>
<td>40.2</td>
<td>23.0</td>
<td>27.2</td>
<td>31.4</td>
</tr>
<tr>
<td>Field Crops</td>
<td>2.1</td>
<td>3.5</td>
<td>5.5</td>
<td>2.6</td>
<td>1.9</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Deciduous</td>
<td>24.7</td>
<td>25.7</td>
<td>23.6</td>
<td>16.6</td>
<td>11.2</td>
<td>5.4</td>
<td>8.2</td>
<td>7.5</td>
</tr>
<tr>
<td>Pasture</td>
<td>3.9</td>
<td>5.3</td>
<td>3.2</td>
<td>2.6</td>
<td>3.5</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Nursery</td>
<td>1.1</td>
<td>1.7</td>
<td>4.1</td>
<td>5.7</td>
<td>6.1</td>
<td>4.9</td>
<td>4.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>18.9</td>
<td>3.3</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Values from 1966-1997 are for the model area. Acres from 2009-2012 are for PVWMA service area and represent consolidated land use categories. For example, Field Crops were mapped as Vegetable Row Crops.


2.3 PROGRAM OBJECTIVES

The specific objectives of the BMP Update are as follows:

- prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation;
- manage existing and supplemental water supplies to control overdraft and provide for present and future water needs;
- create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley;
- develop water conservation programs; and
- recommend a program that is cost effective and environmentally sound.

In 2010, PVWMA formed the Ad Hoc BMP Committee as a means to engage the community and encourage participation in the development of an updated BMP that addresses the water issues, discussed above. The BMP Update planning process began with the development of a comprehensive list of
potential supplemental water supply projects that could help meet the goals of stopping seawater intrusion and basin overdraft, including some identified in previous BMPs. In total, 44 potential projects were screened, ranked, and prioritized for feasibility, cost, and other factors. Based on this analysis, seven components were selected for recommendation to the PVWMA Board of Directors for inclusion in the BMP Update portfolio. As a group, the seven components (or primary projects and programs) proposed by the BMP Update were simulated using the Pajaro Valley Hydrologic Model and were considered adequate to solve more than 90 percent of the seawater intrusion and basin overdraft problems. Additional projects were identified for potential future implementation if the selected portfolio does not meet the planning-level expectations with respect to supply yield or demand offset using an adaptive management method of project implementation. See Section 2.7, Project Schedule, for more information on the adaptive management method proposed.

2.4 PROPOSED BMP UPDATE

2.4.1 Overview

The Program includes implementing the following seven primary projects and programs (also referred to as components in the BMP Update):

- Conservation
- Increased Recycled Water Storage at Treatment Plant
- Increased Recycled Water Deliveries
- Harkins Slough Recharge Facilities Upgrades
- Watsonville Slough with Recharge Basins
- College Lake with Inland Pipeline to Coastal Distribution System (CDS)
- Murphy Crossing with Recharge Basins

Figure 2-5 shows the locations of the BMP Update components. Based upon an assessment of timing issues for implementation, most components of the proposed BMP Update (i.e., the first six bullets above), are described as Phase 1 components, as they are assumed to be implemented within the near-term (2015-2024) following a successful Proposition 218-compliant rate-setting process. The other components, such as Murphy Crossing with Recharge Basins, would require further design development, interagency agreements, acquisition of water rights, and resource agency permits and, therefore, would likely not be constructed until 2025-2035. The Ad Hoc BMP Committee considered Murphy Crossing with Recharge Basins a Phase 2 component of the BMP Update. In addition, using an adaptive management method of responding to the results of the basin monitoring, additional components will be implemented depending upon the success of the existing and Phase 1 components. The precise location, dimensions and use of any private property affected by these projects will depend upon meeting environmental concerns, confronting the many issues raised by the agencies whose permits or review are required, seeking financing and partnership arrangements and securing necessary property interests after paying just compensation for such interests.
As part of an adaptive management strategy, the following seven additional projects are included for future consideration should the recommended projects and programs not provide the projected yields, or if these yields are not sufficient to balance the basin and halt seawater intrusion:

- CDS expansion
- Winter Recycled Water Deep Aquifer Storage and Recovery (ASR)
- River Conveyance of Water for Recharge at Murphy Crossing
- San Benito County Groundwater Demineralization at Watsonville WWTP
- Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and ASR
- Seawater Desalination
- Bolsa de San Cayetano Dam with Pajaro River Diversion

The recommended projects and programs that form the BMP Update are described below. The additional projects are described and analyzed in the Alternatives Analysis (Chapter 5).

### 2.4.2 Conservation

This component is estimated to result in a reduction of groundwater pumping by 5,000 AFY. Details of the program are not addressed because no adverse environmental impacts are associated with the implementation of the conservation program (see NOP, page 6). Specifically, there would be no substantial change to any of the physical conditions in the area, including land, air quality, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. The social and economic changes that may occur would not indirectly result in a substantial physical change to the environment. Additional information regarding the conservation program details is provided in Chapter 6 of the BMP Update.

### 2.4.3 Increased Recycled Water Storage at Treatment Plant

**Project Background**

The Watsonville Recycled Water Treatment Facility was completed in 2009. The facility was constructed in partnership with the City of Watsonville and was designed to deliver 4,000 AFY of recycled water. To reduce the concentration of salts in the recycled water, it is blended with other water supplies. The blend water supplies are from groundwater wells owned and leased by PVWMA, the City of Watsonville’s potable supply, and the Harkins Slough Recharge Facility’s extraction wells.

The volume of recycled water delivered to growers has increased each year that the recycled water facility has been in operation, from 1,298 AF in 2009 to 2,516 AF in 2012. All of the potential supply, however, is not being used because:

1. It is not available during the daytime when demand is the highest.
2. There is insufficient nighttime demand to utilize the nighttime flows into the wastewater treatment plant.

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8 This project would increase the total storage capacity of College Lake to 4,600 AF, increase the water supplies to College Lake, and add a seasonal storage component. This project diverts water from Corralitos Creek, Pinto Lake, and Watsonville Slough and provide ASR injection during the winter and recovery during the summer. For more information see Draft 2012 BMP Update (Carollo Engineers, January 2013, at page B-13).
3. There is insufficient demand in the “shoulder” periods before and after the peak irrigation season, particularly March to mid-April and October to mid-November. Currently, recycled water is not produced unless there is a demand (water order) by a grower or group of growers. Water that has received secondary treatment is sent through the City of Watsonville’s ocean outfall when there is no demand for delivered water. A goal of the BMP Update is to develop projects and programs that would increase demand and deliveries during the irrigation season to fully utilize the 4,000 AFY available from the facility. This project, Increased Recycled Water Storage at Treatment Plant, addresses Item 1 above, insufficient supplies during the daytime. Items 2 and 3, above, are addressed in the following section "Increased Recycled Water Deliveries."

**Project Description**

The most cost-effective way to provide additional supplies of disinfected, tertiary treated water during the day is to treat and store recycled water that can be produced at night. This project was developed to provide the additional recycled water storage needed to optimize the facility for daytime deliveries.

The recycled water treatment facilities include approximately one million gallons (MG) of water storage. Space is available south of the existing storage tank to add approximately two MG of storage. This project would add two one-million-gallon storage tanks at the treatment plant and additional pumps at the distribution pump station to allow more recycled water to be sent to the CDS during the daytime over the peak demand months (May through September). The project also includes installation of approximately 500 feet of parallel 24-inch diameter CDS pipe adjacent to the treatment plant. The proposed location of the storage tanks, pumps, and parallel 24-inch diameter pipe and a schematic of the project are shown in Figure 2-6.

**Water Quality and Yield**

Two million gallons of additional storage is estimated to allow an additional 750 AFY of recycled water to be supplied to meet daytime demand in the CDS. The additional storage will be designed to ensure adequate water quality in the CDS.
2.4.4 Increased Recycled Water Deliveries

Project Background

As described in the previous section, approximately 2,000 AFY of recycled water supplies are not being used, due in part to insufficient nighttime and shoulder period demand. Figure 2-7 shows typical peak irrigation system recycled water demand and supply pattern. As the figure indicates, during the daytime the irrigation demand is greater than the supply. At night, the pattern is reversed: the flow to the wastewater treatment plant typically becomes greater than the irrigation demand. Some success is being realized by current efforts to encourage more deliveries. Since 2006, deliveries have increased by an average of 20 percent per year. This is likely due to increased grower acceptance of the new supply, outreach and education efforts, and the further deterioration of groundwater quality along the coast. The PVWMA Water Quality and Project Operations Committee recommended to the Board that it evaluate a reduction in nighttime delivered water rates to encourage increased use. PVWMA is currently exploring the potential for use of reduced rates for nighttime delivered water.

The increased storage project, presented above, is estimated to deliver approximately 750 additional AFY. The remaining 1,250 AFY of additional recycled water will need to be delivered at night and during the shoulder periods to fully utilize the 4,000 AFY available. The purpose of this project is to increase nighttime irrigation season recycled water deliveries by approximately 1,000 AFY and shoulder period recycled water deliveries by approximately 250 AFY, for a total of 1,250 AFY increased deliveries.

Project Description

A schematic of Increased Recycled Water Deliveries is shown in Figure 2-8. The BMP Committee identified strategies to increase recycled water deliveries that included the following:

- Pricing of delivered water at a lower rate during off-peak hours and shoulder periods
- Peer encouragement from coastal growers and landowners who recognize the benefit to the basin
- Lease or producer requirements to use blended recycled water, if available
- Adoption of the mandatory use ordinance by PVWMA Board requiring use of recycled water if available

These strategies would not result in significant adverse environmental effects; therefore, the details are not included herein. Specifically, there would be no substantial change to any of the physical conditions in the area, including land, air quality, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. The social and economic changes that may occur would not indirectly result in a substantial physical change to the environment. For more information, see Chapter 5 of the BMP Update.

Water Quality and Yield

The goal of this program is to increase recycled water use by approximately 1,250 AFY, in addition to the approximately 750 AFY estimated to be supplied during the day when Increased Recycled Water Storage at Treatment Plant is operational. Nighttime water quality could be worse than daytime since nighttime supplies to the CDS have historically included less blend water due to insufficient demand. Efforts are being made to provide similar water quality at night and during the day by blending the recycled water with roughly the same percentage of potable or supplemental well water at all times.
2.4.5 Harkins Slough Recharge Facilities Upgrades

Project Background

The Watsonville Slough system consists of six major branch sloughs: Watsonville, Harkins, Hanson, Struve, West Branch of Struve, and Gallighan. The slough system is a network of approximately 800 acres of coastal salt marsh, seasonal wetlands, brackish and freshwater emergent marsh and riparian communities. It receives runoff from a 13,000-acre watershed area. The Resource Conservation District of Santa Cruz County is conducting a hydrologic study of Watsonville Slough from October 2011 to September 2013. The results of the study should increase the understanding of the Watsonville Slough system.

The Harkins Slough Recharge Facilities were constructed in 2002 and seasonally store wet weather flows from Harkins Slough in the shallow aquifers near the coast. The wet weather flows are pumped through pressure sand filters and then to a recharge basin where the water percolates into the ground. Stored water is pumped from a series of recovery wells and is delivered to coastal farms through the CDS during the irrigation season. The pump station at Harkins Slough is owned and operated by Santa Cruz County. The location and schematic of the Harkins Slough Recharge Facilities are shown in Figure 2-9.

On June 8, 2000, PVWMA received a Permit for Diversion and Use of Water #21039 from the State Water Resources Control Board (SWRCB), which allows the use of up to 2,000 AFY of Harkins and Watsonville Slough water from November 1 to May 31. The project has diverted a total of 6,880 AF (an average of 625 AFY) from Harkins Slough from 2002 through 2012, with a maximum of 904 AF in 2010. The average annual yield from the extraction wells to the CDS was estimated to be 1,100 AFY at the time the project was constructed. The project has delivered an average of 171 AFY of water to the CDS from 2002 through 2012, with a maximum of 239 AF in 2012.

Diversions from the slough are periodically constrained by high turbidity and inadequate water quality in the slough and the diversion pump intakes being clogged with sediment. Water supplied to the CDS from the extraction wells has been limited by low yields from the wells. The low yields are due to the presence of fine grained sediment lenses (silt and clay) located above the screened interval of several recovery wells, which restricts the vertical flow of water in the subsurface.

In early 2001, when the facility was still under construction, ten extraction wells were installed around the recharge basin. These ten wells were constructed with a 40-foot perforated interval, with perforations averaging 36 feet above sea level to about 5 feet below sea level. As noted above, yield from the wells has been much lower than anticipated. In 2008, the PVWMA was awarded a Local Groundwater Assistance Grant (AB303) from the California Department of Water Resources for a proposal called the Harkins Slough Project Re-Operation Feasibility Study. As part of that study, three new monitoring wells were installed around the recharge basin in an effort to detect diverted slough water leaking into the surficial aquifer. The study led to a detailed review of existing recovery well construction data and analysis of associated SCADA data and eventually to the construction of three new recovery wells in 2012.
Collaborative studies with the University of California Santa Cruz and Stanford University were taking place at the recharge basin concurrently. The UC Santa Cruz group was studying the spatial and temporal dynamics of recharge (Russo, et al., 2013 in review) and the effects of recharge on denitrification (Schmidt et al., 2011). The Stanford team was testing and continues to test geophysical methods to learn about the infiltration and deeper percolation of recharged water (PVWMA/Carollo Engineers, 2013). The Russo, et al study of the Harkins Slough Recharge Basin found there was high spatial and temporal variability in point-specific infiltration rates, with the mean of measured values generally lower than rates indicated by whole-pond calculations. Infiltration rates at the Harkins Slough Recharge Basin varied from 3 feet/day to less than 0.3 feet/day.

As described above, PVWMA’s existing water rights permit for Harkins and Watsonville Slough diversions was received in 2000. A water rights permit may be finalized or “licensed” as a water right by the SWRCB after 10 years of putting the water to beneficial use. However, the SWRCB will typically grant a license only for the maximum annual amount of water utilized during the permit period, and 904 AF is the maximum annual amount diverted to date. In order to realize the full benefits of the original Harkins Slough Project, the PVWMA applied to the SWRCB in December 2011 for a 10-year extension to put the 2,000 AFY to beneficial use. On July 13, 2012, the PVWMA received a draft amended permit from the SWRCB that extends the date for putting the water to beneficial use until December 31, 2021. The PVWMA commented on the draft permit in October 2012. Facility improvements are needed to accomplish three goals:

1. Maximize diversions from the slough
2. Maximize infiltration of diverted water
3. Maximize water extracted from the recovery wells and supplied to the CDS

The Harkins Slough Recharge Facilities Upgrades are designed to accomplish these goals through the construction of new infrastructure and upgrades to existing infrastructure.

**Project Description**

The component includes installation of new shallow extraction wells at the recharge basin, upgrading the pump station and filters at the slough diversion to improve system operation and recharge infiltration rates, and construction of a new recharge basin. Potential recharge basin locations identified to date include the Southeast Recharge Basin and Monitoring Well #7 Recharge Basin sites, as shown in Figure 2-9. Figure 2-9 also shows the Harkins Slough Recharge Facilities Upgrade Component Plans and Schematic.

In 2011, PVWMA removed the invasive vegetation and accumulated mud that had prohibited the pump station from operating at full capacity. This component includes replacing the pumps to allow the PVWMA to better control the amount of flow sent to the pressure filters, construction of coagulant addition facilities and additional filters to reduce the amount of solids sent to the recharge basin, and construction of an additional recharge basin. The pump station upgrades may also include upgrades to the pump house, controls, and intake to improve facility reliability and minimize future clogging issues. The pump station and treatment plant will be designed with acoustical treatments (building enclosures, louvered vents, noise walls, etc.) to maintain noise levels at nearby properties at or below ambient levels.
The USDA Natural Resources Conservation Service (NRCS) is planning to construct a wetland on land between Harkins Slough and Watsonville Slough and to divert water from the sloughs into it. This may improve the water quality diverted to the recharge basin. The proposed diversion from the sloughs into the wetlands would be upstream of the confluence of Watsonville and Harkins Sloughs and the Harkins Slough Pump Station. The PVWMA will coordinate with the NRCS when implementing the Harkins Slough Recharge Facilities Upgrades component of the BMP Update.

New extraction wells near the existing recharge basin will be built sequentially so that each well location and screened depth can be based on information from the previous wells. The number of wells required depends on the yield of individual wells. Horizontal drilling and additional new site(s) for recharge will also be considered.

**Water Quality and Yield**

The goal of the upgrades is to increase the project’s yield of recovered water by approximately 1,000 AFY on average, in addition to the current recovered water yield of approximately 200 AFY. The average projected yield is lower than the maximum diversion of 2,000 AFY. This is because some years the maximum diversion is not possible due to high suspended solids affecting filtration and percolation rates, high TDS, and losses such as evaporation. With the diversion limitation of 2,000 AFY, the average yield of the project cannot be increased beyond approximately 1,200 AFY without a new water rights permit application. However, a new diversion from the sloughs is the basis for the Watsonville Slough and Recharge Basins Project described in the following section.

Diversions from Harkins Slough are permitted to occur from November through May. In practice, diversions have occurred no earlier than December, when the quality of slough water becomes acceptable for recharge. Diversions occur when the turbidity level is less than 50 NTU (Nephelometric Turbidity Units) so that the filters do not get clogged. Elevated chloride concentrations, a result of the 2012 brackish water flood, prevented operation of the diversion in 2012 and reduced the period of diversion in 2013. This could become a greater problem in the future due to a rising sea level and the types of storms we may see with climate change. The planned wetland construction by the NRCS could improve the water quality at the diversion point by: (1) bringing higher quality water from the Watsonville Slough to Harkins Slough, (2) reducing turbidity by settling and filtering solids in the wetland, and (3) by improving water quality through natural vegetation filtration (anticipated to reduce nutrient concentrations) as the water flows through the constructed wetland.

**2.4.6 Watsonville Slough with Recharge Basins**

**Project Background**

The planning and design of this project would utilize the results of the Watsonville Slough Hydrologic Study, discussed above. This project is designed to utilize the available freshwater surface supply. The project approach and design are similar to the Harkins Slough Recharge Facilities, including diversion, treatment, and recharge facilities as described below. Permitting for the project is similar to the permitting for the Harkins Slough Recharge Facilities, including a water rights permit from the SWRCB.

As described in the previous section, the NRCS is planning to construct a wetland between Harkins Slough and Watsonville Slough, upstream of the existing Harkins Slough diversion. As designed,
channels will route water from the present alignment of the sloughs into the constructed wetlands. Watsonville Slough will join with Harkins Slough upstream of the Harkins Slough pump station. The PVWMA would coordinate this project with the NRCS project.

**Project Description**

The Watsonville Slough with Recharge Basins component would divert Watsonville Slough water during high flows from December to May. The water would be stored in the surficial groundwater aquifer at the proposed North Dunes Recharge Basin (PVWMA, 2002) and/or at alternative locations near the existing Harkins Slough Recharge Basin (the Southeast Recharge Basin and the Monitoring Well #7 Recharge Basin). The location of these sites is shown in Figure 2-10.

Water would be diverted directly from the Watsonville Slough within the yellow area shown on Figure 2-10 (specifically, from just south of the Harkins Slough to approximately 2,000 feet upstream of Harkins Slough). If the NRCS wetland is constructed on the land between the Harkins and Watsonville prior to project-level design, the diversion location for this project may be located within, or downstream of, the constructed wetland area. A pump station at the diversion point would divert the water to a filtration facility located at the site of the existing Harkins Slough filter plant. For the purposes of this EIR, the analysis assumes a straight pipeline between the diversion point pump station and the existing filtration plant, including horizontal directional drilling underneath either the Watsonville or Harkins Slough near their confluence, if required. The water would be sent through an approximately 2,000 foot long pipeline, then filtered at the filtration plant (to be expanded as part of this component), pumped to the recharge site through the Harkins Slough Recharge Facilities pipeline and a new connecting pipeline, and stored in the surficial aquifer. The pump station and treatment plant will be designed with acoustical treatments (building enclosures, louvered vents, noise walls, etc.) to maintain noise levels at nearby properties at or below ambient levels. A schematic of the proposed component is shown in Figure 2-10.

The proposed North Dunes Recharge Basin would require a 25-acre percolation area, assuming a percolation rate of 0.3 feet/day (RMC, 2001), based on a maximum diversion rate of 2,000 AFY from Watsonville Slough between December and May. The Southeast Recharge Basin would require a smaller percolation area of 14 acres due to a faster infiltration rate of 0.6 feet/day (PVWMA, 2002), but it would require further evaluation to determine storage and recovery characteristics. Percolation tests have not been performed at Monitoring Well #7 Recharge Basin site. A recent study of the Harkins Slough Recharge Basin found that there was high spatial and temporal variability in point-specific infiltration rates, with the mean of measured values generally lower than rates indicated by whole-pond calculations (Racz et al., 2012). Infiltration rates at the Harkins Slough Recharge Basin varied from 3 feet/day to less than 0.3 feet/day. Future studies would be needed to better determine infiltration rates in the proposed basins in order to design corresponding basin size.

Recovery wells constructed around the recharge basin(s) would extract water during the irrigation season. Horizontal wells will also be considered. As planned, this project would require construction of a diversion structure, inlet pump station, potentially up to 2,000 feet of intake pipeline from the diversion point to the site of the existing filtration facility, expansion of the existing filtration facility, booster pump station, recharge basin(s), recovery wells, and up to approximately 6,000 feet of connecting pipelines. The pipeline routing could be modified if the CDS system is expanded in the future, allowing for a shared
pipeline leading to the Harkins Slough Recharge Basin and additional piping leading to the North Dunes Recharge Basin.

**Water Quality and Yield**

The proposed project would yield approximately 1,200 AFY. The yield is lower than the maximum diversion of 2,000 AFY due to years when the maximum diversion is not possible because of water quality and flows and losses, such as evaporation and seepage. Diversions would occur from December through May when the quality of slough water is acceptable for recharge. Raw water from the slough typically exhibits total suspended solids (TSS) and turbidity concentrations higher than those generally required for percolation. To avoid clogging the recharge basin, filtration would need to reduce the TSS to acceptable levels.

PVWMA would need to obtain a new water rights permit from the SWRCB in order to achieve an average yield of 1,200 AFY from this project, in addition to the planned yield of 1,200 AFY from the upgraded Harkins Slough Recharge Facilities. The diversion point for Watsonville Slough water would be influenced by the final design of the proposed NRCS wetlands. A possible diversion alternative that could expedite the environmental permitting process and water rights acquisition is to locate the diversion point on Harkins Slough at the outlet of the proposed wetland or further north along the Watsonville Slough. The PVWMA would coordinate any proposed diversion location with the NRCS project.

This project is planned to store and recover water using a perched aquifer and would need to be permitted similarly to the existing Harkins Slough Recharge Facilities. Technical Memorandum No. 2 for the Dunes Recharge Project (CH2M Hill, 1997) indicated that recharge sites in the area of the North Dunes Recharge Basin have the potential to directly recharge the Aromas Formation aquifer. Water perched above the clay layer may be percolating into the Aromas aquifer in areas where the clay may not be continuous.

**2.4.7 College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

**Project Background**

College Lake is located approximately one mile northeast of the Watsonville city limits. It is a naturally occurring seasonal lake that receives water inflows from the Green Valley, Casserly, and Hughes Creek subwatersheds. These streams drain approximately 11,000 acres of range, rural residential, and crop lands. Casserly Creek and two of its tributaries, Banks Creek and Gaffey Creek, are known to support the state and federally listed south-central California coast steelhead (*Onchorhynchus mykiss*). Outflows from the lake naturally flow downstream to Salsipuedes Creek (mixing with overflow from Pinto Lake) in the winter. A low flashboard dam, operated by the College Lake Reclamation District (Reclamation District #2049) on the south side of the lake, causes inundation of approximately 234 acres of the basin and helps prevent water from Salsipuedes Creek from entering College Lake. At the existing headgate level elevation, storage capacity of this depression is about 1,400 AF. In the spring, usually beginning mid-March to May 1st, depending on the amount of spring rains, the lake is pumped dry to allow farming to take place during the summer. Pumping generally continues intermittently throughout the summer until mid-October or November, depending on early rains and crops that may need to be harvested (Allen
Harryman, College Lake Reclamation District, personal communication, September 2012). The majority of the lakebed is used for row crops.

A similar water supply project at College Lake was included in the PVWMA Local Water Supply and Distribution Projects Environmental Impact Report (PVWMA, 1999). The US Army Corps of Engineers (USACE) is studying how to optimize College Lake for flood control. The agency is developing plans for levee reconstruction along Salsipuedes Creek, which includes relocating a stretch of Pinto Creek near College Lake (USACE 2012).

From June 2012 to September 2013, the Resource Conservation District of Santa Cruz County (RCD) is conducting a study of College Lake water flows, usage, and resource management. The study will increase the understanding of the hydrology of College Lake to inform and support collaboration in developing a multi-benefit alternative for College Lake. This will involve developing a set of management measures for the lake that maximizes benefits for water supply and flood management, while preserving steelhead migration. It also will support other environmental and community benefits. Results of the study will play a major role in PVWMA’s development of this project.

Project Description

Working with the RCD, the flood control district, USACE, and property owners, PVWMA has identified the opportunity to increase the storage capacity of the lake, allowing water to be captured, stored, and delivered for irrigation. This project includes the development of the facilities required to store, treat, and deliver the water and construction of a new adjustable weir downstream of the existing low dam. The new outlet weir would raise the College Lake outlet elevation by 2.3 feet to 62.5 feet. This would increase the total storage capacity of the lake from approximately 1,400 AF to approximately 2,000 AF. It also would increase the total inundated area from approximately 260 acres to 300 acres.

The proposed project would include construction of a screened inlet structure, a filter supply pump station, a sand filtration and disinfection system (also referenced herein as a “treatment plant”), a booster pump station, and a new outlet weir structure. These facilities, which would be located near the College Lake outlet channel, would occupy approximately one acre.Withdrawals would occur through a screened intake that prevents trash and debris from entering the pump station and complies with National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) screening methodology guidelines for protection of fish. Diverted water would be delivered to a filter supply pump station, which would discharge the diverted water to a sand filtration system consisting of filters installed on a concrete pad followed by injection of sodium hypochlorite for disinfection. The filtered and disinfected water would flow to the booster pump station that would provide the additional pressure needed to pump the water through a new conveyance pipeline to the Coastal Distribution System or other inland agricultural water users. The 200-horsepower booster pumps would be located on a concrete pad near the sand filtration system. The pump station and treatment plant will be designed with acoustical treatments (building enclosures, louvered vents, noise walls, etc.) to maintain noise levels at nearby

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9 National Marine Fisheries Service (NMFS). Fish Screening Criteria for Anadromous Salmonoids. National Marine Fisheries Service Southwest Region, 1997 is the currently accepted guidelines although site-specific studies may be required to confirm specific screening requirement for this specific site/project.
properties at or below ambient levels. Total system water flow into the conveyance pipeline from the College Lake would range from 1,500 gallons per minute (gpm) to 6,000 gpm.

Construction would include approximately 5.8 miles of a new 18-inch or 25-inch water main, in addition to the above-referenced new pump station and filtration plant. Conceptual project plans (including one potential alignment of the pipeline to the RWF and/or CDS that may be modified during project-level design, based upon a routing study), and a project schematic are shown in Figure 2-11.

The project would send water from College Lake, during the summer, through a new pipeline either to the Recycled Water Facility (RWF) storage tank to supply the CDS or directly to the CDS, with provisions to supply inland users along the new water main pipeline. Sending College Lake water to the existing and/or proposed RWF storage tank(s) would allow blending with recycled water before distribution to provide more uniform water quality to CDS users; however, it would reduce the amount of storage available for recycled water. Conversely, sending College Lake water directly to the CDS preserves the amount of storage available for recycled water at the RWF; however, it would result in varying water quality in the CDS, depending on the timing of College Lake and recycled water being pumped to the CDS. The facilities would be constructed to allow College Lake water to be supplied to either location and to allow the PVWMA flexibility in balancing water quality and storage.

The results of the RCD study, along with stakeholder and landowner input, will help further define how College Lake can be developed as a water supply source, while preserving habitat for steelhead and other wetland/riparian species. It also will support other environmental and community benefits and will help reduce implementation issues for the project. PVWMA submitted a water rights application to the SWRCB in 1995 for diversion and storage at College Lake. The water rights application would need to be re-initiated and a water right received to allow this project to be implemented.

The precise location, dimensions and use of any private property affected by these projects will depend upon meeting environmental concerns, confronting the many issues raised by the agencies whose permits or review are required, seeking financing and partnership arrangements and securing necessary property interests after paying just compensation for such interests.

**Water Quality and Yield**

This project would provide a yield of approximately 2,400 AFY. The estimated yield includes the volume of the lake of 2,000 AF, plus an estimated inflow of 700 AF during the irrigation season, minus an estimated outflow of 300 AF to satisfy minimum flow requirements downstream for steelhead habitat. The estimated College Lake outflow requirement is based on a minimum flow requirement of 7.5 cfs in Salsipuedes Creek, immediately downstream of the Corralitos Creek confluence. This flow is supplemented by the estimated minimum of 300 AF (2 cfs) coming from College Lake over the weir from March 15 to May 31 for steelhead smolt outmigration (ESA 2002). These minimum flow estimates were derived from a 1997 channel configuration (critical riffle) assessment that will need to be confirmed. Moreover, the existing College Lake dam is typically fully inundated during the winter adult steelhead upmigration period (approximately January through March) under current conditions; therefore, it does not present an adult migration impediment at this time. However, depending on existing hydrology, the proposed raising of the dam by 2.3 feet may delay its overtopping. This could impede adult upmigration and necessitate an adult passage structure and adult bypass flows that were not evaluated during the 1997 investigations.
Water quality at College Lake varies seasonally. During the first storms of the season, the runoff collected in College Lake exhibits high values of TDS, nitrates, and other constituents. High nitrates concentrations are typically observed during the beginning of the rainy season, with dilution occurring through the rainy season and improving water quality (RMC, 2001). **Figure 2-12** is a chart of average TDS and nitrate concentrations collected at the College Lake outlet from 2002-2011 and showing annual TDS and nitrate fluctuations. It is assumed that diversions from College Lake would occur after the initial runoff has occurred and sufficient dilution has taken place.

The filters and pump station would be located near the southern part of College Lake, above the east bank of Salsipuedes Creek.

### 2.4.8 Murphy Crossing with Recharge Basins

#### Project Background

Murphy Crossing with Recharge Basins was included in the PVWMA Local Water Supply and Distribution Projects Environmental Impact Report (ESA 2002). The Pajaro River is the largest stream in the Pajaro Valley, draining approximately 1,190 square miles above the gauge at Chittenden. Streams and tributaries to the Pajaro River include the Corralitos, Salsipuedes, Brown’s Valley, Green Valley, Casserly, and Pescadero Creeks, which drain the southern slopes of the Santa Cruz Mountains. Annual stream flow, as recorded by the US Geological Survey at the Chittenden gauging station, averaged 164 cfs from 1940 through 2011, with a minimum of 1 cfs in 1977 and a maximum of 905 cfs in 1983. Peak flows in the Pajaro River, available between December and May, are a potential water source for diversion and groundwater infiltration.

An application for a water right was submitted to the SWRCB in 1995. The National Marine Fisheries Service (NMFS) and California Department of Fish and Wildlife (CDFW) requested that additional investigations be undertaken to evaluate the sediment disruption characteristics of the proposed infiltration gallery. The reduced diversions associated with the updated version of the project may help alleviate the concerns of the NMFS and CDFW. The Murphy Crossing Project was evaluated as a part of the *Pajaro Valley Water Management Agency Local Water Supply and Distribution Projects Environmental Impact Report* (ESA, 1999).

#### Project Description

The Murphy Crossing with Recharge Basins component would divert water from the Pajaro River between December and May. This is when the Pajaro River water quality is within an acceptable range and streamflows are above the required minimum necessary to maintain steelhead habitat. The project includes the construction of an infiltration gallery, pump station, monitoring wells, recharge basins, and a connector pipeline from pump station to recharge basins.

**Figures 2-13** and **2-14** show the proposed conceptual project plans and schematic. An infiltration gallery located upstream of the Murphy Crossing bridge would capture water and transport it to four recharge basins.
The recharge basins would be located just north of the intersection of Highway 129 and Murphy Road. The site covers approximately 20 acres. The designated area for the recharge basins functions largely as a natural drainage collection area for the farm fields and foothill watersheds to the east of the site.

The recharge basins would have a total area of approximately nine acres. The basin layout uses as much of the existing natural depressions as possible. The site would be divided into four separate basins, separated by earthen berms, with percolation rates for the basins ranging from 1.7 feet/day for Basins 1, 2, and 3 to 0.6 feet/day for Basin 4 (CH2M HILL, 2000). The portion of the proposed recharge basins adjacent to the proposed pipeline (Ortega Basin) was dug out by a local grower in 2011 for collection of drainage and groundwater recharge. The portion of the proposed recharge basins farthest from the Ortega Basin, known as the Bokariza-Drobac site, was tested for infiltration capacity in 2011 and developed into a recharge pond (Russo, 2011). The 2002 BMP estimated that the project’s average annual available yield from the river could be up to 1,600 AFY; 620 AF of this would be available for recharge, and the remaining 980 AF would be diverted for irrigation via an inland irrigation pipeline. This scenario was based on 54 diversion days at 15 cfs (CH2MHILL, 1999). The current version of the Murphy Crossing Project is for recharge only. Accounting for years of low precipitation volumes and consequently lower flows in the Pajaro River, a conservative yield of 500 AFY of diversion and recharge is estimated.

The Murphy Crossing infiltration gallery would generally divert Pajaro River water from late December through mid-May, when flows are highest in the Pajaro River. A variety of numbers, ranging from 35 cfs to 90 cfs, have been used in the past regarding minimal flows needed to avoid impact on steelhead smolt passage. A 1997 report by Habitat Restoration Group (2002 BMP EIR, Appendix C) identified a minimum flow rate of 45 cfs for steelhead passage. CH2MHILL (1999) reported that at minimum flow values of 90 cfs, there would be approximately 52 days during which 7,000 gpm could be extracted from the Pajaro River. This extraction volume far exceeds the current proposed extraction volumes. An infiltration gallery would consist of 18-inch-diameter perforated pipe placed approximately 5 to 6 feet below the river bottom, forming a water collection grid. The infiltration gallery would cover approximately two acres of the riverbed just upstream of the Murphy Crossing bridge. River water collected in the perforated pipe would flow by gravity into a sump on the north side of the river. Pumps would convey the water from the sump into the conveyance pipeline to the recharge basins and will be designed with acoustical treatments (building enclosures, louvered vents, noise walls, etc.) to maintain noise levels at or below ambient levels.

As discussed above in other components, the precise location, dimensions and use of any private property affected by these projects will depend upon meeting environmental concerns, confronting the many issues raised by the agencies whose permits or review are required, seeking financing and partnership arrangements and securing necessary property interests after paying just compensation for such interests.

**Water Quality and Yield**

The proposed Murphy Crossing Project would provide approximately 500 AFY. The key water quality parameter of concern is TDS. TDS concentrations of water in the Pajaro River are below 800 mg/L at flows between 45 cfs and 90 cfs, with TDS concentrations decreasing with increasing flows, as shown in Figure 2-15. The RWQCB recommends irrigation water TDS to be less than 500 mg/L, with high TDS concentrations affecting growth and crop production of sensitive crops such as strawberries and raspberries. However, two nearby monitoring wells exhibit average TDS levels of 818 mg/L and 1430...
mg/L for data collected by PVWMA between 2007 and 2011. The proposed project could help decrease current groundwater TDS levels, thus improving current irrigation water quality from local wells. Figure 2-15 also shows TDS values measured at Murphy Crossing from 2002-2011.
2.5  STANDARD CONSTRUCTION PRACTICES ASSUMED

For the purpose of the EIR analysis, the following standard construction practices were assumed to be included in the plans and specifications for all components implemented under the BMP Update, thus supporting the determination that many construction impacts would be less-than-significant as described in the relevant sections of the EIR (specifically, noise and traffic):

Construction Noise Minimization Practices: PVWMA will incorporate the following requirements into plans and contract specifications:

- Contractors shall comply with all local sound control and noise level rules and regulations, and shall notify residents and businesses within ¼ mile of the construction site prior to commencing construction activities.
- Equipment and trucks used for construction activities shall utilize the best available noise control techniques (including mufflers, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) in order to minimize construction noise impacts.
- Impact equipment (e.g., jack hammers, pavement breakers, and rock drills) used for construction activities shall be hydraulically- or electrically-powered whenever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used (such as drilling rather than impact equipment) whenever feasible.
- Stationary noise sources shall be located as far from sensitive receptors as possible. If they must be located near existing receptors, they shall be adequately muffled.
- Temporary walls may be erected at some locations to reduce noise impacts to residences adjacent to construction sites.
- Construction activities generating noise shall be limited to the hours of 8:00 a.m. to 5:00 p.m., Monday through Saturday.

Construction Traffic Management Practices: PVWMA will incorporate the following requirements into plans and contract specifications:

- Schedule truck trips outside peak commute hours (i.e., avoid weekdays from 7:00 a.m. to 9:00 a.m. and 4:00 a.m. to 6:00 a.m.).
- Use haul routes that minimize truck traffic on local roadways to the extent possible.
- The construction contractor shall prepare traffic safety and control plans to show specific methods for maintaining traffic flows. This shall include identifying roadway locations where special trenching techniques would be used to minimize impacts to traffic flow and operations. The traffic control plan shall be subject to the review/approval by Caltrans and the governing Public Works Department(s), as applicable. Construction trenches shall be covered by steel trench plates to allow access to driveways. Contractors shall notify police, fire, and emergency services of the timing, location, and duration of construction activities in roadway right-of-ways and identify the locations of any detours and lane closures. Install construction signs that provide advanced public notification of construction schedule along affected roadways.
2.6 REQUIRED PERMITS AND APPROVALS

This EIR evaluates the aggregate impacts of the BMP Update components. Several components of the Plan evaluated on a program level in this EIR will require additional project-level CEQA analysis prior to implementation. The EIR also serves as the foundation for these future site-specific, “project-level” CEQA documents, which are considered to “tier off” of the EIR. In addition to this project-level CEQA that will be determined prior to implementation of each component, Section 15385 of the CEQA Guidelines defines “tiering” as:

“…the coverage of general matters in broader EIRs (such as on general plans or policy statements) with subsequent narrower EIRs or ultimately site-specific EIRs incorporating by reference the general discussions and concentrating solely on the issues specific to the EIR subsequently prepared. Tiering is appropriate when the sequence of EIRs is:

(a) From a general plan, policy, or program EIR to a program, plan, or policy EIR of lesser scope or to a site-specific EIR;

(b) From an EIR on a specific action at an early stage to a subsequent EIR or a supplement to an EIR at a later stage. Tiering in such cases is appropriate when it helps the Lead Agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe.”

Future CEQA documents (Negative Declarations, Mitigated Negative Declarations, or EIRs) would incorporate this EIR by reference and would focus on those environmental issues not specifically evaluated herein. These issues are expected to be site-specific (e.g., biological resources, cultural resources, hazards, hydrology and water quality, visual, and traffic impacts).

Table 2-8 presents anticipated permits and approvals associated with each component of the BMP Update.
# Project Description

## Table 2-8 Applicable or Potentially Applicable Permits and Approvals

<table>
<thead>
<tr>
<th>Action Requiring Permit or Consultation</th>
<th>Agency or Organization</th>
<th>Permit or Approval</th>
<th>Recycled Water Storage Increase</th>
<th>Harkins Slough Recharge Basins</th>
<th>Watsonville Slough w/ Recharge Basins</th>
<th>College Lake w/ CFS Pipeline Connection</th>
<th>Murphy Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts to wetlands/waters of the United States.</td>
<td>U.S. Army Corps of Engineers</td>
<td>Clean Water Act Section 404 Permit (33 USC 1341)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Impacts to ocean water quality or species</td>
<td>Monterey Bay National Marine Sanctuary</td>
<td>Review of certain RWQCB permits</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impacts to biological resources and federal nexus</td>
<td>U.S. Fish and Wildlife Service</td>
<td>Fish and Wildlife Coordination Act compliance (16 USC 661-667e; the Act of March 10, 1934; ch 55; 48 stat. 401)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction in wetland and upland areas where federally listed species may be present.</td>
<td>U.S. Fish and Wildlife Service; National Marine Fisheries Service</td>
<td>Consultation and Coordination under Endangered Species Act (ESA, Section 7 consultation)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of new surface water diversions</td>
<td>State Water Resources Control Board: Division of Water Rights</td>
<td>Water Rights Permits</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alteration of streambeds during construction;</td>
<td>Department of Fish and Wildlife</td>
<td>Streambed Alteration Agreement (Fish &amp; Game Code Section 1602)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>If state-listed species are present, or may be present, &amp; project may adversely affect such species.</td>
<td>Department of Fish and Wildlife</td>
<td>Incidental Take Permit (CESA Section 2081)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects within Coastal Zone</td>
<td>Coastal Commission</td>
<td>Coastal Development Permits (PRC Section 30000 et seq.)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential for surface water quality impairment from pollutant discharge</td>
<td>Regional Water Quality Control Board</td>
<td>401 Certification and National Pollutant Discharge Elimination System for Construction (WQO 99-08-DWQ)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Construction in or near cultural resources</td>
<td>State Historic Preservation Officer</td>
<td>Section 106 of the National Historic Preservation Act (16 USC 470)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Review &amp; concurrence for recycled water storage/distribution</td>
<td>Department of Public Health</td>
<td>Compliance with Title 22 Division 4, Chapter 3 of California Code of Regulations</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction under State Highways</td>
<td>Department of Transportation (Caltrans)</td>
<td>Encroachment Permits (Streets and Highways Code Section 660)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction affecting Pajaro River levees and drainage ditches.</td>
<td>Monterey County Water Resources Agency</td>
<td>Encroachment Permit Approval</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross railroad tracks, parallel tracks; enter the railroad right-of-way.</td>
<td>Santa Cruz County Regional Transportation Commission</td>
<td>Easement; Right of Entry</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction and excavation activities in Santa Cruz County</td>
<td>Santa Cruz County Planning Dept</td>
<td>Grading Permits; Riparian Exceptions; Coastal Development Permits</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Private Industry <em>Note: The precise location, dimensions and use of any private property affected by these projects will depend upon meeting environmental concerns, confronting the many issues raised by the agencies whose permits or review are required, seeking financing and partnership arrangements and securing necessary property interests after paying just compensation for such interests.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Denise Duffy & Associates, Inc.**

2-27  
Pajaro Valley Water Management Agency  
BMP Update Draft EIR
2.7 PROJECT SCHEDULE

Figure 2-16 displays the proposed schedule for permitting, environmental, engineering, construction and implementation of the various components of BMP Update. This schedule is a conceptual timeline for determining when decisions may be required to consider implementation of the more expensive capital projects identified in the BMP Update. The basis for such decisions will be the measurement of basin groundwater improvement (basin groundwater levels and seawater intrusion). The PVWMA regularly measures groundwater levels, water quality, groundwater production, and delivered water use. Continued monitoring of these parameters will be an important component of the BMP implementation. The purpose of the monitoring as part of the BMP Update implementation will be as follows:

- To understand the impact of conservation: Is pumping basin-wide reduced over a given period of time? Are groundwater levels improving?
- To understand the impact of delivered water use: Has groundwater production declined in the delivered water zone? How is the decline in groundwater production affecting water levels and water quality?
- To measure the yield of capital projects: Are capital projects producing the anticipated yield?
- To determine if new projects need to be considered to solve the remaining basin overdraft and/or seawater intrusion: Are existing facilities, in combination with increased water use efficiency programs, stopping groundwater overdraft and halting seawater intrusion?

For conservation, it is anticipated that the BMP conservation program would be initiated in 2015 if funding is available, and that it (along with other on-going conservation efforts) would achieve 100% of the savings goal (5,000 AFY) in eight years (by 2023). The PVWMA would continuously monitor basin conditions and by 2020 determine if a minimum of 75% of the conservation goal (reduced pumping) is being met; if not, the PVWMA would revise the program to increase the levels of conservation and water use efficiency. By 2025 the PVWMA would determine whether overdraft is reduced by at least 80% and seawater intrusion is reduced by at least 90%; if not, the PVWMA would begin the process of identifying new projects to make up the shortfall for solving the basin problem. The new project(s) would be identified prior to a Phase 2 rate setting process after 2025 (required to pay for the construction of Phase 2 projects) and would be implemented in Phase 2.

For maximizing recycled water use (from 2011 use of approximately 2,000 AFY to 4,000 AFY), it is anticipated that an ongoing program would be required to encourage growers and landowners to use delivered water at night, on weekends, and on irrigation shoulder months (March to mid-April and October to mid-November) to optimize this resource. Pricing, outreach, and education are proposed to achieve maximum usage. Mandatory use requirements could be considered if these initial approaches are not effective. There are no alternative projects for maximizing recycled water deliveries. For new local surface water projects, the monitoring of the effectiveness of these projects would be determined by measuring yield of each project, measuring groundwater production, and monitoring water levels in the aquifers and water quality in the delivered water zone. The process for then determining whether additional, more expensive projects are still required to solve the basin problem would follow a process similar to that identified above for conservation. By 2025 the PVWMA would determine if at least 80% of the basin overdraft and 90% of seawater intrusion problems have been addressed, assuming the full portfolio of Phase 1 projects are implemented. If the PVWMA determines the improvements are not on...
track, it would begin the process of identifying new projects to make up the shortfall for solving the basin problem. The new project(s) would be identified prior to a future rate setting process after 2025, and would be implemented in Phase 2 that is not assessed in this EIR.
Seawater Intrusion within the Pajaro Valley

Explanation

- Cities & Towns
- PVWMA Boundary
- Extent of SWI as of 1951*
- Extent of SWI as of 1966*
- Extent of SWI as of 1998*
- Extent of SWI as of 2011*

*Chloride contours are set to concentrations of 100 mg/L

Title: Seawater Intrusion within the Pajaro Valley

Date: June 2013

Project: 2012-48
Historical City of Watsonville Water Use and Existing PVWMA Water Supply Facilities

June 2013

2012-48

Figure 2-3

Denise Duffy and Associates, Inc.
Environmental Consultants
Resource Planners
947 Cass Street, Suite 5
Monterey, CA 93940
(831) 373-4341
Figure 2-5 BMP Update Project Locations

- Harkins Slough Pump Station
- Harkins Slough Recharge Basin
- Watsonville Slough
- Watsonville Slough w/ Recharge Basins
- Recycled Water Facility
- College Lake
- Murphy Crossing

Title: BMP Update Project Locations
Date: June 2013
Project: 2012-48

File: P:\DDA Current Projects\2012-48 PVWMA BMP CEQA\Public Review Draft EIR\Working Draft EIR\Figures\2-0 Project Description Figures\Figure 2-5 BMP Update Project Locations.pdf
Increased Recycled Water Storage

Date: June 2013

Project: 2012-48

Increased Ability to Match CDS Supply and Demand
Typical Summer Recycled Water Demand and Supply Pattern

Daytime demand is greater than flow.

Nighttime flow is greater than demand.

Average Summer Flow, gpm
Typical Summer Plant Flow Pattern, gpm
Typical Summer Demand Pattern

Time of Day
Increased Recycled Water Deliveries Project

Date: June 2013

Project: 2012-48

Figure 2-8
North Dunes Recharge Basin (25 Acres)

Monitoring Well #7 Recharge Basin (3-5 Acres)

Potential Location for Watsonville Slough Diversion

Harkins Slough Diversion

Harkins Slough Recharge Basin

Southeast Recharge Basin (14 Acres)

Legend

- Existing Pipeline
- New Pipeline
- CDS Alignment
- Potential Location for Watsonville Slough Diversion

Watsonville Slough Recharge Basin

Filtration System

Recharge Basins

Coastal Distribution System

Title: Watsonville Slough Recharge Basin

File: P:\DDA Current Projects\2012-48 PVWMA BMP CEQA\Public Review Draft EIR\Working Draft EIR\Figures\2-0 Project Description\Figures 2-0 Project Description\Figures\Figure 2-10 Watsonville Slough Recharge Basin.pdf

Date: June 2013

Project: 2012-48

Figure 2-10
College Lake Inland Pipeline to CDS

Date: June 2013
Project: 2012-48

Legend
- New Pipeline
- CDS Alignment
Title: College Lake Outflow Water Quality

Date: August 2013

Project: 2012-48

File: P:\DDA Current Projects\2012-48 PVWMA BMP CEQA\Public Review Draft EIR\Working\Draft EIR\Figures\2-0 Project Description Figures\Figure 2-12 College Lake Outflow Water Quality

Figure 2-12: College Lake Outflow Water Quality

- TDS (Total Dissolved Solids)
- N-NO3

Graph shows fluctuations in TDS and N-NO3 levels from January 2002 to January 2013.
TDS vs. Flow Rates in Pajaro River at Murphy Crossing 2002-2011

Minimum Flow Requirement of 45 to 90 cfs

Pajaro River TDS Levels at Murphy Crossing 2002-2011

June 2013

2012-48

Pajaro River Flow and TDS at Murphy Crossing

Project Description Figures/Figure 2-15
Pajaro River Flow and TDS at Murphy Crossing.pdf
Proposed Schedule for BMP Update

Date: June 2013  
Project: 2012-48  

Project Description:

Conservation
- Support ongoing conservation efforts
- Pursue conservation funding grants
- Amend Agency Act to fund conservation
- BMP Conservation Program

Increase Recycled Water Deliveries
- Meet with Stakeholders
- Increase Recycled Water Deliveries

Increased Recycled Water Storage at WWTP
- CEQA
- Preliminary Design
- Grant Applications
- Design/Permit
- Construction

Harkins Slough Recharge Facilities Upgrades
- CEQA
- Design
- Resource Agency Permitting
- Construction

Watsonville Slough with Recharge Basin
- CEQA
- Initiate Water Rights Application
- Water Rights Resolution Process
- Technical Studies/Design
- Resource Agency Permitting
- Final Design
- Construction

College Lake with Inland Pipeline to CDS
- Discussions with RCD and ACDE
- Partnership Development/Agreement
- Conceptual Project Development
- Inter-Agency Water Rights Application
- Water Rights Resolution Process
- Technical Studies
- Conceptual Design
- CEQA/NEPA
- Preliminary Design
- Resource Agency Permitting
- Final Design
- Construction

Murphy Crossing with Recharge Basins
- Conceptual Design
- Preliminary Resource Agency Meetings
- Initiate Water Rights Application
- Water Rights Resolution Process
- Technical Studies/Preliminary Design
- CEQA (after 2023)
- Resource Agency Permitting (after 2025)
- Final Design (after 2024)
3.0 ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

3.0.1 INTRODUCTION

This chapter of the EIR presents the potential environmental impacts of the proposed Basin Management Plan Update (BMP Update). The analyses in this section of the EIR address five priority components of the BMP Update that could have direct or indirect physical environmental impacts (i.e., Increased Recycled Water Storage, Harkins Slough Facilities Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins). The overall scope of the analysis and key attributes of the analytical approach are presented below to assist reviewers of this EIR in understanding the manner in which impact analysis has been approached in this document.

Environmental resource areas are grouped into the following 11 topics consistent with the issues in the CEQA Environmental Checklist (Appendix G of CEQA Guidelines):

3.1: Aesthetics
3.2: Agriculture and Land Use
3.3: Air Quality and Greenhouse Gas
3.4: Biological Resources
3.5: Cultural Resources
3.6: Energy, Utilities, and Services
3.7: Geology and Soils
3.8: Hazards, and Hazardous Materials
3.9: Surface Water, Groundwater, and Water Quality
3.10: Noise and Vibration
3.11: Transportation and Traffic

For each resource topic, the EIR describes the existing environmental setting, the thresholds of significance, the potential for proposed BMP Update components to cause significant environmental impacts, and mitigation measures that could reduce or avoid potentially significant impacts.

\footnote{The Conservation and Increased Recycled Water Deliveries components of the BMP Update would not result in significant adverse environmental effects; therefore, analyses for each topic are not included in this section. Specifically, these two components of the BMP Update would have no substantial adverse change to any of the physical conditions with the area, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. The social and economic changes that may occur due to these two components would not indirectly result in a substantial physical change to the environment that could be considered to be adverse.}
3.0 Environmental Setting, Impacts, and Mitigation Measures

3.0.2 DEFINITION OF BASELINE

The environmental setting discussion for each environmental topic describes the baseline physical environmental conditions at each of the five priority components of the BMP Update that could have associated physical environmental impacts. For purposes of the analyses in this EIR, baseline conditions are those that existed at the time of the Notice of Preparation was published in accordance with CEQA Guidelines §15126.2 (in this case, approximately February 2013). With some environmental resources, such as hydrology, the baseline will be equivalent to anticipated conditions at various times of the year due to the seasonal and annual fluctuations in the conditions of various resources. This anticipated condition will be based on review of historical data and information about the conditions of the resource.

3.0.3 DEFINITION OF STUDY AREA

The extent of the environmental area evaluated (the study area) varies among environmental resource areas and environmental topics depending on the locations where impacts would be expected. For example, potential traffic impacts from construction and implementation of BMP Update components are assessed for the regional roadway network, whereas potential cultural resource impacts are assessed for each component site.

Throughout this EIR, the "BMP Area" is used to describe the geographical context for the discussion of potential environmental impacts. For purposes of this EIR, the BMP Area generally includes portions of Santa Cruz and Monterey Counties and the City of Watsonville that are located in the PVWMA’s service area. This includes both the Pajaro Valley Groundwater Basin as included in the Pajaro Valley Hydrologic Model (Hanson, et al., 2013, in review) and the PVWMA service area shown in Figure 2-1.

3.0.4 APPLICABLE LAND USE PLANNING DOCUMENTS

Insert language about all applicable general planning documents.

3.0.5 BASIS OF IMPACT ANALYSIS

The analyses of potential impacts contained in this EIR are based primarily on one of two factors, depending on the potential primary cause of an impact. For example, impacts related to geology and soils, hydrological changes and water quality, cultural resources, and biological resources are analyzed primarily on the basis of the location and acreage of ground disturbance and other direct changes to those resources that are anticipated to occur as a result of construction and implementation of specific BMP Update components. Impacts related to aesthetics, traffic, air quality, noise, utilities, and public services are analyzed primarily on the basis of potential impacts to people and sensitive receptors in the vicinity or region of each BMP Update component.

3.0.6 YEAR OF IMPACT ANALYSIS

Impacts are typically evaluated in terms of changes that would be attributed to construction and implementation of BMP Update components as compared to existing conditions (see Definition of Baseline above) as well as, where appropriate, relative to conditions that would exist without implementation of the components in the future. Although the BMP Update considers projects that could be implemented after 2025, four of the five priority BMP Update components analyzed in this EIR could be implemented by 2025.

---

2 The BMP Update states that the Murphy Crossing with Recharge Basins component could not be implemented before 2025 and is thus, called a “Phase 2” component in the BMP Update; however, as it is included in the BMP Update priority component list, the component is considered consistent with the other four priority components analyzed in this EIR.
3.1 AESTHETIC RESOURCES

3.1.1 ENVIRONMENTAL SETTING

3.1.1.1 Regional Setting

The BMP Area contains visual resources representative of California’s northern coast range and inland valley landscapes. Visual elements in the BMP Area include expansive croplands, rolling terrain, and meandering creeks and drainages. Peaks and ridgelines of the Coast Ranges are visually prominent landform bodies to the east, and Monterey Bay provides a scenic background feature to the west. The prominence of these landforms provides visual contrast to the relatively flat topography of the floor of the Pajaro Valley. The City of Watsonville is an urbanized area situated on the valley floor, with primarily agricultural lands surrounding the City limits.

3.1.1.2 Regulatory Setting

Applicable objectives, goals and policies from the Santa Cruz County General Plan/Local Coastal Program and the City of Watsonville General Plan are presented below. The Monterey County General Plan is not referenced herein because the above-ground facilities in the BMP Update are within Santa Cruz County and aesthetic impacts would only occur within Santa Cruz County and potentially, the City of Watsonville due to potential views of the new facilities from some City areas.

**County of Santa Cruz General Plan/Local Coastal Program**

Objective 5.10a: Protection of Visual Resources. To identify, protect and restore the aesthetic values of visual resources.

Objective 5.10b: New Development in Visual Resource Areas. To ensure that new development is appropriately designed and constructed to have minimal to no adverse impact upon identified visual resources.

Policy 5.10.2: Development within Visual Resource Areas. Recognize that visual resources of Santa Cruz County possess diverse characteristics and that the resources worthy of protection may include, but are not limited to, ocean views, agricultural fields, wooded forests, open meadows, and mountain hillside views. Require projects to be evaluated against the context of their unique environment and regulate structure height, setbacks and design to protect these resources consistent with the objectives and policies of this [visual resources] section.

Policy 5.10.3: Protection of Public Vistas. Protect significant public vistas as described in policy 5.10.2 from all publicly used roads and vista points by minimizing disruption of landform and aesthetic character caused by grading operations, timber harvests, utility wires and poles, signs, inappropriate landscaping and structure design. Provide necessary landscaping to screen development which is unavoidably sited within these vistas.

Policy 5.10.4: Preserving Natural Buffers. Preserve the vegetation and landform of natural wooded hillsides, which serve as a backdrop for new development.

Policy 5.10.5: Preserving Agricultural Vistas. Continue to preserve the aesthetic value of agricultural vistas. Encourage development to be consistent with the agricultural character of the community. Structures appurtenant
to agricultural uses on agriculturally designated parcels shall be considered to be compatible with the agricultural character of surrounding areas.

Policy 5.10.11: Development Visible from Rural Scenic Roads. In the viewsheds of rural scenic roads, require new discretionary development, including development envelopes in proposed land divisions, to be sited out of public view, obscured by natural landforms and/or existing vegetation. Where proposed structures on existing lots are unavoidably visible from scenic roads, identify those visual qualities worthy of protection and require the siting, architectural design and landscaping to mitigate the impacts on those visual qualities.

Policy 5.10.13: Landscaping Requirements. All grading and land disturbance projects visible from scenic roads shall conform to the following visual mitigation conditions:

a) Blended contours of the finished surface with the adjacent natural terrain and landscape to achieve a smooth transition and natural appearance; and

b) Incorporate only characteristic or indigenous plant species appropriate for the area.

City of Watsonville Vista 2030 General Plan

Goal 5.1: Visual Resources. Preserve and enhance the built and natural visual resources within Watsonville.

Goal 5.2: Community Appearance. Blend new development with recognized values of community appearance and scenic qualities, and ensure that new development enhances, rather than detracts from, its surroundings.

Goal 5.5: Viewscape. Preserve scenic rural qualities surrounding the urbanized portions of the Planning Area.

Goal 5.10: Natural Scenic Resources. Conserve and enhance natural resources that contribute to the visual, recreational, and educational aesthetics of Watsonville. Such resources include: wetlands, sloughs, rivers, lakes, hillsides and stands of vegetation.

Policy 5.A.5: Scenic Resources. The City shall, through its design review process, consider the impact of the development on both the visual quality of the built environment and the scenic quality of natural features including sloughs, wetlands, rivers, lakes, hillsides and stands of vegetation.

Scenic Road Designations

Santa Cruz County

Policy 5.10.10 of the Santa Cruz County General Plan/Local Coastal Program (LCP) identifies designated scenic roads within the County that are valued for their vistas. According to the General Plan/LCP, a scenic road is defined as a road that has unusual or outstanding scenic qualities. Within the BMP Area, the following roadways are designated scenic roads that are valued for their vistas: Highway 1; Highway 152 (East Lake Avenue) from Highway 1 to Santa Clara County; Highway 129 from Highway 1 to San Benito County; Beach Road from Highway 1 to Palm Beach; Buena Vista Drive from San Andreas Road to Larkin Valley Road; Sunset Beach Road; and Shell Road. These roads are valued for their vistas and afforded the highest level of protection in the General Plan/LCP.
City of Watsonville

Within the County of Santa Cruz and the City of Watsonville, there are no officially designated State Scenic Highways. However, Highway 1 and Highway 152 (which both traverse the City of Watsonville) are eligible for the official State Scenic Highway designation. The County of Santa Cruz General Plan Conservation and Open Space Element identifies portions Highway 1, SR-129, SR-152, and Buena Vista Drive as scenic roadways.

Commercial and residential development typifies views east of Highway 1 towards the city, while views to the east are dominated by the Watsonville sloughs and agricultural production. In general, agricultural lands border SR-129 and SR-152 outside the city. As the roadway along Buena Vista Drive, rangeland and rural development typify scenic views.

State of California

There are no officially designated State Scenic Highways within the County of Santa Cruz and the City of Watsonville. However, Highway 1 and Highway 152, which extend through the Pajaro Valley, are both eligible for the official State Scenic Highway designation.

3.1.1.3 Setting by Component

Increased Recycled Water Storage at Treatment Plant

Views of the site proposed for development, located adjacent to the existing Recycled Water Facility (RWF) at the treatment plant, are available from the following vantage points: Beach Road, approximately 500 feet to the north; San Andreas Road, approximately 2,500 feet to the west; and Highway 1, approximately 3,000 feet to the east. Views from Highway 1 are distant and intermittent due to intervening development and vegetation. Distant views of the mountains and midrange views of the heavily vegetated riparian corridor along the Pajaro River are present from both San Andreas and Beach Roads in the project vicinity. As previously indicated, Beach Road is designated as a scenic road in the Santa Cruz County General Plan/LCP. Highway 1 is a designated scenic road in the City of Watsonville General Plan and the Santa Cruz County General Plan/LCP, and is eligible for official State Scenic Highway designation by Caltrans.

The general component area, which contains expansive croplands and little urban development, exhibits a rural visual landscape; however, the existing treatment plant, including the RWF, is a dominant industrial feature. The existing facilities include buildings, pumping facilities, and several large tanks. Existing agricultural operations in the area often include heavy equipment, trucks and vehicles at agricultural sites. A viewpoint map is shown in Figure 3.1-1; accompanying photographs of the viewpoints for this component are in Figure 3.1-3.

Harkins Slough Recharge Facilities Upgrades

The Harkins Slough Recharge Facilities Upgrades component area consists of rolling terrain and expansive irrigated croplands located between San Andreas Road and Monterey Bay. Surrounding lands are used for agricultural production. Structures located in the site area include the existing diversion facility and the existing filtration facility near the confluence of Watsonville and Harkins Sloughs. The project's recharge area is located approximately 2,000 feet west of San Andreas Road; however, the rolling terrain in the general area screens views of the recharge basin from San Andreas. The diversion facility and filtration facility are not visible from San Andreas Road due to intervening terrain and vegetation. Long range views across the project area include
Monterey Bay to the west, Mt. Madonna and the Santa Cruz Mountains to the north, and the Moss Landing electric generation plant to the south. A viewpoint map is shown in Figure 3.1-1; accompanying photographs of the viewpoints for this component are in Figure 3.1-2.

**Watsonville Slough with Recharge Basins**

The visual setting for the Watsonville Slough with Recharge Basins component would be roughly equivalent to the Harkins Slough Recharge Facilities Upgrades, as the two components are located adjacent to each other. The new pipeline and recharge basin proposed for the Watsonville Slough facilities would be separated from existing Harkins Slough facilities; however, the setting for these Watsonville Slough facilities would be similar to the setting for the Harkins Slough pipelines and recharge basins. See discussion above for Harkins Slough Recharge Facilities Upgrades. A viewpoint map is shown in Figure 3.1-1; accompanying photographs of the viewpoints for this component are in Figure 3.1-2.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

College Lake is a seasonal lake located in a natural depression that, when dry, is used for vegetable and flower crop production during the summer and fall months. Agricultural uses dominate the surrounding area, which includes the proposed new inundation area and facilities site; however, single family residences are located in the vicinity of the project site to the south, west and north. During summer and fall, the farmed lakebed blends in with the surrounding expansive agricultural lands to the north, west, and south.

Highway 152 is designated as a scenic road in the County of Santa Cruz General Plan and is eligible for official State Scenic Highway designation by Caltrans. motorists traveling along Highway 152 have views of College Lake and adjacent agricultural lands that are partially obscured by intervening terrain, vegetation, and structures. Existing visual features along these roadways include residences, Lakeview Middle School, and St. Francis School, Church, Cemetery, and Santa Cruz County Fairgrounds. Long-range views across College Lake include Mt. Madonna and the Santa Cruz Mountains to the north, croplands to the west and south, and the City of Watsonville to the south. Existing water pumping facilities are located at the south end of the lake near the proposed facilities site; these facilities are partially visible from Highway 152. The proposed water diversion and filtration facilities site is located along Highway 152 and is intermittently visible to motorists traveling along the roadway. A viewpoint map is shown in Figure 3.1-1; accompanying photographs of the viewpoints for this component are in Figure 3.1-4.

**Murphy Crossing with Recharge Basins**

The proposed recharge area of the Murphy Crossing with Recharge Basins component is located north of the intersection of Murphy Road and Riverside Road/Highway 129. The recharge area is clearly visible from Highway 129, which is a designated scenic road in the County of Santa Cruz General Plan, but is not identified as being eligible for a state scenic highway according to Caltrans information. The recharge area does not have distinct visual boundaries and thus it is not distinguishable from surrounding agricultural lands. The relatively flat topography of the project area provides long-range views of the Santa Cruz Mountains to the north and northeast, Chittenden Gap to the east, and the Bolsa de San Cayetano hills to the south. A viewpoint map is shown in Figure 3.1-1; accompanying photographs of the viewpoints for this component are in Figure 3.1-3.
3.1.2 **SIGNIFICANCE CRITERIA**

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Have a substantial, adverse effect on a scenic vista
- Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway
- Substantially degrade the existing visual character or quality of the site and its surroundings
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area

For the purposes of this EIR, a significant impact would result from a substantial change in the visual landscape that produces a high level of visual contrast visible in the short-term and/or long-term in the foreground view from along a designated or candidate Scenic Highway (e.g., Highway 1), or at any designated vista point or visually protected area accessible to the public. A change in the visual landscape that is noticeable in the middle ground or background view from a scenic road or public scenic vista would be considered a less-than-significant impact, as these effects would not alter the larger visual environment.

3.1.3 **IMPACTS AND MITIGATION MEASURES BY COMPONENT**

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to all or multiple components are identified for each potential significant impact. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are also identified.

3.1.3.1 **Impacts to Scenic Vistas**

*Implementation of the BMP Update and future construction of BMP components would not result in elimination or obstruction of scenic vistas. This is a less-than-significant impact.*

**Increased Recycled Water Storage at Treatment Plant**

Implementation of the Increased Recycled Water Storage at Treatment Plant component would result in construction of two new one-million gallon recycled water storage tanks. While the project site is intermittently visible from Highway 1 as a part of a distant view, and from San Andreas Road and Beach Road (a County-designated scenic road) as part of midrange and distant views, the proposed storage tanks would appear as part of the existing facilities at the treatment plant site. The addition of the tanks would not substantially alter scenic views from public roads in the area as the existing facilities, including several large tanks, are already visible. Distant mountain views would not be obstructed. See Impact AE-1 for further discussion of effects of the tank structures on the visual character of the surrounding area. The proposed pipeline extending from the treatment plant to existing CDS pipeline would be underground. This represents a less-than-significant impact.
Harkins Slough Recharge Facilities Upgrades

Implementation of the Harkins Slough Recharge Facilities Upgrades component and future construction of the new shallow extraction wells and recharge basin would have no impact on a scenic vista as the site is not visible from a scenic road nor is it part of a scenic view. The planned recharge basin(s), which could be located at one of two sites (called Monitoring Well #7 and Southeast Recharge Basins and shown on Figure 2-9 in Section 2 Project Description), would not be visible from public vantage points. No facilities associated with the upgrades are located within the public viewshed. Pipelines associated with this component would be underground. This represents a less-than-significant impact.

Watsonville Slough with Recharge Basins

Implementation of the Watsonville Slough with Recharge Basins component and future construction of a recharge basin and pipeline would have no impact on a scenic vista as the site is not visible from a scenic road nor is it part of a scenic view. No facilities associated with the upgrades are located within the public viewshed. Pipeline associated with this component would be underground.

College Lake with Inland Pipeline to Coastal Distribution System (CDS)

Implementation of the College Lake with Inland Pipeline to CDS component and future construction of a small pump station and booster pump station would not significantly affect scenic views. Portions of the facilities may be visible from Highway 152, a Santa Cruz County designated scenic highway. The planned facilities would consist of relatively small buildings and would not be highly distinguishable from other existing structural development in the area. Future construction would not result in obstruction of views from the highway or across the lake. Views across the lake toward the Santa Cruz Mountains may be considered scenic; however, facilities associated with the project would not detract from these views. This represents a less-than-significant impact.

Murphy Crossing with Recharge Basins

Implementation of the Murphy Crossing with Recharge Basins component and future construction of a pump station, monitoring wells, recharge basin, and a connector pipeline would have no impact on a scenic vista from Highway 101. The pipeline would be underground and a small pump station would appear as an agricultural accessory structure that is common in the area. A recharge basin would be located on the north side of Highway 129 and would appear as a water body feature surrounded by chain-link fence also common in the area. Thus, this component would have no impact on scenic views.

3.1.3.2 Impacts to Scenic Resources

Implementation of the BMP Update and future construction of BMP components would not remove or substantially damage scenic resources; thus, no impacts to scenic resources would occur.

Increased Recycled Water Storage at Treatment Plant

Implementation of the Increased Recycled Water Storage at Treatment Plant component would result in installation of two new recycled water storage tanks on a previously disturbed portion of the site. No trees or
other features would be removed, and there would be no impact on scenic resources, since scenic resources are not located within the vicinity of the component site.

**Harkins Slough Recharge Facilities Upgrades**

Implementation of the Harkins Slough Recharge Facilities Upgrades component would not result in removal or damage to a scenic resource, since none are located on or within the vicinity of the component sites.

**Watsonville Slough with Recharge Basins**

Implementation of the Watsonville Slough with Recharge Basins component would have no impact on scenic resources, since scenic resources are not located within the vicinity of the component sites.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

College Lake itself could be considered a scenic resource during winter months when inundated; however, construction and implementation of the component would not detract from this resource, but rather, could result in an expansion of this scenic feature. There would be no permanent removal of trees or other features that would be considered scenic resources.

**Murphy Crossing with Recharge Basins**

Implementation of the Murphy Crossing with Recharge Basins component would not result in permanent removal of trees or other features that may be considered scenic resources, as none exist in the area, which is dominated by agricultural uses.

3.1.3.3 Visual Character Impacts

*Impact AE-1: Implementation of the BMP Update and future construction of identified BMP components would not generally alter the visual character of the sites or surrounding area, although some of the structural development may be visible. This represents a potentially significant impact that will be reduced to a less-than-significant level with the incorporation of mitigation measures listed below.*

Mitigation Measure(s):

*Mitigation Measure AE-1a: PVWMA shall use design elements to enhance visual integration of the proposed above-ground facilities with their surroundings. Proposed structures shall be painted low-glare earth-tone colors that blend with the surrounding terrain, unless colors otherwise specified by regulatory agencies, such as purple facilities for recycled water systems.*

**Increased Recycled Water Storage at Treatment Plant**

Construction of proposed upgrades to the Recycled Water Facility would result in placement of two new one million-gallon above-ground storage tanks adjacent to the existing wastewater treatment plant facilities. The cylindrical tanks would be approximately 300 feet in diameter with a maximum height of 30 feet, which is equivalent to the height of the tallest facilities at the existing treatment plant. While the tanks would be the same
height as existing facilities at the treatment plant, the massing of the tanks would make them appear somewhat more dominant than other facilities on the site. Given the slightly larger massing of the tank structures, this could be considered a potentially significant impact. However, the site is already characterized by the existing treatment plant facilities and tanks and the addition of two new tanks, albeit slightly larger than existing tanks, would not substantially degrade the visual character of the site or surrounding area. Other existing structures within the treatment plant site would be visible in views from Beach Road and Highway 1. These structures, which include filtration, disinfection, and pumping facilities, are smaller in scale than the storage tanks, but are prominently visible from nearby roads.

While the storage tanks would be dominant visual features, they would not substantially alter the visual character of the area because they would be adjacent to the existing treatment plant, which represents a prominent industrial feature in the visual landscape. The proposed expansion would increase development on the site with similar industrial facilities. Mitigation Measure AE-1a would apply, requiring proposed facilities to be painted low-glare earth-tone colors that blend with the surrounding terrain and the existing facilities. This would reduce the potential impact to a less-than-significant level.

**Harkins Slough Recharge Facilities Upgrades**

Implementation of the Harkins Slough Recharge Facilities Upgrades would create a large groundwater recharge basin at one of two possible locations on agricultural land west of San Andreas Road (called the Monitoring Well #7 and Southeast Recharge Basins). Creation of the recharge basin would not substantially degrade the visual character of the area, since water bodies are generally considered aesthetically pleasing to many people, and the recharge basin would not alter the rural character of the area. Therefore, this would not be considered a significant visual impact. The proposed pipelines would be located entirely below grade; therefore, no long-term visual impacts would result from development of this component.

**Watsonville Slough with Recharge Basins**

Potential impacts for the Watsonville Slough with Recharge Basins component would be similar to the Harkins Slough Facilities Upgrades as construction of a recharge basin would not substantially alter the visual character of the area. Although the project would involve construction of above-ground facilities for diversion facilities on Watsonville Slough and wells and fences at the recharge basin sites, existing topography and vegetation would largely shield the facility from off-site viewpoints, and the low-profile nature of the facility would not substantially degrade the visual quality of the surrounding area that is characterized by agricultural uses with accessory sheds, pump stations, and other appurtenances that are part of the existing visual setting of agricultural uses.

This component would create one to three groundwater recharge basins on agricultural land west of San Andreas Road. Creation of the recharge basins would not substantially degrade the existing visual character, since water bodies are generally considered aesthetically pleasing and the basins would not alter the rural quality of the area.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

Development of the College Lake component would expand the maximum College Lake inundation area in a 100-year storm by up to 38 acres onto adjacent agricultural lands for water storage. The lake currently inundates approximately 234 acres during the rainy season. The expanded reservoir elevation would increase the maximum
size of the lake to 272 acres, and also would store water longer each year. The expansion would not be considered to result in degradation of the visual character of the area as water bodies generally are regarded as positive aesthetic elements of a visual landscape. Additionally, the expanded reservoir elevation would not have any effect on the visual landscape during the summer and fall, when crops would continue to be planted in the lake. Therefore, this would not be considered a significant adverse change of the visual landscape.

New structures housing the proposed pumping and filtration facilities would be constructed along Highway I52. While design plans have not yet been developed, these structures likely would be box-shaped, concrete buildings with an industrial appearance. Such structures would be similar to the existing pumps to the south of College Lake (to be removed for construction of the new weir) and consistent with varied development along the roadway that includes residential, school and church uses. The facilities would not constitute a substantial change in the visual quality of the area. They could slightly contrast with the immediate surrounding landscape if not designed to blend with the color and vegetation of the surrounding area; however, this is not considered a significant impact. Implementation of Mitigation Measure AE-1a, above, and Mitigation Measure AE-1b below would apply to this component to minimize contrast with the surrounding landscape.

This component includes construction of a new adjustable weir downstream of the existing low dam. The new outlet weir would raise the College Lake outlet elevation by 2.3 feet to 62.5 feet and thus the 2.3-foot increase in dam height would not be a noticeable viewshed change due to the physical facility construction. Since views of College Lake currently are obstructed by existing vegetation and development along Highway I52, this would not be considered a significant impact. However, the weir would introduce an unnatural visual feature in the area. Implementation of Measure AE-1c below would reduce this impact by planting vegetation along the dam to visually integrate it into the surrounding landscape.

The new weir would be visible from Holohan Road and could screen views of agricultural lands within the interior of College Lake from this road, although views of College Lake from Holohan Road are currently obstructed by existing residential development. Since the rural character of views from Holohan Road would not change, this is not considered a significant impact.

The following mitigation measures are identified for this component to reduce potentially significant visual impacts from the College Lake component to a less-than-significant level.

**Mitigation Measure(s)**

*Mitigation Measure AE-1b:* PVWMA shall use design elements and landscaping to enhance visual integration of the College Lake pumping and filtration facilities with their surroundings. Proposed facilities shall be painted low-glare earth-tone colors that blend closely with the surrounding terrain. Vegetation shall be planted at proposed facilities to provide screening from views of the facilities from Highway I52.

*Mitigation Measure AE-1c:* PVWMA shall shield the weir with vegetation to minimize textural contrasts with the surrounding vegetation using grasses, shrubs and trees typical of the immediately surrounding area.

**Murphy Crossing with Recharge Basins**

Development of the groundwater extraction wells, infiltration gallery, pipeline and recharge basins of the Murphy Crossing component would not substantially alter the visual character of the project area. The proposed Murphy Crossing component would create four (4) groundwater recharge basins on a 20-acre agricultural site that is
Currently partially used for groundwater recharge north of the intersection of Highway 129 and Murphy Road. The recharge basins, including fences, would be visible to motorists traveling along Highway 129, a designated scenic route in the Santa Cruz County General Plan/LCP, but creation of the recharge basin would not be considered an adverse visual impact, since water bodies are generally regarded as positive aesthetic elements of a visual landscape and the basin would not alter the rural character of the area.

The proposed groundwater, infiltration gallery and pumping facilities would not be visible from nearby roadways, and would likely be low profile structures. In addition, implementation of Mitigation Measure AE-1a would require that design elements and landscaping be used to visually integrate these facilities with their surroundings.

### 3.1.3.4 Introduction of New Sources of Light

*Future development of BMP Update components would not introduce significant new sources of light or glare. This is a less-than-significant impact.*

**Increased Recycled Water Storage at Treatment Plant**

Development of the Increased Recycled Water Storage at Treatment Plant component would not introduce new sources of light onto the component site since no exterior lighting is proposed as part of this component. Exterior security lighting exists at the treatment plant. This is a less-than-significant impact.

**Harkins Slough Recharge Facilities Upgrades**

The proposed installation of new shallow extraction wells at the recharge basin, upgrading the pump station and filters at the slough diversion, and construction of a new recharge basin would not introduce any new sources of light or glare due to the nature of the facilities, which do not involve structural development. This is a less-than-significant impact.

**Watsonville Slough with Recharge Basins**

No creation of new light or glare sources is associated with implementation of the Watsonville Slough component. This is a less-than-significant impact.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

Development of the College Lake component would not introduce substantial new sources of light at the component site nor increase ambient light in the area. Exterior security lighting proposed at the pump station, pretreatment, filtration, and dam facilities is expected to be minimal and would not introduce substantial new sources of lighting in the area, which consists of a mix of existing residential and institutional uses with existing exterior lighting. While exterior lighting could be visible from some residences to the south, it would not substantially increase ambient light in the project area. This is a less-than-significant impact.

**Murphy Crossing with Recharge Basins**

The proposed construction of a pump station and a new recharge basin would not result in the need for lighting or structural development. Exterior lighting may be installed on the pump station; however, this would be minimal...
and would not result in the introduction of substantial light or glare in the area. This is a less-than-significant impact.

3.1.4 **Impacts and Mitigation Measures Overall Combined BMP Update**

As identified in this section, implementation of the overall combined BMP Update would have potential significant impacts based on impacts related to substantial degradation of the visual quality of the area for three components. However, as previously discussed, potential impacts would be less than significant or reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.
3.1 Aesthetic Resources

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Photo 1. San Andreas Road looking northeast toward Harkins Slough.

Photo 2. Sunset Beach Road looking south.

Photo 3. San Andreas Road looking west/southwest.

Photo 4. San Andreas Road looking southeast toward treatment plant.
Photo 5. Beach Street looking south toward treatment plant.

Photo 6A. Highway 1 southbound looking west toward treatment plant.

Photo 6B. Highway 1 northbound looking west toward treatment plant.

Photo 7. Murphy Road at Pajaro River looking east.
Figure 2012-48 3.1-4

Photos From Public Viewpoints

Photo 8. Highway 129 looking northeast.

Photo 9. Highway 152 looking northwest toward College Lake.

Date: 8/1/2013
Project: 2012-48
3.2 AGRICULTURAL RESOURCES & LAND USE

3.2.1 ENVIRONMENTAL SETTING

3.2.1.1 Regional Setting

The proposed BMP Update includes water supply components that are generally located within an agricultural area within the unincorporated area of Santa Cruz County, except for one site -- the proposed site of the Increased Recycled Water Storage at Treatment Plant component, which is located within the City of Watsonville. The College Lake with Inland Pipeline to Coastal Distribution System (CDS) component would extend through both unincorporated areas, as well as through portions of the City of Watsonville. The infiltration gallery component of the Murphy Crossing with Recharge Basins component is located partially within unincorporated Monterey County; however, the facilities in Monterey County are only within the riparian area of the Pajaro River.

Land uses in the vicinity of the proposed water supply facilities sites were identified through field reconnaissance and inspection of aerial photographs. As shown in Figure 3.2-1A, agriculture is the predominant land use. Crops grown in the Pajaro Valley include strawberries, bush berries, apples, flowers, lettuce, artichokes, and other vegetables. While farmhouses are scattered throughout the valley, residential areas within the project area are primarily located near urban centers, such as the City of Watsonville and the neighboring community of Freedom, with some residential areas along the coast. Rural residential development is also present in inland foothill areas. Commercial uses, schools and parks are also concentrated in the City of Watsonville. Figure 3.2-1B through Figure 3.2-1E show existing land uses in the vicinity of each of the proposed BMP Update components.

3.2.1.2 Regulatory Setting

State Regulations

Important Farmlands Mapping Program

The Farmland Mapping and Monitoring Program (FMMP) was established in 1982 by the State of California in response to a critical need for assessing the location, quality, and quantity of agricultural lands and conversion of these lands over time. The California Natural Resources Agency, Office of Conservation, maps important farmland throughout California. The maps identify five farmland categories, as well as two non-agricultural categories. Figure 3.2-2A provides an overview of the state's mapped farmlands for all the component sites.

- Prime Farmland is land that has the best combination of physical and chemical characteristics for crop production. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed.

- Farmland of Statewide Importance is land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production.

- Unique Farmland is land that does not meet the criteria for Prime Farmland or Farmland of Statewide importance, which has been used for the production of specific high economic value crops.
• Farmland of Local Importance is either currently producing crops, or has the capability of production, and does not meet the criteria of the categories above.

• Grazing Land is land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock, and the minimum mapping unit for Grazing Land is 40 acres.

**Williamson Act**

The California Land Conservation Act, also known as the Williamson Act, was adopted in 1965 with the purpose of encouraging participating property owners to continue farming their land and to prevent the premature conversion of farmland to urban uses. Under a Williamson Act contract, a landowner agrees to limit the use of the land to agriculture and compatible uses for a period of at least ten years. In return, the land is taxed at a rate based on the agricultural production of the land, rather than its real estate market value, protecting landowners against tax increases caused by inflation. Cancellation of Williamson Act contracts is allowed; however, the landowner is assessed penalty charges and the cancellation takes up to ten years to complete.

**State Lands Commission**

The State Lands Commission has “exclusive jurisdiction and authority over all ungranted tidelands, submerged lands, and the beds of navigable rivers, sloughs, lakes, etc.” (Public Resources Code Section 6301). The use of sovereign lands, particularly within the Pajaro River, could be restricted by the existence of a public trust easement. "Sovereign Lands” include nearly four (4) million acres of land underlying the State’s navigable and tidal waterways that were acquired by the state when California became a state in 1850 and are managed by the California State Lands Commission. The public trust easement would limit the allowable uses of the lands to commerce, navigation, fisheries, open space, preservation of natural resources, and other water dependent or water-oriented public uses.

**California Coastal Commission**

The California Coastal Commission has jurisdiction over the coastal zone, which generally extends from Monterey Bay inland to the City of Watsonville in Santa Cruz County, and from Monterey Bay to Highway 1 and east of Elkhorn Slough in Monterey County. Santa Cruz and Monterey Counties, as well as the city of Watsonville, have authority to approve coastal development permits within their jurisdictions pursuant to provisions of their Local Coastal Programs certified by the California Coastal Commission. Actions taken by cities and counties within the coastal zone may be appealed to the Coastal Commission only under defined circumstances (specified in Public Resources Code Section 30603). The California Coastal Commission retains permit authority in certain limited areas, such as tidelands and submerged lands (Coastal Act Section 30519(b)). Figure 3.2-3 displays the coastal zone in the vicinity of BMP Update components.

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3.2 Agricultural Resources & Land Use

**Timber Resources**

Commercial timber lands are afforded protection through the state’s Forest Taxation Reform Act of 1976, which mandates the creation of timberland preserve zones (TPZ) to restrict and protect commercial timber resources. A TPZ is a 10-year restriction on the use of land on timber lands. Land use under a TPZ will be restricted to growing and harvesting timber, and to compatible uses approved by a county (or city). In return, taxation of timberland under a TPZ will be based only on such restrictions in use.

**Local Regulations**

**County of Santa Cruz General Plan/Local Coastal Program**

Land use, development, and protection of resources within portions of PVWMA, located in unincorporated Santa Cruz County is governed by the Santa Cruz County General Plan/Local Coastal Program (GP/LCP). Additionally, the County Code regulates land use in Title 13 - Planning and Zoning Regulations, which includes coastal zone regulations (Chapter 13.20). Applicable objectives, goals, and policies from the County's GP/LCP are presented below.

**Water Resources**

Objective 5.5a: Watershed Protection. To protect and manage the watersheds of existing and future surface water supplies to preserve the quality and quantity of water produced and stored in these areas to meet the needs of County residents, local industry, agriculture, and the natural environment.

**Groundwater Protection**

Objective 5.8b: To act directly and coordinate and work with relevant water purveyors and agencies to eliminate long-term groundwater overdraft in all water basins where overdraft has been documented.

Program C: Work with water purveyors and water management agencies to augment natural groundwater recharge where it is environmentally and fiscally acceptable.

Program H: Continue to work with the Pajaro Valley Water Management Agency to eliminate overdraft and salt water intrusion through implementation of their Basin Management Plan.

**Agriculture**

Policy 5.13.6: Conditional Uses on Commercial Agricultural (CA) Zoned Lands. All conditional uses shall be subject to standards which specify siting and development criteria; including size, location and density. Allow conditional uses on CA zoned lands based upon the following conditions:

a) The use constitutes the principal agricultural use of the parcel or

b) The use is ancillary incidental, or accessory to the principal agricultural use of the parcel or

c) The use consists of an interim public use which does not impair long term agricultural viability and

d) The use is sited to avoid conflicts with principal agricultural activities in the area and
3.2 Agricultural Resources & Land Use

The use is sited to avoid, where possible, or otherwise minimize the removal of land from agricultural production.

Policy 5.13.10 Water and Sewer Lines in the Coastal Zone. Prohibit the placement of water or sewer lines on commercial agricultural lands in the Coastal Zone. Allow exceptions to this policy only under the following circumstances (not applicable to the BMP Update, therefore, not provided herein) and require safeguards to be adopted which ensure that such facilities will not result in the conversion of commercial agricultural uses to non-agricultural uses. General Agricultural Policies/Programs

Program F: Ensure a continued sustainable supply of water for agricultural use through conservation, protection and development of surface and groundwater, utilization of excess domestic water, utilization of recycled wastewater, or importation of water from outside the County.

The Santa Cruz County General Plan identifies commercial agricultural lands within the County, which are divided into seven categories. Four of these categories, which are described below, are applicable to the study area for this EIR.

- Type 1A - Viable Agricultural Land. Type 1A agricultural lands comprise areas of known high productivity which are not located in any utility assessment district for which bonded indebtedness has been incurred. These lands essentially meet the U.S. Department of Agriculture Soil Conservation Service and the California Department of Food and Agriculture criteria for “prime” and “unique” farmland and “prime” rangeland.

- Type 1B – Viable Agricultural Land in Utility Assessment Districts. This type includes viable agricultural lands, as defined above, which are within a utility assessment district for which bonded indebtedness has been incurred, except Agricultural Preserves.

- Type 2C – Limited Agricultural Land in Utility Assessment Districts. This type includes agricultural lands with limiting factors which are in a utility assessment district, as of 1979, which has incurred bonded indebtedness.

- Type 3 - Viable Agricultural Land within the Coastal Zone. This category includes all of the following lands outside the Urban Services Line and the Urban Rural Boundary, and within the Coastal Zone in Santa Cruz County:
  - Land which meets the U.S. Department of Agriculture Soil Conservation or California Department of Food and Agricultural Service criteria for prime farmland or rangeland soils and which is physically available for agricultural use.
  - Land which meets the California Department of Food and Agriculture criteria for unique farmland of statewide importance and which is physically available for agricultural use.

**City of Watsonville General Plan**

The City of Watsonville General Plan, adopted in January 2013, has a timeframe that extends to the year 2030. The Watsonville General Plan considers the agricultural heritage of the city and the Pajaro Valley to be an important aspect of the city’s character, but recognizes that the preservation of agricultural land alone will not ensure preservation of the agricultural economy. Other factors, such as availability of irrigation water and facilities for support industries, are also important in preserving agriculture. The General Plan recognizes that groundwater overdraft is a major concern in the Pajaro River Basin.
Policies pertaining to water supply are presented below.

11.2.11 Water Availability & Conservation. The City shall cooperate with the Pajaro Valley Water Management Agency (PVWMA) in its efforts to secure a reliable long-term supply of water. The City shall also continue to improve City water conservation programs, as set forth in the Public Facilities Element, Policy 12.2.2. In addition, the City shall work with PVWMA to educate and create incentives for measures targeting private water users, including: water-efficient plumbing fixtures and faucets, reducing use of lawns and other water-intensive plants, encouraging drought-tolerant native plants and “xeriscapes,” mulching to retain soil moisture, and using water-efficient irrigation systems.

11.2.13 Aquifer Protection & Salt Water Intrusion. The City shall continue to cooperate with the PVWMA to analyze and implement solutions that reduce or eliminate additional saltwater intrusion into area aquifers. Specifically, the City shall work cooperatively with PVWMA to construct a water recycling facility adjacent to the City’s wastewater treatment plant, to provide a new source of water for agricultural use.

3.2.1.3 Setting by BMP Project Component

Increased Recycled Water Storage at Treatment Plant

The majority of the site of the proposed upgrades to increase recycled water storage at the Recycled Water Facility (RWF) is located within the Watsonville city limits. However, approximately 500 linear feet of 24-inch pipeline that will connect the RWF to a Coastal Distribution System pipeline located nearby, is located in unincorporated Santa Cruz County. The predominant land use in the vicinity of the proposed upgrades is the RWF itself and agricultural uses, primarily fruit and vegetable croplands. Existing land uses are shown on Figure 3.2-1B.

The RWF site is mapped as "Urban and Built-Up Land" in the State Farmland Mapping and Monitoring Program, and the pipeline is located through lands mapped as "Farmland of Statewide Importance." See Figure 3.2-2B.

The proposed upgrades to the RWF site are within the City of Watsonville, which is designated Public/Quasi Public in the Land Use Diagram of the Watsonville General Plan. Lands adjacent to the treatment plant site are designated as Agriculture in the City's General Plan. The General Plan indicates that all lands that lie outside of the City’s urban limit line, but within its planning area, are designated Agriculture, regardless of its size or actual use.

The area planned for the pipeline extension to Beach Road is designated Agriculture in the Santa Cruz County General Plan/LCP. The lands adjacent to the RWF are mapped as Prime Farmland, specifically Type 3 agricultural lands, which are considered prime agricultural lands located within the County's coastal zone. None of these BMP component sites contain parcels subject to Williamson Act agricultural preserve contracts.

Harkins Slough Recharge Facilities Upgrades

Harkins Slough, located west of Highway 1 in unincorporated Santa Cruz County, is a partially channelized, ephemeral waterway that originates in an area of small residential properties north of Watsonville and flows through agricultural land to its confluence with Watsonville Slough, east of San Andreas Road. The existing Harkins Slough Recharge Facilities were constructed in 2002. The surrounding area where the current diversion and filtration facilities are located consists of agricultural uses, primarily vegetable and strawberry crops (see Figure 3.2-1C).
The two alternative recharge basin sites associated with the proposed Harkins Slough Recharge Facilities Upgrades would be located near the existing recharge basin for the Harkins Slough diversion facility, approximately 2,000 feet west of San Andreas Road. The sites are mapped primarily as "Unique Farmland" in the State Farmland Mapping Program. The exception is the area mapped "Prime Farmland" within portions of the recharge basin sites (see Figure 3.2-2C). The recharge basin sites are designated Agriculture in the Santa Cruz County General Plan/LCP, and the site and surrounding lands are mapped as Type 2A, 2B, 2C, 2D, and 3 agricultural lands in the County General Plan. None of these project sites contain parcels subject to Williamson Act agricultural preserve contracts.

**Watsonville Slough with Recharge Basins**

Watsonville Slough is located primarily west of Highway 1 in unincorporated Santa Cruz County. Watsonville Slough, which is also channelized, extends from a developed area within the City of Watsonville, west across Highway 1, through agricultural land to Shell Road. The confluence of Harkins Slough and Watsonville Slough is near San Andreas Road, midway between Highway 1 and the Ocean. At Shell Road, the slough turns southward, parallel to the coastline, and extends through the Pajaro Dunes gated residential community, and eventually empties into the Pajaro Lagoon. The Environmental Setting for Land Use for the Watsonville Slough with Recharge Basins component is the same as for the Harkins Slough Recharge Facilities Upgrades component described above. The sites are mapped primarily as "Unique Farmland" in the State Farmland Mapping Program, although there are some mapped "Prime Farmland" areas within portions of the recharge basin sites (see Figure 3.2-2C). The recharge basin sites are designated Agriculture in the Santa Cruz County General Plan/LCP, and the site and surrounding lands are mapped as Type 2A, 2B, 2C, 2D, and 3 agricultural lands in the County General Plan. None of these component sites contain parcels subject to Williamson Act agricultural preserve contracts.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

College Lake, located approximately one mile north of the Watsonville city limits, is a seasonal lake that receives water from an 11,000 acre watershed during the rainy season. For many years, a majority of its accumulated water has been pumped into Salsipuedes Creek in the spring, thus allowing farming to take place on the lake bed during the dry season. Remnants of the former natural hydrology are evident in the persistence of groves of willow trees along the lowest reaches of Casserly Creek, just before it empties into College Lake. Surrounding agricultural lands produce vegetables, flowers, raspberries, and grapes. Residential uses are located to the north of College Lake and to the south along Holohan Road and East Lake Avenue. St. Francis Church and cemetery, St. Francis School, and Lakeview Middle School are located southeast of the lake along East Lake Avenue, and the Santa Cruz County Fairgrounds is located to the east. Figure 3.2-1D depicts land uses in the project vicinity.

The proposed water diversion and filtration facilities would be located near the existing pumps and headgate, in close proximity to residential uses along Holohan Road and a church and cemetery on East Lake Avenue. The pipeline would pass through areas used for agricultural production and near residential uses.

The proposed College Lake facilities are located in areas mapped as "Prime Farmland," "Grazing Land", and "Other Land" in the State Farmland Mapping Program as shown on Figure 3.2-2D. The pipeline to the Watsonville RWF is located primarily through lands mapped as "Urban and Built-Up Lands," but the pipeline would also traverse some areas mapped as "Prime Farmland."

The proposed College Lake facilities would be located in unincorporated Santa Cruz County, but also lie within the City of Watsonville planning area. According to the Santa Cruz County Agricultural Resources Map, the sites
of the proposed water diversion and treatment facilities, dams, and the increased reservoir elevation at College Lake are located on Type 1A, 1B, and 2B agricultural lands. None of the parcels proposed for facilities are subject to Williamson Act agricultural preserve contracts.

**Murphy Crossing with Recharge Basins**

With the exception of the infiltration gallery within the Pajaro River riparian corridor, all of the proposed facilities of the Murphy Crossing with Recharge Basins component would be located in areas currently in agricultural use. Crops planted in the site's area include flowers, strawberries, and vegetables (Figure 3.2-1E). At the proposed recharge basin location, land uses include vegetables, berries, and apple orchards. A recharge basin was recently developed by private landowners in this area and the implementation of this component would necessitate coordination with the landowners’ recharge efforts.

The proposed recharge basins and pipeline are located in areas mapped as "Prime Farmland" in the State Farmland Mapping Program as shown on Figure 3.2-2E. These facilities would be located in unincorporated Santa Cruz County, and are located on sites designated as Type 1A and 1B agricultural lands in the Santa Cruz County GP/LCP. None of these project sites are within Williamson Act agricultural preserve contracts.

### 3.2.2 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- convert prime farmland, unique farmland, or farmland of statewide importance (farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- conflict with existing zoning for agricultural use, or Williamson Act contract;
- result in the loss of forest land or conversion of forest land to non-forest use;
- involve other changes in the existing environment which, due to their location or nature, could result in the conversion of farmland to non-agricultural use or conversion of forest land to non-forest use
- physically divide an established community;
- conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or
- conflict with any applicable habitat conservation plan or natural community conservation plan.

### 3.2.3 Impacts and Mitigation Measures by Component

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to more than one component are identified for each potential impact. If specific mitigation measures apply to individual components, these specific mitigation measures are identified by components.
3.2.3.1 Loss/Conversion of Agricultural Lands

Impact AG-1: Implementation of BMP Update components would result in the permanent conversion of agricultural lands. This represents a significant and unavoidable impact.

Future development of some BMP Update components (specifically, Harkins Slough Recharge Facilities Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins) would potentially result in permanent conversion of up to approximately 66 acres of farmland to non-agricultural uses, including the following assumptions about the number of acres that may be converted (Note: These are worst-case assumptions that will be refined with project-specific design and environmental review):

- Conservation: 0 acres
- Increased Recycled Water Storage at Treatment Plant: 0 acres
- Increased Recycled Water Deliveries: 0 acres
- Harkins Slough Recharge Facilities Upgrades: up to 14 acres, depending upon whether the Monitoring Well #7 site or the Southeast Recharge Basin is constructed as part of this component.
- Watsonville Slough with Recharge Basins: up to 30 acres, depending upon which of the three potential recharge basin sites are developed (Monitoring Well #7, Southeast, and/or North Dunes).
- College Lake with Inland Pipeline to Coastal Distribution System: 1 acre, and
- Murphy Crossing with Recharge Basins: 21 acres.

The permanent conversion of up to 66 acres of prime, unique or important state farmlands to non-agricultural land uses is considered a significant impact; however, the agricultural land conversion is for water supply facilities needed for supplying agricultural land uses (i.e., meeting the BMP Update objectives of acquiring adequate water supplies for the agricultural uses in the Pajaro Valley).

Mitigation Measure(s):

No feasible mitigation available; therefore, this impact represents a significant and unavoidable impact that applies to the BMP Update as a whole and the following components: Harkins Slough.

---

2 The increased area of inundation and the increased length of time of inundation may reduce agricultural productivity of the land; however, these do not result in a significant impact to agricultural resources in accordance with PVWMA’s significance criteria for the BMP because this inundation does not preclude use of the land for agricultural operations, and therefore, for the purposes of this EIR would not be considered a conversion of farmland to non-agricultural uses. The precise location, dimensions and use of any private property affected by these projects will depend upon meeting environmental concerns, confronting the many issues raised by the agencies whose permits or review are required, seeking financing and partnership arrangements, and securing necessary property interests after paying just compensation for such interests.
3.2 Agricultural Resources & Land Use

Recharge Facilities Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins.\(^3\)

**Increased Recycled Water Storage at Treatment Plant**

The proposed Increased Recycled Water Storage at the Treatment Plant component would not result in a loss or conversion of agricultural lands. The majority of the proposed development of this component would be located on the existing site of the RWF. A 500-foot long pipeline extending from the facilities to existing CDS pipeline would be located within or parallel to a dirt roadway and would only temporarily disrupt agricultural activities in the area during its relatively short construction period of no more than one month.

**Harkins Slough Recharge Facilities Upgrades**

The proposed Harkins Slough Recharge Facilities Upgrades would not result in a loss or conversion of agricultural lands, except the new recharge basin needed for this component. New extraction wells, which would be installed at the existing recharge basin site, would not result in a permanent conversion of agricultural lands. Pipeline upgrades that may be associated with this component would be located within existing roadways and would not result in the permanent conversion of agricultural lands. However, establishing a new recharge basin would result in the permanent loss of agricultural land of approximately 5 to 14 acres, depending on which alternate site is selected (Monitoring Well #7 site, which is smaller, or the larger Southeast Basin site). Both sites are mapped primarily as "Unique Farmland" by the State Farmland Mapping program, although the conceptual basin locations do cover some areas of mapped "Prime Farmland." Either option would result in a significant impact due to permanent agricultural land conversion.

**Watsonville Slough with Recharge Basins**

Diversion and filtration activities associated with the Watsonville Slough with Recharge Basins component would not result in a loss or conversion of agricultural lands, as these elements of the project would occur at the existing Harkins Slough facilities. Additionally, this component would utilize existing pipeline infrastructure associated with the Harkins Slough facilities for conveyance of filtered water to the proposed recharge basin(s). In the event that the North Dunes Recharge Basin is developed as a recharge basin for this component, new conveyance pipeline totaling approximately 6,000 linear feet would be required for installation; however, this would not result in a permanent conversion of agricultural lands on its own.

Implementation of this component, however, would result in a development of a new recharge basin that would convert agricultural lands. Either option, the North Dunes Recharge Basin or the Southeast Recharge Basin, would result in a permanent loss of agricultural lands. Development of the North Dunes Recharge Basin would require a 25-acre impact area and the Southeast Recharge Basin would require a 14-acre impact area. Both sites are mapped primarily as "Unique Farmland" by the State Farmland Mapping program, although the conceptual basin locations do cover some areas of mapped "Prime Farmland." Either option or both together would result in a significant impact due to agricultural land conversion.

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\(^3\) PVWMA staff has considered implementing agricultural conservation easements; however, the ability for PVWMA to implement a mitigation measure like that is considered to be infeasible at this time.
College Lake with Inland Pipeline to Coastal Distribution System (CDS)

The proposed pump station and filtration facilities of the College Lake component would potentially convert approximately one acre of agricultural land to water distribution uses that would preclude farming on the site. An exact location has not yet been selected. According to the State Farmland Mapping and Monitoring Program, potential sites are mapped as Unique Farmland, although adjacent sites to the east are not mapped as farmland. The agricultural sites are also designated Type 1B in the Santa Cruz County General Plan/Local Coastal Program. This EIR assumes a worst-case analysis that up to one acre of agricultural land may be converted for construction of the pump station and filtration facilities, although final site selection may result in less or no agricultural land conversion.

The proposed inland pipeline and increased area of inundation at College Lake would not result in the permanent conversion of agricultural land; however, these activities would affect agricultural production. Installation of the 5.8-mile pipeline could disrupt agricultural production within the alignment for at most one cropping season, depending on the timing of construction. The pipeline alignment would extend through some prime farmlands, although the conceptual alignment also appears to follow the existing road rights-of-way. It can be expected that agricultural production will be allowed within an easement for the pipeline, the loss of agricultural land would be negligible. Because construction disturbance would be temporary, and operation of the pipeline, once installed, would not significantly preclude agricultural production, this would not be considered a significant impact.

The increased area of inundation would reduce agricultural production on 38 acres of prime farmlands during the winter and spring, but would not result in a permanent conversion of these lands. Furthermore, it is assumed that agricultural activities will still occur on the drained lake area each year. The increased area of inundation and the increased period of inundation in some years may reduce agricultural productivity (i.e., the economic benefits of the land); however, these do not result in a significant impact to agricultural resources in accordance with PVWMA’s significance criteria for the BMP Update because this seasonal inundation does not preclude use of the land for agricultural operations and therefore, would not convert agricultural land to non-agricultural uses. Therefore, this represents a less-than-significant impact.

Murphy Crossing with Recharge Basins

The proposed recharge basins associated with the Murphy Crossing with Recharge Basins component would convert approximately 20 acres of agricultural land to water distribution and recharge uses that would preclude farming on the site. The proposed booster pump station and pipeline together may occupy approximately one acre of farmland, for a total conversion of 21 acres of farmland to non-farmland use. According to the State Farmland Mapping and Monitoring Program, these sites are mapped as "Prime Farmland." Additionally, all of these facilities would be located on Type 1A agricultural land as designated in the Santa Cruz County GP/LCP. The infiltration gallery would not impact agricultural land, as it is proposed to be located within the Pajaro River riparian corridor. None of the parcels proposed for this component are subject to Williamson Act agricultural preserve contracts.

As previously stated, the proposed facilities are intended to divert water from the Pajaro River and deliver it to nearby recharge basins for percolation to the aquifer that supplies irrigation water to nearby agricultural land. For this reason, the proposed facilities must be located in and near the river and in appropriate recharge areas. Since all of the surrounding lands along the river in the Murphy Crossing with Recharge Basins area are designated as Type 1A prime agricultural lands, no mitigation is available that would reduce or avoid the conversion of prime
farmland. This BMP Update component would result in a significant impact due to conversion of up to 21 acres of agricultural land to non-agricultural uses. Installation of the proposed pipeline of the Murphy Crossing with Recharge Basins component could disrupt agricultural production within the alignment for at most one cropping season, depending on the timing of construction. While it can be expected that agricultural production will not be allowed within an easement for the pipeline, this loss of agricultural land would be negligible. Because construction disturbance would be temporary, and operation of the pipeline, once installed, would not significantly preclude agricultural production, this would not be considered a significant impact on agricultural lands.

### 3.2.3.2 Conflict with Agricultural Zoning

Several areas within the PVWMA boundaries are under Williamson Act contracts for the preservation of land in agriculture. None of the BMP Update components are sited on lands subject to Williamson Act contracts. The location of these facilities would not likely require cancellation of Williamson Act contracts, as none of the BMP Update components would result in the permanent conversion of agricultural land under Williamson Act contract.

Elements of all BMP Update components would be located within areas zoned for agricultural use in the Santa Cruz County Zoning Ordinance. The lands within and adjacent to the Harkins Slough Recharge Facilities Upgrades, Watsonville Slough with Recharge Basins, and College Lake with Inland Pipeline to CDS components are zoned CA -- Commercial Agriculture. The principal permitted land uses within the CA zone are agricultural pursuits for the commercial cultivation of plant crops and the commercial raising of animals. In addition, "dams, canals and aqueducts of any public water project" are principal permitted uses (Section 13.10.312 [b] of the Santa Cruz County Code). Thus, it appears that the proposed water pipelines, recharge basins and the proposed expanded College Lake facilities would be consistent with agricultural zoning regulations.

### 3.2.3.3 Forest Lands

There are no designated forest lands or lands zoned Timberland Preserve located within the vicinity of any of the BMP Update components.

### 3.2.3.4 Other Changes That Could Lead to Conversion of Farmland

The BMP Update includes water facility improvements. As discussed in preceding sections, the improvements would be sited in four locations adjacent to existing infrastructure facilities. None of the proposed components would result in operations that would be expected to lead to indirect conversion of adjacent agricultural lands to non-agricultural land uses. The project does not involve construction of habitable structures or introduction of new residents or workers that often can lead to conflicts with agricultural uses.

The installation of pipelines and other facilities could result in short-term disruption of agricultural operations during construction, but even with the temporary and short-term duration of construction, development of BMP Update components would not be expected to substantially impair agricultural operations on or adjacent to sites with proposed facility improvements. Typical construction activities would be expected to last approximately one week at any given location along the pipeline alignment at the Recycled Water Facility.

The College Lake component would increase the area of inundation at College Lake onto adjacent agricultural lands and would construct a pump station and related facilities on land designated as Agriculture. However, this would not be inconsistent with General Plan policies that call for preservation of agricultural land, because the
expansion would not result in the permanent conversion of agricultural lands. College Lake is a seasonal water body that is filled by winter rains and is drained each spring. While the project would increase the size of the lake, the annual filling and draining of the lake would still occur albeit inundation of some land may occur for longer time periods. The exact amount of increased time of inundation is unknown due to lack of available information on past and current pumping operations of the Reclamation District. In addition, it is assumed that inundated lands would still be farmed, following development of the College Lake component.

3.2.3.5 Division of Community

The proposed BMP Update components consist of improvements to existing water infrastructure facilities, including creation of new water recharge facilities, to manage water resources and prevent further groundwater overdraft and seawater intrusion. The facilities are limited in type and magnitude and all are adjacent to existing facilities or are within agricultural areas. Implementation of the proposed BMP components would not cause a division of a community, as no communities exist within the vicinity of the proposed BMP Update components except where the facilities would be underground.

3.2.3.6 Consistency with Applicable Plans and Policies

Implementation of the proposed BMP components, including conservation, would be consistent with County GP/LCP objectives and policies to protect and manage watersheds (Objective 5.5.a) and coordinate and work with agencies to eliminate long-term groundwater overdraft in overdrafted basins (Objective 5.8b, Programs C and H). Implementation of the BMP elements would reduce groundwater pumping in an overdrafted basin. Taken together, all components will result in an offset of a portion of pumped groundwater used to meet agricultural irrigation demands and to ensure a continued sustainable supply of water for agricultural use (Program F). Development of recharge basins as part of the Harkins Slough Recharge Facilities Upgrades, Watsonville Slough with Recharge Basins, and Murphy Crossing with Recharge Basins components would convert agricultural lands, which may conflict with County policies to protect agricultural land. Additionally, limited segments of pipelines would cross agricultural lands, potentially conflicting with County GP/LCP policy 5.3.10. This could result in a partial conflict with policies to protect agricultural lands. However, the overall project purpose would be to manage groundwater resources in order to help reduce overdraft conditions and support continued agricultural operations that have water demands, therefore, the BMP Update is supportive of agricultural uses. Evaluation of BMP Update components with County policies will be further reviewed by County staff and decision-makers at the time use and coastal permits are considered for specific BMP Update components.

The Watsonville General Plan recognizes that the preservation of agricultural land alone will not ensure preservation of the agricultural economy and that other factors, such as availability of irrigation water and facilities for support industries, are also important in preserving agriculture. Therefore, while development of proposed water supply facilities on agricultural lands would be inconsistent with specific policies, it would not contradict the overall intent of the general plans.

3.2.3.7 Conflict with Habitat Conservation Plan

There are no approved Habitat Conservation Plans that apply to the sites of the proposed BMP Update components. Please also see discussion in Section 3.4 Biological Resources.
3.2.4 IMPACTS AND MITIGATION MEASURES OVERALL COMBINED BMP UPDATE

As discussed above, implementation of the BMP Update would result in the permanent conversion of agricultural lands. This represents a significant and unavoidable impact. Future development of some BMP Update would potentially result in permanent conversion of up to approximately 66 acres of farmland to non-agricultural uses, including the following assumptions about the number of acres that may be converted.
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Legend
Source: PVWMA, 2012

- Proposed 24" Pipeline to CDS
- Proposed Storage Tank Site

Land Use
- Native Vegetation / Riparian
- Turf (Urban)
- Vegetable Row Crops
- Strawberries
- Bushberries / Vines
- Orchards
- Other

Proposed 24" Pipeline to CDS
Proposed Storage Tank Site

Land Use at Increased Recycled Water Storage at Treatment Plant Component

Date: 10/15/2013
Scale: 1 inch = 250 feet
Project: 2012-48

Legend:
Proposed 24" Pipeline to CDS
Proposed Storage Tank Site

Source: PVWMA, 2012

Scale: 1 inch = 250 feet
Project: 2012-48

Figure 3.2-1B

File:
C:\GIS\GIS_Projects\2012-48 PVWMA\Final Products\LU Treatment Plant.mxd

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Legend

- Proposed Pipelines
- Existing College Lake dam elev. 60.2 ft. (234 ac.)
- Proposed College Lake dam elev. 62.5 ft. (272 ac.)

Land Use
- Native Vegetation / Riparian
- Turf (Urban)
- Vegetable Row Crops
- Strawberries
- Bushberries / Vines
- Orchards
- Other

Source: PVWMA, 2012

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, PC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

Figure 3.2-1D

Title: Land Use at College Lake with Inland Pipeline to CDS Component

Date: 10/15/2013
Scale: 1 inch = 0.3 miles
Project: 2012-48

File: C:\GIS\GIS_Projects\2012-48 PVWMA\Final Products\LU College Lake.mxd
Land Use at Murphy Crossing with Recharge Basins Component

Legend

- Proposed Pipeline From Gallery to Basin
- Proposed Infiltration Gallery and Pump Station
- Proposed Recharge Basin

Source: PVWMA 2012

Land Use

- Native Vegetation / Riparian
- Turf (Urban)
- Vegetable Row Crops
- Strawberries
- Bushberries / Vines
- Orchards
- Other

Scale: 1 inch = 0.2 miles

Date: 10/15/2013
Project: 2012-48

File: C:\GIS\GIS_Projects\2012-48 PVWMA\Final Products\LU Murphy Crossing.mxd

Service Layer Credits: Sources: Esri, DeLorme, NA/TEQ, USGS, Intermap, PC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Legend
- Proposed Pipelines
- Existing College Lake dam elev. 60.2 ft. (234 ac.)
- Proposed College Lake dam elev. 62.5 ft. (272 ac.)
- Recharge Basins
- Existing and Proposed Diversion and Treatment Site

Dept. of Conservation Important Farmland
- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Farmland of Local Importance
- Grazing Land
- Urban and Built-up Land
- Water
- Other Land

Source Data: California Natural Resources Agency, Department of Conservation 2010
Service Layer Credits: Sources: Esri, DeLorme, NAIVEO, USGS, Intermap, ITSC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

Title: Farmland Mapping & Monitoring Program at BMP Update Component Locations
Date: 10/15/2013
Scale: 1 inch = 0.88 miles
Project: 2012-48
Legend

- Proposed 24" Pipeline to CDS
- Proposed Storage Tank Site

Dept. of Conservation Important Farmland

- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Farmland of Local Importance
- Grazing Land
- Urban and Built-up Land
- Water
- Other Land

Source Data: California Natural Resources Agency, Department of Conservation 2010

Service Layer Credits: Sources: Esri, DeLorme, NAI, TEQ, USGS, Intarmap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Farmland Mapping & Monitoring Program at College Lake with Inland Pipeline to CDS Component

File: C:\GIS\GIS_Projects\2012-48 PVWMA\Final Products\FMMP College Lake.mxd

Date: 10/15/2013
Scale: 1 inch = 0.3 miles
Project: 2012-48

Santa Cruz
College Lake

Legend
- Proposed Pipelines
- Existing College Lake dam elev. 60.2 ft. (234 ac.)
- Proposed College Lake dam elev. 62.5 ft. (272 ac.)

Dept. of Conservation Important Farmland
- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Farmland of Local Importance
- Grazing Land
- Urban and Built-up Land
- Water
- Other Land

Source Data: California Natural Resources Agency, Department of Conservation 2010

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IBCAO, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Copyright © 2013 Esri, DeLorme, NAVTEQ, TomTom
Legend

- Proposed Pipeline From Gallery to Basin
- Proposed Infiltration Gallery and Pump Station
- Proposed Recharge Basin

Dept. of Conservation Important Farmland
- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Farmland of Local Importance
- Grazing Land
- Urban and Built-up Land
- Water
- Other Land

Source Data: California Natural Resources Agency, Department of Conservation 2010
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
3.3 AIR QUALITY AND GREENHOUSE GAS

3.3.1 ENVIRONMENTAL SETTING

3.3.1.1 Regional Setting

The BMP Update component sites are located within the North Central Coast Air Basin (NCCAB). The NCCAB is comprised of Monterey, Santa Cruz, and San Benito counties. The Pajaro Valley Water Management Agency (PVWMA) lies within the northern portion of the NCCAB. The PVWMA service area is bounded by the Santa Cruz range to the north and northeast, the Pacific Ocean to the west, and the Salinas Valley to the south.

The primary factors that determine air quality are the locations of air pollutant sources and the amounts of pollutants emitted. Meteorological and topographical conditions are also important. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

The semipermanent high-pressure cell over the eastern Pacific Ocean is the basic controlling factor in the climate of the air basin. In the summer, the high pressure cell is dominant and causes persistent west and northwest winds over the entire California coast. The onshore air currents pass over cool ocean waters and bring fog and relatively cool air into the coastal valleys. The warmer air acts as a lid, inhibiting vertical air movement.

The generally northwest-southeast orientation of mountainous ridges tends to restrict and channel the summer onshore air currents. Typically during the fall, when surface winds become weak, north or east winds develop and can transport pollutants from either the San Francisco Bay Area or the Central Valley into the NCCAB.

During the winter, the Pacific high-pressure area has less influence on the air basin. Air frequently flows in a southeasterly direction out of the Salinas and San Benito valleys, especially during night and morning hours. Northwest winds are still dominant in the winter, but easterly flow is more frequent. The absence of deep, persistent inversions and the occasional storm systems usually result in good air quality for the basin as a whole in winter and early spring.

Sensitive Receptors

One of the most important reasons for air quality standards is the protection of the population who are most sensitive to the adverse health effects of air pollution, referred to as "sensitive receptors." “Sensitive receptors” refer to specific population groups, as well as the land uses where individuals would reside for long periods. Sensitive population groups include children, the elderly, the acutely ill, and the chronically ill. Commonly identified sensitive land uses would include residences, schools, playgrounds, childcare centers, retirement homes or convalescent homes, hospitals, and clinics.

Criteria Pollutants and Human Health

For the protection of public health and welfare, the Federal Clean Air Act (FCAA) requires the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for various pollutants. These pollutants are referred to as "criteria" pollutants because the EPA publishes criteria documents to justify the choice of standards. These standards define the maximum amount of an air pollutant that can be present in...
ambient air without harm to the public’s health. Common air pollutants, emission sources, and associated health and welfare effects are summarized in Table 3.3-1. Within the NCCAB, the air pollutants of primary concern, with regard to human health, include ozone and particulate matter (PM).

### Table 3.3-1 Common Pollutant Sources and Adverse Effects

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Characteristics</th>
<th>Health Effects</th>
<th>Major Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone (O₃)</td>
<td>A highly reactive photochemical pollutant created by the action of sunshine on ozone precursors (primarily reactive hydrocarbons and oxides of nitrogen). Often called photochemical smog. Highest concentrations of ozone are found downwind of urban areas.</td>
<td>▪ Respiratory function impairment.</td>
<td>Sources of ozone precursors (nitrogen oxides and reactive hydrocarbons) are combustion sources, such as factories and automobiles, and evaporation of solvents and fuels.</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>Carbon monoxide is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels. CO concentrations are highest in the winter, when radiation inversions over large areas can limit vertical dispersion.</td>
<td>▪ Impairment of oxygen transport in the bloodstream. ▪ Aggravation of cardiovascular disease. ▪ Fatigue, headache, confusion, dizziness. ▪ Can be fatal in the case of very high concentrations.</td>
<td>Automobile exhaust, combustion of fuels, combustion of wood in woodstoves and fireplaces.</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td>Reddish-brown gas that discolors the air, formed during combustion. Nitrogen dioxide levels in California have decreased in recent years due to reduced power plant and improved automobile emissions. Ambient standards are typically not exceeded in NCCAB.</td>
<td>▪ Increased risk of acute and chronic respiratory disease. ▪ Also, it is an ozone precursor.</td>
<td>Automobile and diesel truck exhaust, industrial processes, fossil-fuel powered plants. Also formed via atmospheric reactions.</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO₂)</td>
<td>Sulfur dioxide is a colorless gas with a pungent, irritating odor. Ambient standards for sulfur dioxide are rarely exceeded in the NCCAB.</td>
<td>▪ Aggravation of chronic obstruction lung disease. ▪ Increased risk of acute and chronic respiratory disease.</td>
<td>Diesel vehicle exhaust, oil-powered power plants, industrial processes.</td>
</tr>
<tr>
<td>PM₁₀ &amp; PM₂.₅</td>
<td>Solid and liquid particles of dust, soot, aerosols and other matter which are small enough to remain suspended in the air for a long period of time. PM₁₀ is particulate matter with diameter less than 10 microns. PM₂.₅ is particulate matter with diameter less than 2.5 microns. PM₂.₅ has been found to be more harmful to humans.</td>
<td>▪ Aggravation of chronic disease and heart/lung disease symptoms.</td>
<td>Combustion, automobiles, field burning, factories and unpaved roads. Also, formed secondarily by photochemical processes of combustion emissions. PM₂.₅ is primarily a secondary pollutant.</td>
</tr>
</tbody>
</table>

### Ambient Air Quality

Existing air quality concerns within the NCCAB are primarily related to increases of regional criteria air pollutants (i.e., ozone and particulate matter); and exposure of sensitive receptors to toxic air contaminants and odors. Existing air quality conditions and applicable regulatory background associated with these emissions of primary concern are discussed separately below.
The Monterey Bay Unified Air Pollution Control District (MBUAPCD) is the regional agency empowered to regulate air pollution emissions from stationary sources in the NCCAB. MBUAPCD regulates air quality through its permit authority over most types of stationary emission sources and through its planning and review activities. MBUAPCD operates air quality monitoring stations that provide information on ambient concentrations of criteria air pollutants. The Salinas station is located at East Laurel Drive in Salinas and the Santa Cruz station is located at 2544 Soquel Avenue in Santa Cruz. The results from these air quality monitoring stations for 2010 to 2012 are presented in Table 3.3-2.

### Table 3.3-2 Local Ambient Air Quality Levels

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Standards (Allowable Amount)</th>
<th>Year</th>
<th>Maximum Concentration</th>
<th>Days (Samples) State/Federal Standards was Exceeded</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ozone (O₃)</strong> (1 hour)²</td>
<td>0.09 ppm (1 hour)</td>
<td>2010</td>
<td>0.077</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td>0.071</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2012</td>
<td>0.071</td>
<td>0/0</td>
</tr>
<tr>
<td><strong>Ozone (O₃)</strong> (8 hour)³</td>
<td>0.07 ppm (8 hour)</td>
<td>2010</td>
<td>0.059</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td>0.065</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2012</td>
<td>0.053</td>
<td>0/0</td>
</tr>
<tr>
<td><strong>Carbon Monoxide (CO)</strong> (1 hour)³</td>
<td>20 ppm (1 hour)</td>
<td>2010</td>
<td>1.30</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td>1.40</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2012</td>
<td>6.40</td>
<td>0/0</td>
</tr>
<tr>
<td><strong>Carbon Monoxide (CO)</strong> (8 hour)³</td>
<td>9.0 ppm (8 hour)</td>
<td>2010</td>
<td>0.76</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td>0.99</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2012</td>
<td>1.39</td>
<td>0/0</td>
</tr>
<tr>
<td><strong>Nitrogen Dioxide (NO₂)⁴</strong></td>
<td>0.18 ppm (1 hour)</td>
<td>2010</td>
<td>0.036</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td>0.040</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2012</td>
<td>0.035</td>
<td>0/0</td>
</tr>
<tr>
<td><strong>Particulate Matter (PM₁₀)²,⁴,⁵</strong></td>
<td>50 μg/m³ (24 hour)</td>
<td>2010</td>
<td>31.0</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td>22.0</td>
<td>0/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2012</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Fine Particulate Matter (PM₂.₅)²,⁵</strong></td>
<td>No Separate Standard</td>
<td>2010</td>
<td>32.8</td>
<td>NA/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2011</td>
<td>17.2</td>
<td>NA/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2012</td>
<td>13.8</td>
<td>NA/0</td>
</tr>
</tbody>
</table>

Notes:
1) Maximum concentrations are measured over the same period as the California standard
2) Santa Cruz Soquel – The Santa Cruz monitoring station is located at 2544 Soquel Ave., Santa Cruz, CA 95063
3) Salinas #3 monitoring station is located at East Laurel Dr., Salinas, CA 93901
4) PM₁₀ exceedances are based on State thresholds established prior to amendments adopted on June 20, 2002
5) PM₁₀ and PM₂.₅ exceedances are derived from the number of samples exceeded, not days
6) The Federal standard was revoked in June 2005

Source: Aerometric Data Analysis and Measurement System, Summaries from 2010 to 2012 as found at http://www.arb.ca.gov/adam/

As shown in Table 3.3-2, no exceedance of state or federal ambient air quality standards (AAQS) for any pollutants have been measured at the Soquel and Salinas monitoring stations over the past three years. Ozone concentrations within the basin are generally decreasing.

### Attainment Status for Criteria Air Pollutants

The attainment status of the NCCAB is summarized in Table 3.3-3. An attainment designation for an area signifies that pollutant concentrations did not violate the standard for that pollutant in that area. A nonattainment
designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as defined in the criteria. Unclassified designations indicate insufficient data is available to determine attainment status.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>State Standards</th>
<th>National Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone (O\textsubscript{3})</td>
<td>Nonattainment\textsuperscript{2}</td>
<td>Attainment/Unclassified\textsuperscript{3}</td>
</tr>
<tr>
<td>Inhalable Particulates (PM\textsubscript{10})</td>
<td>Nonattainment</td>
<td>Attainment</td>
</tr>
<tr>
<td>Fine Particulates (PM\textsubscript{2.5})</td>
<td>Attainment</td>
<td>Attainment/Unclassified\textsuperscript{4}</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>Monterey Co. – Attainment San Benito Co. – Unclassified Santa Cruz Co. - Unclassified</td>
<td>Attainment/Unclassified</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO\textsubscript{2})</td>
<td>Attainment</td>
<td>Attainment/Unclassified\textsuperscript{5}</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO\textsubscript{2})</td>
<td>Attainment</td>
<td>Attainment\textsuperscript{6}</td>
</tr>
<tr>
<td>Lead</td>
<td>Attainment</td>
<td>Attainment/Unclassified\textsuperscript{7}</td>
</tr>
</tbody>
</table>

Notes
1) State designations based on 2009 to 2011 air monitoring data.
2) Effective July 26, 2007, the ARB designated the NCCAB a nonattainment area for the State ozone standard, which was revised in 2006 to include an 8-hour standard of 0.070 ppm.
3) On March 12, 2008, EPA adopted a new 8-hour ozone standard of 0.075 ppm. In April 2012, EPA designated the NCCAB attainment/unclassified based on 2009 to 2011 data, with a design value of 0.070 ppm.
4) In 2006, EPA revised the 24-hour standard for PM\textsubscript{2.5} from 65 to 35 μg/m\textsuperscript{3}. In 2009, EPA designated the NCCAB as attainment/unclassified.
5) In 2011, EPA indicated it plans to designate the entire state as attainment/unclassified for the 2010 NO\textsubscript{2} standard. Final designations have yet to be made by EPA.
6) In June 2011, the ARB recommended to EPA that the entire state be designated as attainment for the 2010 primary SO\textsubscript{2} standard. Final designations have yet to be made by EPA.
7) On October 15, 2008 EPA substantially strengthened the national ambient air quality standard for lead by lowering the level of the primary standard from 1.5 μg/m\textsuperscript{3} to 0.15 μg/m\textsuperscript{3}. Final designations were made by EPA in November 2011.
8) Nonattainment pollutants are highlighted in Bold.
Source: MBUAPCD, 2013

Naturally Occurring Asbestos

Naturally occurring asbestos (NOA) can be released from serpentinite and ultramafic rocks when the rock is broken or crushed. At the point of release, the asbestos fibers may become airborne, causing air quality and human health hazards. Asbestos may be released to the atmosphere due to vehicular traffic on unpaved roads, during grading for development projects, and at quarry operations.

Serpentinite and/or ultramafic rock are known to be present in 44 of California's 58 counties. These rocks are particularly abundant in the counties associated with the Sierra Nevada foothills, the Klamath Mountains, and Coast Ranges. According to the Department of Conservation Division of Mines and Geology, A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos Report (August 2000), the project is not located in an area where NOA is likely to be present.
**Odors**

Although offensive odors rarely result in any physical harm, they can be unpleasant, leading to stress among the public and often generating citizen complaints to local governments including the MBUAPCD. The MBUAPCD has determined some common types of facilities that have been known to produce odors, including wastewater treatment facilities, chemical manufacturing plants, painting/coating operations, feed lots/dairies, composting facilities, landfills, and transfer stations. Because offensive odors rarely cause any physical harm and no requirements for their control are included in state or federal air quality regulations, the MBUAPCD has no rules or standards related to odor emissions other than its nuisance rule. Any actions related to odors are based on citizen complaints to local governments and the MBUAPCD. No major stationary sources of odors have been identified in the vicinity of the project components.

**Global Climate Change & Greenhouse Gases**

The natural process through which heat is retained in the atmosphere is called the greenhouse effect. The greenhouse effect traps heat in the atmosphere through a threefold process as follows: short wave radiation emitted by the sun is absorbed by the earth; the earth emits a portion of this energy in the form of long wave radiation; greenhouse gases (GHGs) in the upper atmosphere absorb this long wave radiation and emit this long wave radiation into space and toward the earth. This trapping of the long wave (thermal) radiation emitted back toward the earth is the underlying process of the greenhouse effect.

The most abundant GHGs are water vapor and carbon dioxide (CO\textsubscript{2}). Many other trace gases have greater ability to absorb and re-radiate long wave radiation; however, these gases are not as plentiful. For this reason, and to gauge the potency of GHGs, scientists have established a Global Warming Potential (GWP) for each GHG based on its ability to absorb and re-radiate long wave radiation. The GWP of a gas is determined using CO\textsubscript{2} as the reference gas. CARB recommends use of the Intergovernmental Panel on Climate Change’s (IPCC) Third Assessment Report (IPCC, 2001) as the source for the GWP due to the use of those GWPs for their regulatory programs.

Table 3.3-4 provides descriptions of the primary GHGs attributed to global climate change and their GWPs, including a description of their physical properties, primary sources, and contribution to the greenhouse effect.

<table>
<thead>
<tr>
<th>Greenhouse Gas/GWP</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide (CO\textsubscript{2}) GWP: 1</td>
<td>Carbon dioxide (CO\textsubscript{2}) is a colorless, odorless gas. CO\textsubscript{2} is emitted in a number of ways, both naturally and through human activities. The largest source of CO\textsubscript{2} emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources. A number of specialized industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO\textsubscript{2} emissions. The atmospheric lifetime of CO\textsubscript{2} is variable because it is so readily exchanged in the atmosphere.</td>
</tr>
<tr>
<td>Methane (CH\textsubscript{4}) GWP: 21</td>
<td>Methane (CH\textsubscript{4}) is a colorless, odorless gas that is not flammable under most circumstances. CH\textsubscript{4} is the major component of natural gas, about 87 percent by volume. It is also formed and released to the atmosphere by biological processes occurring in anaerobic environments. Methane is emitted from a variety of both human-related and natural sources. Human-related sources include fossil fuel production, animal husbandry (intestinal fermentation in livestock and manure management), rice cultivation, biomass burning, and waste management. These activities release significant quantities of methane to the atmosphere. Natural sources of methane include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources</td>
</tr>
</tbody>
</table>
### Greenhouse Gas/GWP

<table>
<thead>
<tr>
<th>Description</th>
<th>such as wildfires. Methane’s atmospheric lifetime is about 12 years.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrous Dioxide (N₂O): GWP: 310</td>
<td>Nitrous oxide (N₂O) is a clear, colorless gas with a slightly sweet odor. N₂O is produced by both natural and human-related sources. Primary human-related sources of N₂O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, adipic acid production, and nitric acid production. N₂O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests. The atmospheric lifetime of N₂O is approximately 120 years.</td>
</tr>
<tr>
<td>Hydrofluorocarbons (HFCs): GWP: 6,500</td>
<td>Hydrofluorocarbons (HFCs) are man-made chemicals, many of which have been developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products. The only significant emissions of HFCs before 1990 were of the chemical HFC-23, which is generated as a byproduct of the production of HCFC-22 (or Freon 22, used in air conditioning applications). The atmospheric lifetime for HFCs varies from just over a year for HFC-152a to 260 years for HFC-23. Most of the commercially used HFCs have atmospheric lifetimes of less than 15 years (e.g., HFC-134a, which is used in automobile air conditioning and refrigeration, has an atmospheric life of 14 years).</td>
</tr>
<tr>
<td>Perfluorocarbons (PFCs): GWP: 6,500</td>
<td>Perfluorocarbons (PFCs) are colorless, highly dense, chemically inert, and nontoxic. There are seven PFC gases: perfluoromethane (CF₄), perfluoroethane (C₂F₆), perfluoropropane (C₃F₈), perfluorobutane (C₄F₁₀), perfluorocyclobutane (C₄F₈), perfluoropentane (C₅F₁₂), and perfluorohexane (C₆F₁₄). Natural geological emissions have been responsible for the PFCs that have accumulated in the atmosphere in the past; however, the largest current source is aluminum production, which releases CF₄ and C₂F₆ as byproducts. The estimated atmospheric lifetimes for CF₄ and C₂F₆ are 50,000 and 10,000 years, respectively.</td>
</tr>
<tr>
<td>Sulfur Hexafluoride (SF₆): GWP: 23,900</td>
<td>Sulfur hexafluoride (SF₆) is an inorganic compound that is colorless, odorless, nontoxic, and generally nonflammable. SF₆ is primarily used as an electrical insulator in high voltage equipment. The electric power industry uses roughly 80 percent of all SF₆ produced worldwide. Significant leaks occur from aging equipment and during equipment maintenance and servicing. SF₆ has an atmospheric life of 3,200 years.</td>
</tr>
</tbody>
</table>

### 3.3.1.2 Regulatory Setting

#### Clean Air Act

The EPA is the federal agency that oversees the 1977 Federal Clean Air Act (FCAA) and 1990 amendments and other air quality-related legislation. The EPA established NAAQS and classifies air basins (or portions of air basins) as either attainment or nonattainment for each criteria air pollutant based on whether or not the NAAQS have been achieved. The CAA requires states to prepare plans for attainment of standards, called State Implementation Plans that prescribe control measures to reduce air pollutant emissions/concentrations.

In addition to pollutants regulated by NAAQS, EPA regulates hazardous air pollutants (HAPs). State and local air districts use the term toxic air contaminants (or TACs). This is achieved primarily through the National Emission Standards for Hazardous Air Pollutants,¹ which include source-specific regulations that limit allowable emissions of such pollutants to protect public health and welfare. Title V of the FCAA, as amended in 1990, creates an operating permits program for certain defined sources.

¹ The National Emission Standards for Hazardous Air Pollutants are promulgated under Title 40 of the Code of Federal Regulations, Parts 61 & 63.
California Air Resources Board (CARB)

The California Air Resources Board (CARB) coordinates and oversees both state and federal air pollution control programs in California. As part of this responsibility, CARB monitors existing air quality, establishes state air quality standards, and limits allowable emissions from vehicular sources. Regulatory authority within established air basins is provided by local air pollution control agencies, which control stationary-source and most categories of area-source emissions and develop regional air quality plans. The project is located within the jurisdiction of the MBUAPCD. The state and federal standards for the criteria pollutants are presented in Table 3.3-5. These standards are designed to protect public health and welfare. The “primary” standards have been established to protect the public health. The “secondary” standards are intended to protect the nation’s welfare and account for air pollutant effects on soils, water, visibility, materials, vegetation, and other aspects of general welfare.

### Table 3.3-5 Summary of National and State Ambient Air Quality Standards

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Time</th>
<th>California Standards</th>
<th>National Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Primary (a)</td>
</tr>
<tr>
<td>Ozone (O₃)</td>
<td>1-hour</td>
<td>0.09 ppm</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>8-hour</td>
<td>0.070 ppm</td>
<td>0.075 ppm</td>
</tr>
<tr>
<td>Particulate Matter (PM₁₀)</td>
<td>AAM</td>
<td>20 μg/m³</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>50 μg/m³</td>
<td>150 μg/m³</td>
</tr>
<tr>
<td>Fine Particulate Matter (PM₂.₅)</td>
<td>AAM</td>
<td>12 μg/m³</td>
<td>15 μg/m³</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>No Standard</td>
<td>35 μg/m³</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>1-hour</td>
<td>20 ppm</td>
<td>35 ppm</td>
</tr>
<tr>
<td></td>
<td>8-hour</td>
<td>9 ppm</td>
<td>9 ppm</td>
</tr>
<tr>
<td></td>
<td>8-hour (Lake Tahoe)</td>
<td>6 ppm</td>
<td>–</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td>AAM</td>
<td>0.030 ppm</td>
<td>0.053 ppm</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>0.18 ppm</td>
<td>100 ppb</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO₂)</td>
<td>AAM</td>
<td>–</td>
<td>0.03 ppm</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.04 ppm</td>
<td>0.14 ppm</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>0.25 ppm</td>
<td>75 ppb</td>
</tr>
<tr>
<td>Lead</td>
<td>30-day Average</td>
<td>1.5 μg/m³</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Calendar Quarter</td>
<td>–</td>
<td>1.5 μg/m³</td>
</tr>
<tr>
<td></td>
<td>Rolling 3-Month Average</td>
<td>–</td>
<td>0.15 μg/m³</td>
</tr>
<tr>
<td>Sulfates</td>
<td>24-hour</td>
<td>25 μg/m³</td>
<td>–</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>1-hour</td>
<td>0.03 ppm</td>
<td>–</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>24-hour</td>
<td>0.01 ppm</td>
<td>–</td>
</tr>
<tr>
<td>Visibility-Reducing Particle Matter</td>
<td>8-hour</td>
<td>Extinction coefficient: 0.23/kilometer-visibility of 10 miles or more (0.07 - 30 miles or more for Lake Tahoe) due to particles when the relative</td>
<td>–</td>
</tr>
</tbody>
</table>
### Pollutant Standards

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Time</th>
<th>California Standards</th>
<th>National Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>humidity is less than 70%.</td>
<td>Primary (a)</td>
</tr>
</tbody>
</table>

**Notes:**
AAM = Annual Arithmetic Mean; μg/m³ = Micrograms per Cubic Meter; ppm = Parts per million.
Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 torr.

(a) Levels necessary to protect the public health.
(b) Levels necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
Source: California Air Resource Control Board, 6/7/2012.

### State Air Toxics Program

According to Section 39655 of the California Health and Safety Code, a toxic air contaminant is "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health". In addition, 189 substances that have been listed as federal hazardous air pollutants (HAPs) pursuant to Section 7412 of Title 42 of the United States Code are TACs under the State's air toxics program pursuant to Section 39657 (b) of the California Health and Safety Code.

TACs can cause various cancers, depending on the particular chemicals, their type and duration of exposure. Additionally, some of the TACs may cause other health effects over the short or long term exposure. The ten TACs posing the greatest health risk in California are acetaldehyde, benzene, 1-3 butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchlorethylene, and diesel particulate matter.

### Monterey Bay Unified Air Pollution Control District (MBUAPCD)

The MBUAPCD regulates air quality in the NCCAB, is responsible for attainment planning related to criteria air pollutants, and conducts district rule development and enforcement. It also reviews air quality analyses prepared for CEQA assessments and has published the CEQA Air Quality Guidelines document for use in evaluation of air quality impacts.

### County of Santa Cruz General Plan/Local Coastal Plan

Santa Cruz County General Plan was adopted by the Board of Supervisors in May of 1994 and certified by the California Coastal Commission in December of 1994. The following air resources policies are applicable to the BMP Update area.

**Objective 5.18, Air Resources.** To improve the air quality of Santa Cruz County by meeting or exceeding state and federal ambient air quality standards, protect County residents from the health hazards of air pollution, protect agriculture from air pollution induced crop losses and prevent degradation of the scenic character of the area.

**Policy 5.18.1, New Development.** Ensure new development projects are consistent at a minimum with the Monterey Bay Unified Air Pollution Control District Air Quality Management Plan and review such projects for potential impact on air quality.
Section 3.3 Air Quality and Greenhouse Gas

City of Watsonville Vista 2030 General Plan

Policy 11.5.1. The City shall implement measures in the operation of City facilities and its vehicle fleet that reduce energy use, reduce exhaust emissions and contribute to the improvement of local, regional and global air quality.

The City shall cooperate with the MBUAPCD to maintain and improve regional air quality.

The City shall purchase, to the maximum extent available, low-emission vehicles for its fleet of cars, trucks and equipment.

Policy 11.5.11 Air Quality Evaluation. As part of the project review process the City shall refer projects with identifiable air quality impacts to the MBUAPCD for recommendations on appropriate air quality impact mitigations.

Greenhouse Gas

Federal

On April 17, 2009, the EPA Administrator signed Proposed Endangerment and Cause or Contribute Findings for GHGs under Section 202(a) of the Clean Air Act. EPA held a 60-day public comment period, which ended June 23, 2009, and received more than 380,000 public comments. These included written comments and testimony at two public hearings in Arlington, Virginia, and Seattle, Washington. EPA carefully reviewed, considered, and incorporated public comments and has now issued the final findings.

EPA found that six GHGs taken in combination endanger both the public health and the public welfare of current and future generations. EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse effect and, under Section 202(a) of the Clean Air Act, result in air pollution that endangers public health and welfare. These findings were based on careful consideration of the full weight of scientific evidence and a thorough review of the numerous public comments received on the proposed findings published on April 24, 2009. The findings were effective as of January 14, 2010. The specific GHG regulations EPA has adopted to date are as follows:

- 40 CFR Part 98. Mandatory Reporting of Greenhouse Gases Rule. This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO$_2$e emissions per year (EPA 2009). Additionally, the reporting of emissions is required for owners of SF$_6$- and PFC-insulated equipment when the total nameplate capacity of these insulating gases is above 17,280 pounds. The BMP update would not trigger the GHG reporting required by this regulation.

- 40 CFR Part 52. Proposed Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule. EPA recently mandated that Prevention of Significant Deterioration requirements be applied to facilities that have stationary-source CO$_2$e emissions exceeding 75,000 tons per year. The BMP Update would not trigger the Prevention of Significant Deterioration permitting required by this regulation.

State

CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CCAA, which was adopted in 1988. Various statewide and local initiatives to reduce the State’s contribution to GHG emissions have raised awareness that, even though the
various contributors to and consequences of global climate change are not yet fully understood, global climate change is under way, and there is a real potential for severe adverse environmental, social, and economic effects in the long term.

**Assembly Bill 32.** The Legislature enacted AB 32 (AB 32, Nuñez), the California Global Warming Solutions Act of 2006, which was signed on September 27, 2006 to further the goals of Executive Order S-3-05. (Health & Safety Code, § 38500 et seq.) AB 32 requires CARB to adopt statewide GHG emissions limits to achieve statewide GHG emissions levels realized in 1990 by 2020. A longer-range goal requires an 80 percent reduction in GHG emissions from 1990 levels by 2050. CARB adopted the 2020 statewide target and mandatory reporting requirements in December 2007, and a statewide scoping plan in December 2008 (the AB 32 Scoping Plan). The AB 32 Scoping Plan, developed by ARB in coordination with their Climate Action Team, proposes a comprehensive set of actions designed to reduce overall greenhouse gas emissions in California, improve the environment, reduce dependence on oil, diversify energy sources, save energy, create new jobs, and enhance public health.

**Executive Order S-3-05.** The Executive Order S-3-05 established the following goals: GHG emissions should be reduced to 2000 levels by 2010; GHG emissions should be reduced to 1990 levels by 2020; and GHG emissions should be reduced to 80 percent below 1990 levels by 2050. The Secretary of the California EPA (the Secretary) is required to coordinate efforts of various agencies in order to collectively and efficiently reduce GHGs.

**Senate Bill 97.** Senate Bill (SB) 97 of 2007 required the California Office of Planning and Research (OPR) to develop CEQA guidelines for analysis and, if necessary, the mitigation of effects of GHG emissions to the Resources Agency. The CEQA Guidelines Amendments became effective on March 18, 2010.

### 3.3.1.3 Setting by Component

**Sensitive Receptors**

**Increase Recycled Water Storage at Treatment Plant**

The nearest sensitive receptors to the Increase Recycled Water Storage at Treatment Plant component site include residences located more than 1,000 feet north of the proposed site. Residences are also located approximately 1,000 feet east of the proposed North Dunes Recharge Basin.

**Harkins Slough Recharge Facilities Upgrades**

As shown in Figure 3.3-1, Harkins Slough contains a few low density residential units within a quarter mile radius of the project site. A few residences are located near the proposed pipeline alignment for the filter waste backwash along San Andreas Road. In addition, an existing residence is located just west of the Harkins Slough Diversion pump station.
Watsonville Slough with Recharge Basins

There are residential units within a quarter mile of the diversion and recharge sites proposed in the Watsonville Slough with Recharge Basins component, including residential units 1,000 feet west of the proposed diversion and one additional residential unit located approximately 300 feet west of the proposed North Dunes Recharge Basin.

College Lake with Inland Pipeline to CDS

As shown in Figure 3.3-1, the College Lake with Inland Pipeline to CDS component is near a number of sensitive receptors. Sensitive receptors nearest to College Lake include Our Lady Help of Christians Valley Roman Catholic Church, Saint Francis Catholic High School, and Lakeview Middle School. Sensitive residential uses also extend south of the College Lake site near the intersection of Highway 152/Holohan Road. Numerous sensitive receptors, including residences and schools, are located along various portions of the proposed Inland Pipeline that extends from College Lake to the wastewater treatment plant. These include Watsonville High, Eagle Independent Study, and Linscott (J.W.) Elementary Charter School, which are within a quarter-mile of the proposed pipeline.

Murphy Crossing with Recharge Basins

The Murphy Crossing with Recharge Basins project component is located in a rural area east of Watsonville. The area 300-500 feet south of the infiltration gallery location of this component contains two single family residences, which are potentially sensitive receptors. In addition, a single residence is located immediately north of, and two additional residences are located south of the proposed recharge basins.

3.3.2 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Conflict with or obstruct implementation of the applicable air quality plan
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)\(^2\)
- Expose sensitive receptors to substantial pollutant concentrations
- Create objectionable odors affecting a substantial number of people
- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment

\(^2\) See the cumulative analysis in Section 4. Other CEQA Considerations for the relevant analysis of this significance criteria.
• Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases

3.3.2.1 Air Quality Thresholds of Significance

For the purposes of this EIR, the thresholds of significance established by the applicable air quality management or air pollution control district were used. Since the BMP Update components lies within the NCCAB, the methods and thresholds contained in MBUAPCD CEQA Air Quality Guidelines were applied. According to the MBUAPCD, construction activities (e.g., excavation, grading, on-site vehicles) that directly generate 82 pounds per day or more of PM$_{10}$ would have a significant impact on local air quality when they are located nearby, and upwind of, sensitive receptors. Construction activities temporarily emit precursors of ozone; however, these emissions are accounted for in the emissions inventories of state- and federally-required air plans and, therefore, would not have a significant impact on the attainment and maintenance of ozone ambient air quality standards.

The MBUAPCD recommends the following the project-level thresholds of significance for operational impacts. An exceedance of any threshold would represent a significant impact on local or regional air quality. If the project will:

a) generate direct plus indirect emissions of either ROG or NO$_x$ that exceed 137 lb/day
b) generate on-site emissions of PM$_{10}$ exceeding 82 lb/day
c) generate direct emissions of CO exceeding 550 lb/day;
d) cause or substantially contribute to a violation of PM$_{10}$ standard near any off-site unpaved roads along which project-generated vehicle trips would travel;
e) cause or substantially contribute to a violation of a CO standard; or
f) be inconsistent with the adopted AQMP.

3.3.2.2 Greenhouse Gas Thresholds of Significance

For the purposes of this EIR, project specific thresholds of significance are used. In April 2012, the San Luis Obispo County Air Pollution Control District (SLO APCD) published its greenhouse gas threshold in their CEQA Handbook based. In accordance with CEQA Guidelines Section 15064.7 and MBUAPCD recommendations, PVWMA has elected to use the SLO APCD GHG threshold as a project-specific threshold based on use of the substantial evidence gathered by SLO APCD in their development and approval of GHG thresholds (Amy Clymo, personal communication, 2012 and 2013). More detailed information on the greenhouse gas thresholds can be found in the SLOAPCD’s Greenhouse Gas Thresholds and Supporting Evidence document (March 28, 2012) available at http://slocounty.granicus.com/MediaPlayer.php?view_id=7&clip_id=1251&meta_id=242200.

Construction generated GHG emissions are quantified, amortized over the life of the project, added to the annual operational emissions, and the sum compared to the relevant threshold. SLOAPCD has established a threshold of significance of 1,150 metric tons per year or 4.9 metric tons of CO$_2$e per service population (residents plus employees) per year for operational emissions generated by a land use development projects (SLO ACPD 2012). If annual emissions of GHGs exceed these threshold levels, the proposed project would result in a cumulatively considerable contribution of GHG emissions and a cumulatively significant impact to global climate change. If the emissions are below that threshold, the project’s impact due to GHG emissions would be considered less than cumulatively considerable and, thus, less than significant.
3.3.3 IMPACTS AND MITIGATION MEASURES BY COMPONENT

Introduction

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to each specific component are identified for each potential impact. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are identified.

Site-specific air quality impacts from the BMP Update components relate primarily to combustion emissions from use of construction equipment and fugitive dust emissions from earth movement and vehicle travel over unpaved surfaces during construction of the components. Due to the short-term nature of each construction project (construction periods will not exceed one year at any one site) and the distance to sensitive receptors, significant health risk impacts are not anticipated due to exposing sensitive receptors to substantial pollutant concentrations (i.e., dust or toxic air contaminant emissions, such as diesel exhaust or acrolein). Emissions from long-term operation of the BMP Update components would not result in significant impacts due to: 1) the few number of new stationary sources proposed (potentially, temporary/emergency generators for pumps only), 2) the minimal addition of new traffic trips generated (less than one per day), and (3) lack of toxic air contaminant emissions and odor-generating operations.

3.3.3.1 Construction Impacts – Criteria Air Pollutants

Impact AQ-1: Implementation of the BMP Update components would temporarily generate criteria air pollutants, particularly PM$_{10}$, and may expose sensitive receptors to substantial pollutant emissions during construction. This is a potentially significant impact. With mitigation measures identified in this EIR, the impact would be reduced to a less-than-significant level.

In accordance with MBUAPCD recommendations, estimated construction-generated emissions of PM$_{10}$ were calculated using the ARB-approved URBEMIS2007 (version 9.2.4) computer program based on default assumptions contained in the model and construction information provided by the applicant. For informational purposes, emissions of ROG, NO$_x$, and PM$_{2.5}$ were also quantified. The URBEMIS2007 program is designed to model construction emissions for land use development projects and allows for the input of project-specific information. Construction schedules used in the modeling were based on the proposed project schedule for each component. Each component was assumed to be constructed over an approximate 1-year period with the exception of the College Lake component where construction will occur over a 1.5-year period due to the time needed to construct the pipeline extending to the wastewater treatment plant. Grading was based on estimated excavation information presented in Appendix B. Load factors were adjusted according to CARB recommendations (CARB, 2010). All other construction-related information, including the equipment usage requirements, construction-related vehicle trips, usage rates, and emission factors were based on the default parameters contained in the URBEMIS computer model for Santa Cruz County. Detailed Assumptions are presented in Appendix B.

Mitigation Measure(s):

Mitigation Measure AQ-1: The construction contractor shall implement a dust program that includes the following elements:
• Water all active construction sites at least twice daily
• Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard
• Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites
• Sweep daily (with water sweepers) all paved access roads, paved parking areas and paved staging areas at construction sites
• Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
• Hydroseed or apply (non-toxic) soil binders to inactive construction areas. However, do not apply these measures in operating agricultural fields under cultivation unless requested by the grower
• Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
• Limit traffic on unpaved roads to 15 mph
• Install sandbags or other erosion control measures to prevent silt runoff to public roadways
• Replant vegetation in disturbed areas as quickly as possible
• The contractor or builder shall designate a person or persons to monitor the fugitive dust emissions and enhance the implementation of the measures as necessary to minimize dust complaints. The name and telephone number of such persons shall be provided to the APCD Compliance Division prior to the start of any grading, earthwork or demolition.

The effectiveness of the above dust control measures in reducing PM\textsubscript{10} emissions is approximately 55 percent (for watering active construction areas) to 90 percent (for covering haul trucks and inactive storage piles) (MBUAPCD, 2008). Implementation of these measures would be expected to reduce PM\textsubscript{10} emissions to below the threshold of 82 pounds per day. With implementation of the above mitigation measures, construction-generated emissions would be less than significant.

Construction emissions generated by the BMP Update components were calculated using CalEEMod and the results are shown in Table 3.3-6 below. Based on the schedule for implementation of the BMP Update components (See Figure 2-16 in Section 2) and the short construction timeframes described in Section 2, construction activities for these components would not overlap such that the construction emissions would need to be added together and compared to thresholds.

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Mitigation Status</th>
<th>ROG</th>
<th>NO\textsubscript{X}</th>
<th>PM\textsubscript{10}</th>
<th>PM\textsubscript{2.5}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycled Water Storage at Treatment Plant</td>
<td>Unmitigated</td>
<td>8</td>
<td>24</td>
<td>134</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Mitigated</td>
<td>8</td>
<td>24</td>
<td>58</td>
<td>13</td>
</tr>
<tr>
<td>Harkins Slough Recharge Facilitates Upgrades</td>
<td>Unmitigated</td>
<td>4</td>
<td>27</td>
<td>161</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Mitigated</td>
<td>4</td>
<td>27</td>
<td>71</td>
<td>15</td>
</tr>
</tbody>
</table>
### Increased Recycled Water Storage at Treatment Plant

Construction, including site grading and excavation activities, of the Increased Recycled Water Storage at Treatment Plant would generate fugitive dust, including unmitigated 134 lbs of PM$_{10}$ exceeding the MBUAPCD’s significance threshold and potentially exposing sensitive receptors to substantial pollutant concentrations. Construction-related emissions of PM$_{10}$ is a potentially significant impact, that would be reduced to a less-than-significant level (per CalEEMod modeling, 58 lbs) with Mitigation Measure AQ-1, as shown in Table 3.3-6.

### Harkins Slough Recharge Facilities Upgrades

Air quality impacts from construction of the Harkins Slough Recharge Facilities Upgrades component would be similar to the Increased Recycled Water Storage at Treatment Plant. As shown in Table 3.3-6, the Harkins Slough Recharge Facilities Upgrades would have a worst case summer unmitigated PM$_{10}$ emissions of 161 lbs exceeding the MBUAPCD’s significance threshold and potentially exposing sensitive receptors to substantial pollutant concentrations. This is a potentially significant impact that can be reduced to a less-than-significant level with implementation of Mitigation Measure AQ-1. Modeling found that PM$_{10}$ emissions on a worst case summer day will be reduced to 71 lbs.

### Watsonville Slough with Recharge Basins

As shown in Table 3.3-6, the Watsonville Slough with Recharge Basins will have a worst case summer unmitigated PM$_{10}$ emissions of 157 lbs. This is a potentially significant impact. With Mitigation Measure AQ-1, PM$_{10}$ emissions on a worst case summer day will be reduced to 68 lbs.

### College Lake with Inland Pipeline to CDS

Air quality impacts from construction of the College Lake with Inland Pipeline to CDS will have a worst case summer unmitigated PM$_{10}$ emissions of 48 lbs which is less than the MBUAPCD threshold of significance. This is a less-than-significant impact. Mitigation Measure AQ-1 will still apply to this component to reduce PM$_{10}$ emissions on a worst case summer day to 22 lbs (see Table 3.3-6).
**Murphy Crossing with Recharge Basins**

Construction of the Murphy Crossing with Recharge Basins component would have a worst case summer unmitigated PM\(_{10}\) emissions of 67 lbs which is less than the MBUAPCD threshold of significance. This is a less-than-significant impact. Mitigation Measure AQ-1 will still apply to this component to reduce PM\(_{10}\) emissions on a worst case summer day to 27 lbs (see Table 3.3-6).

### 3.3.3.2 Construction Impacts – Toxic Air Contaminants

*Implementation of the BMP Update components would temporarily generate toxic air contaminants, such as diesel particulate matter and acrolein, and may expose sensitive receptors to substantial pollutant emissions during construction. This is a less-than-significant impact.*

As indicated previously, the primary toxic air contaminants of concern from BMP Update component would be due to construction equipment exhaust including the emissions of diesel particulate matter and acrolein. The construction equipment would be required to comply with CARB’s airborne toxic control measures and off-road equipment rules, which would reduce emissions of both diesel particulate and acrolein. The construction phase is expected to last only a few months to no more than one year at each construction site, and cancer risk is typically calculated based on a 70-year exposure; thus, the low TAC emissions—along with the short exposure duration—would minimize the health risk. Therefore, sensitive receptors in proximity to the project construction sites would have limited exposure to TAC emissions during construction, and the impact would be less than significant.

### 3.3.3.3 Operational Impacts

*Operation of the BMP Update components would not generate emissions of criteria air pollutants and odors that would exceed thresholds. This is a less-than-significant impact.*

The proposed BMP Update will not created direct on-site operational emissions as defined by the MBUAPCD. As shown in Appendix B, each project component is estimated to only create a maximum of 1 to 2 trips per week; therefore, operational air quality impacts due to mobile sources emissions will be well below the relevant thresholds of significance. Indirect CO\(_2\) emissions from the proposed project energy are assessed in the Operational GHG emissions section below.

**Increased Recycled Water Storage at Treatment Plant**

Operation of the Increased Recycled Water Storage at Treatment Plant site would require periodic maintenance and inspection by PVWMA employees (less than one new trip per day). Emissions generated by employee vehicle trips for this component would not exceed MBUAPCD significance thresholds. The facilities would be powered by electricity, rather than diesel, and would not directly emit criteria air pollutants. Based on the above information, this component would not result in operational emissions that would exceed thresholds set by MBUAPCD. Residences are located within 1,000 feet of the site for this component that would include storage tanks (clearwells) that would contain tertiary treated (recycled) water. Effluent treated to the tertiary levels would not contain biosolids or other organic material that would generate noticeable odors; therefore, the project would not result in a significant odor impact.
**Harkins Slough Recharge Facilities Upgrades**

The Harkins Slough Recharge Facilities Upgrades would require periodic maintenance and inspection by PVWMA employees. Emissions generated by employee vehicle trips would be negligible, 1 to 2 per week, and would not exceed MBUAPCD significance thresholds. The treatment and well facilities would be powered by electricity, rather than diesel, and would not directly emit criteria air pollutants. Based on the above information, this component would not result in operational emissions that would exceed thresholds set by MBUAPCD. Residences are located adjacent to this component site. The proposed Harkins Slough Recharge Facilities Upgrades would include recharge basins that would contain filtered slough water with a low potential for odor generation; therefore, this component would not result in a significant odor impact.

**Watsonville Slough with Recharge Basins**

Similar to the Harkins Slough Recharge Facilities Upgrades, the Watsonville Slough with Recharge Basins would require periodic maintenance and inspection by PVWMA employees. Emissions generated by employee vehicle trips, 1 to 2 per week, and would not exceed MBUAPCD significance thresholds. The facilities would be powered by electricity, and would not directly emit criteria air pollutants. Based on the above information, this component would not result in operational emissions that would exceed MBUAPCD significance thresholds.

Residences are located adjacent to the project component site. The proposed Watsonville Slough with Recharge Basins component would include recharge basins that would containing filtered slough water with a low potential for odor generation; therefore, this component would not result in a significant odor impact.

**College Lake with Inland Pipeline to CDS**

College Lake with Inland Pipeline to CDS would require periodic maintenance and inspection by PVWMA employees. Emissions generated by employee vehicle trips would be negligible, 1 to 2 per week, and would not exceed MBUAPCD significance thresholds. Based on the above information, this component would not result in operational emissions that would exceed MBUAPCD thresholds.

Residences and schools are located near the project component site. The proposed project would construct a screened inlet structure, a filter supply pump station, a sand filtration and disinfection system, a booster pump station, and a new outlet weir structure. Operation of this component would generate no odors; therefore, this component would not result in odor impacts.

**Murphy Crossing with Recharge Basins**

Sensitive receptors such as residences and schools are not located near the Murphy Crossing component site, with the exception of a home immediately adjacent to the recharge basins site. Furthermore, this component would result in only one to two new employee vehicle trips per week on average, and would not exceed MBUAPCD significance thresholds. The proposed Murphy Crossing with Recharge Basins component would include recharge basins that would contain filtered river water with a low potential for odor generation; therefore, this component would not result in a significant odor impact.
3.3.3.4 Generation of Greenhouse Gas Emissions (Cumulative Impact on Climate Change)

Development of the BMP Update components would contribute to increases of GHG emissions that are associated with global climate change; however, not at a cumulatively considerable level. This is a less-than-significant cumulative impact.

California Emissions Estimator Model, version 2011.1.1 (CalEEMod) is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals. Almost all of the operational CO₂ emission would occur from energy usage of the BMP Update components. With the energy usage data provided in the Appendix B, operational emissions were calculated by multiplying the energy usage by the CalEEMod CO₂ intensity factor for energy usage. This intensity factor is based on PG&E’s 2008 historic intensity factor which is anticipated to be overestimated for what will occur during BMP Update component operation. PG&E estimates future CO₂ intensity factors to be lower (approximately 30%) when proposed BMP components would begin operation (PG&E, 2013).

A minor source of operational GHG emissions are the mobile source emissions created as a result of the BMP Update. As stated in the project description each project component is estimated to only create a maximum of 1 to 2 new trips per week, resulting less than 1 metric ton of CO₂e per year. The MBUAPCD has not established a threshold of significance for CO₂e. However, as stated above, SLO APCD adopted threshold of 1,150 metric tons (MT) of CO₂ per year and this EIR uses that threshold as recommended by MBUAPCD staff. See details in Appendix B.

Construction GHG emissions were quantified using URBEMIS2007 with the assumptions above and a correction factor for non-CO2e GHG emissions.

The results of the GHG calculations for the air quality analysis performed for the BMP Update are presented in Table 3.3-7 and Table 3.3-8 below and detailed in Appendix B. A summary of the GHG results for each component is provided in the discussion following these tables.

### Table 3.3-7 Operational CO₂ Emissions from Energy Use

<table>
<thead>
<tr>
<th>BMP Update Component</th>
<th>Energy Usage (kWh/year)</th>
<th>Energy Usage (MWh/year)</th>
<th>CO₂ Intensity Factor (lbs/MWh)</th>
<th>Operational CO₂ (lbs/year)</th>
<th>Operational CO₂ (Metric Tons/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase Recycled Water Storage at Treatment Plant</td>
<td>350,000</td>
<td>350</td>
<td>641</td>
<td>224,350</td>
<td>102</td>
</tr>
<tr>
<td>Harkins Slough Recharge Facilities Upgrades</td>
<td>267,000</td>
<td>267</td>
<td>641</td>
<td>171,147</td>
<td>78</td>
</tr>
<tr>
<td>Watsonville Slough and Recharge Basins</td>
<td>333,000</td>
<td>333</td>
<td>641</td>
<td>213,453</td>
<td>97</td>
</tr>
<tr>
<td>College Lake with Inland Pipeline to CDS</td>
<td>800,000</td>
<td>800</td>
<td>641</td>
<td>512,800</td>
<td>233</td>
</tr>
<tr>
<td>Murphy Crossing with Recharge Basins</td>
<td>80,000</td>
<td>80</td>
<td>641</td>
<td>51,280</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,830,000</strong></td>
<td><strong>1,830</strong></td>
<td></td>
<td><strong>1,173,030</strong></td>
<td><strong>532</strong></td>
</tr>
</tbody>
</table>

### Table 3.3-8 Construction-Related and Total CO₂ and CO₂e Emissions
### Increase Recycled Water Storage at Treatment Plant

As presented in Table 3.3-7, the operation of Increased Recycled Water Storage at Treatment Plant with amortized construction emissions would produce a total of 112 metric tons of CO$_2$e per year. This is below project-specific threshold of significance of 1,150 metric tons of CO$_2$e per year (see Table 3.3-7) and represents a less-than-significant cumulative impact.

### Harkins Slough Recharge Facilities Upgrades

As shown in Table 3.3-7, the operation (including amortized construction emissions) of Harkins Slough Recharge Facilities Upgrades would produce a total of 92 metric tons of CO$_2$e per year. This is project-specific threshold of significance of 1,150 metric tons of CO$_2$e per year (see Table 3.3-7) and represents a less-than-significant cumulative impact.

### Watsonville Slough and Recharge Basin

As stated in Table 3.3-7, the operation (including amortized construction emissions) of Harkins Slough Recharge Facilities Upgrades would produce a total of 120 metric tons of CO$_2$e per year. This is below the project-specific threshold of significance of 1,150 metric tons of CO$_2$e per year (see Table 3.3-7) and represents a less-than-significant cumulative impact.

### College Lake with Inland Pipeline to CDS

The College Lake with Inland Pipeline to CDS component would produce a total of 262 metric tons of CO$_2$e per year with operational and amortized construction emissions. This is below the project-specific threshold of significance of 1,150 metric tons of CO$_2$e per year (see Table 3.3-7) and represents a less-than-significant cumulative impact.

### Murphy Crossing with Recharge Basin

The operation of Murphy Crossing with Recharge Basin would produce a total of 38 metric tons of CO$_2$e per year with operational and amortized construction emissions. This is below the project-specific threshold of significance of 1,150 metric tons of CO$_2$e per year (see Table 3.3-7) and represents a less-than-significant cumulative impact.
significance of 1,150 metric tons of \( \text{CO}_2 \text{e} \) per year (see Table 3.3-7) and represents a less-than-significant cumulative impact.

### 3.3.3.5 Cumulative Impacts of Climate Change on the Project

This section considers the impacts of climate change on the BMP Update components and takes into consideration changes in temperature, precipitation, sea-level rise, and ecosystem effects. Water resources in California and across the US are already being impacted by climate change. The impacts will affect water supplies, water quality, flood management, hydropower production, water demands, ecosystems, and coastal areas, often in unexpected ways. For example, increased temperatures can exacerbate dissolved oxygen deficiencies in water bodies. Temperature increases are already causing more precipitation to fall as rain than as snow, which has impacts on snowpack storage for water supplies. As droughts become more common, water demands for irrigation uses will increase. Climate change also introduces an added level of uncertainty to water resources. Future climate projections are far from certain, and variables like precipitation show large disagreement among various climate models. Impacts to water resources related to the proposed BMP Update are summarized below.

The Cal-Adapt website provides a geographically based climate model interpretation tool that generates predictive changes to various climate variables using different IPCC GHG emissions projections (http://cal-adapt.org/). Specifically, emissions scenario A2, the High Emissions Scenario, represents a scenario in which no effort is taken to alter present practices, resulting in increasing rates of emissions. Emissions scenario B1, the Low Emissions Scenario, represents emission rates associated with global success at curbing emissions as prescribed within international climate treaties. The Cal-Adapt tool was used to project changes in various variables that may affect the BMP Update or success of the BMP project goals. Changes in climate variables are presented for the A2 emissions scenario as a worst-case prediction of potential vulnerabilities. Future analysis will be able to increase climate prediction evaluation for a select set of potential impacts based on this initial investigation. See also Section 3.9, Surface Water, Groundwater, and Water Quality, of this Draft EIR for more information on the impacts of climate change on the region.

#### Temperature

Climate change is expected to affect different areas of the world disproportionately. While some areas are expected to see a dramatic rise in temperatures, other areas may not see as much change. This is also true within the state of California. Some areas, particularly along the coast, may only increase a few degrees. These temperature differences also vary throughout the state depending on the time of year. The projected change in annual average temperatures across Santa Cruz County under a low carbon emissions scenario (B1) is a +3.1°F difference from the baseline time period (1961 to 1990) to end of century period (2070 to 2090). For a high carbon emissions scenario (A2), the projected difference in temperature is +5.4°F. Potential impacts to the implementation of the BMP Update due to an increase in temperature could include the following:

- Increase to agricultural water use to offset higher temperatures and evapotranspiration
- Expansion of invasive species populations
Rainfall

On average, the projections show little change in total annual precipitation in California. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. Santa Cruz County receives approximately 31.5 inches of rainfall each year and it is not anticipated to change drastically for either a low carbon emissions scenario (B1) or high carbon emissions scenario (A2). However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized. Potential impacts to the proposed BMP Update due to changes in precipitation could include the following:

- More frequent and severe droughts
- Changes in hydrograph (driven by rain pattern changes) that could cause increased erosion and habitat loss in creeks and rivers
- Changes in storm intensity that could increase sediment loading in many systems
- Channel stability impacts from higher storm flows causing additional turbidity
- Lower seasonal surface flows leading to higher pollutant concentrations

Sea-level Rise

Global models indicate that California may see up to a 55 inch (140 cm) rise in sea level within this century given expected rise in temperatures around the world. Several of the BMP Update components are located in areas that may be in threat of inundation during an extreme flood event such as the 100-year flood (i.e., at the WWTP, College Lake, Murphy Crossing component sites). These data were developed by scientists from the USGS (Bay Area) and Pacific Institute (Coast). If sea-level rise were to occur, potential impacts to the project due could include the following:

- Sea level rise leading to increased rates of saltwater intrusion
- Sea level rise impacting the current estuary brackish water interface towards more marine systems
- Inundation of coastal wetland systems with increasing frequency, leading to the dieback of tidal marshes and the salinization of fresh and brackish marshes

Ecosystem Effects

According to the U.S. Environmental Protection Agency and California Department of Water Resources, the following ecosystem effects may occur due to climate changes. Habitats for temperature-sensitive fish may be impacted by increased water temperatures. Surface water bodies will also be more susceptible to eutrophication with increased temperatures. Species susceptible to heat waves, droughts, and flooding may be in danger. Invasive species may become even more challenging to manage. Climate change will stress forested areas, making them more susceptible to pests, disease, and changes in species composition. With less frequent but more intense rainfall, wildfires are likely to become more frequent and intense, potentially resulting in changes in vegetative cover. Coastal ecosystems that are sensitive to acidification and changes in salinity balances, sedimentation, and nutrient flows (such as estuaries and coastal wetlands) may be particularly vulnerable. (USEPA/DWR, 2011)
Conclusions

Due to the susceptibility of the Pajaro Valley water supplies to the above climate change impacts, climate change may have adverse effects on the water supply and ecosystem conditions in the Pajaro Valley. The BMP Update would not result in a cumulatively considerable change that would exacerbate these impacts; however, the effectiveness of the components at meeting project objectives may be expected to be compromised at some time in the future. The adaptive management method of responding to actual groundwater conditions by implementing additional projects/programs as needed in the BMP Update area would reduce the adverse conditions that may affect people or the environment due to climate change. There are no known, feasible measures that PVWMA can implement to eliminate the risk of climate change affecting the water supply conditions of the region; however, implementation of the BMP Update will in and of itself help minimize some of these impacts by providing new, more diverse and resilient water supplies for the region.

3.3.4 Impacts and Mitigation Measures Overall Combined BMP Update

As identified in this section, implementation of the overall combined BMP Update would have potentially significant impacts based on exceedences of criteria air pollutant project-specific threshold of significance during the construction of various project components. However, as previously identified, potential impacts would be less than significant or reduced to a less-than-significant level with implementation of the mitigation measures identified in this EIR. When all components of the BMP Update are implemented, the total emissions of CO$_2$e due to the proposed BMP Update will be less than the project-specific threshold of significance of CO$_2$e; therefore, the combined BMP Update would also have a less-than-cumulatively considerable contribution to climate change impacts and thus a less-than-significant cumulative climate change impact. As discussed above, climate change effects on the water supply conditions of the region are anticipated; however, the BMP update is not anticipated to contribute considerably to those effects and would have a less-than-significant cumulative impact on climate change based on the analysis in this section.
Figure 3.3-1

Sensitive Receptors Near BMP Update Components

Date: 10/15/2013
Scale: 1 inch = 2 miles
Project: 2012-48

Legend
- Proposed Pipelines
- Existing and Proposed Diversion and Treatment Sites
- Existing College Lake dam elev. 60.2 ft. (234 ac.)
- Proposed College Lake dam elev. 62.5 ft. (272 ac.)
- Recharge Basins

Sensitive Receptors

Schools

Sensitive Receptors Land Use Designations
- Public and Community Facilities
- Single Family Residential
- Residential Agriculture

Legend
- Proposed Pipelines
- Existing and Proposed Diversion and Treatment Sites
- Existing College Lake dam elev. 60.2 ft. (234 ac.)
- Proposed College Lake dam elev. 62.5 ft. (272 ac.)
- Recharge Basins

Watsonville Slough with Recharge Basins - Diversion Location Area

Proposed College Lake Diversion and Treatment Site

Proposed Murphy Crossing Infiltration and Pump Site

Watsonville Slough with Recharge Basins - Diversion Location Area

Watsonville

San Andreas Rd

Riverside Rd

Green Valley Rd

San Juan Rd

Batista

Aromas

Freedom

Pinto Lake

Kelly Lake

Bell Rd

Riverside Rd

Salinas Rd

Green Valley Rd

San Andreas Rd

San Andews Rd

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

Copyright ©2013 Esri, DeLorme, NAVTEQ
3.4 BIOLOGICAL RESOURCES

3.4.1 ENVIRONMENTAL SETTING

This section describes the existing biological resources within the areas proposed for BMP Update components and the potential impacts upon those resources. Discussion and analysis of impacts are based on available environmental impact reports, studies of regional biological resources, recent field reconnaissance surveys, and discussions with responsible and trustee agencies. Vegetation type mapping was done by combining field observations and mapping based on aerial photographs.

3.4.1.1 Regional Overview

For the assessment of biological resources, the “project area” is defined as the area supporting any proposed BMP Update facility (see Project Description), including areas assumed to be disturbed for construction. A larger area (the “study area”; see below) was investigated where special-status resources may be present near the project area. “Special-status resources” are defined as plant species, or natural communities that have some rarity, endangerment, or protection status conferred by state, federal, or local laws, regulations or policies (see Regulatory Framework section, below). The vegetation resources outlined in the EIR utilizes information contained in the California Department of Fish and Wildlife’s (CDFW) California Natural Diversity Database (CNDDB) (2013) and vegetation typing following the California Natural Community Codes (CaCodes) (California Department of Fish and Wildlife, 2010), which classifies terrestrial natural communities based on the dominant plant species present. A cross-reference table (Table 3.4-1) was created to link the California Wildlife Habitat Relationship (WHR) System used in previous BMP documents to the CNDDB and CaCodes found in the study area.

<table>
<thead>
<tr>
<th>Vegetation Types as per CaCodes</th>
<th>Vegetation and Wildlife Habitats as per WHR Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Coast Arroyo Willow Riparian Forest</td>
<td>Valley Foothill Riparian</td>
</tr>
<tr>
<td>Mixed Riparian Forest</td>
<td>Valley Foothill Riparian</td>
</tr>
<tr>
<td>Coyote Brush Scrub</td>
<td>Coastal Scrub</td>
</tr>
<tr>
<td>Annual Grassland</td>
<td>Annual Grassland</td>
</tr>
<tr>
<td>Coastal Freshwater Marsh</td>
<td>Fresh Emergent Wetland</td>
</tr>
<tr>
<td>Cropland/Agriculture</td>
<td>Cropland/Orchard/Vineyard</td>
</tr>
<tr>
<td>Ruderal</td>
<td>Urban/Developed</td>
</tr>
<tr>
<td>Urban/Developed and Upland Tree Groves</td>
<td>Urban Developed</td>
</tr>
</tbody>
</table>

1 CDFW, 2010; 2 classification used in previous BMP documents

The EIR process has allowed opportunities to solicit information from relevant resource agencies; information was received at the NOP public meeting held in February 2013, a conference call with resource agencies conducted on March 12, 2013, and other individual agency correspondence.
3.4 Biological Resources

Literature Review

Sources used in the preparation of this assessment include information documented in the 2001 Draft EIR, 2002 Final EIR, and the 2003 EIS that analyzed the Revised BMP 2000, environmental permits received for the Coastal Distribution System project and Recycled Water projects, previous field surveys and records from the biological literature, federal and state-listed species for Santa Cruz County (CDFW, 2013), and the CNDDB (2013). CNDDB reports occurrences of special-status species using U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles. The area potentially affected by this project is located on parts of two USGS 7.5-minute quadrangles: Watsonville West and Watsonville East. The CNDDB was consulted for a five-mile envelope surrounding the BMP Update facilities. U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service) soil surveys were reviewed for potential specialty soils (e.g., serpentine substrate, inland marine sands, coastal dunes) that may support special status plant species (SCS, 1980, and 2013). The National Wetlands Inventory maps were reviewed for mapped wetland features in/near the BMP Update facilities. Based on the review of these information sources, a list was compiled of the special-status resources known to occur or have potential to occur within the study area. During the habitat assessment, habitats that potentially contain special-status species were evaluated for the particular species, based on general habitat features and results of previous surveys (2003 EIS).

No additional focused wildlife surveys were conducted in the development of this current PVWMA BMP Update EIR; however, since 2001, Kittleson Environmental Consulting (KEC) and collaborators have conducted numerous fish and wildlife field studies in the Pajaro River Flood Control Channel, Corralitos Creek/Salsipuedes Creek corridor, lower College Lake and the Watsonville Slough System. Wildlife surveys done for Watsonville Sloughs Watershed Conservation & Enhancement Plan (2003), the Land Trust of Santa Cruz County-Watsonville Slough Farm (2009-2013), and the recently completed CALTRANS Salinas Road interchange project have resulted in a substantial increase in data on California red-legged frog and western pond turtle populations and distribution in the lower Pajaro Valley. Results of these recent efforts are included in this EIR.

Vegetation Surveys

The Biotic Resources Group reviewed previous reports and habitat mapping of the project area, reviewed current aerial photos, and conducted reconnaissance-level surveys of the BMP Update facility areas to identify vegetation types. Reconnaissance-level site surveys were conducted on January 24 and March 25, 2013. Areas of natural habitat (classified as nonurban and nonagricultural) were viewed and dominant plant species observed recorded. Any plants belonging to a genus containing a special-status plant known from the region was identified to species. Natural communities previously mapped were field checked to document current conditions. These habitats were recorded as to their CACode vegetation type (see preceding section). In addition, any natural communities listed by CNDDB as “sensitive” were considered a special-status natural community. The location, extent, and condition of these resources were specifically noted and mapped. Table 3.4-2 lists the species, habitat, distribution, and flowering period of special-status plant species known to occur or have potential to occur in the study area. Although no focused plant surveys were conducted for this EIR, the potential for the occurrence of species listed on Table 3.4-2 was assessed based on their habitat requirements and distribution within habitats present in and around the project area.
3.4 Biological Resources

Wetland Assessment

Areas within the study area that might meet the criteria for “wetlands” or “waters of the United States” were mapped as part of the habitat assessment. (See the Regulatory Framework, below, for definitions of these terms.) A preliminary wetland delineation of a larger BMP project study area was prepared in 1999 and submitted to the U.S. Army Corps of Engineers (ACOE) for verification (ESA, 1999b). This wetland delineation was reviewed; however, this wetland delineation did not cover all aspects of the currently proposed BMP Update project components. A wetland delineation of these areas was not conducted as part of this EIR.

Wildlife Surveys

As noted in previous PVWMA BMP EIR documents, most of the BMP Update component areas are thoroughly cultivated and contain limited natural habitat. Despite the disturbed nature of the riparian and wetland habitats in project area, thirty-three special-status wildlife species have been identified as known or potential inhabitants of the project area. Of the special-status species identified, the California red-legged frog (CRF), western pond turtle (WPT), tidewater goby and yellow warbler are present year-round in noteworthy numbers along the Pajaro River corridor (KEC, personal obs. and Timmer and Suddjian, 2011). At the downstream extent of the BMP Update study area, snowy plover regularly nests at the mouth Pajaro River Lagoon.

The waterbodies and wetlands adjacent to, and impacted by, the proposed BMP Update components include College Lake/Casserly Creek, Pajaro River from Murphy Crossing to the ocean, Middle Watsonville Slough and Harkins Slough. KEC has conducted biological studies within the lower Pajaro River Valley and Watsonville Slough system since 2001, including aquatic inventories, nesting bird surveys, California red-legged frog surveys, and western pond turtle trapping studies. Through these efforts, CRF, WPT, steelhead and nesting raptors have all been documented within the BMP Update study area, and within specific BMP Update component project areas. Confirmed sighting locations are mapped on USGS topographic maps and are included in Figures 3.4-1 – 3.4-4. Both yellow warblers and San Francisco dusky-footed wood rats are widely distributed throughout the Pajaro River riparian corridor, and were not mapped. Snowy plover nesting is limited to the Pajaro beach, and also not mapped in this effort. Table 3.4-3 lists the species, habitats, and distribution of special-status wildlife known to occur or to potentially occur in the study area.

A list of special-status wildlife species recorded in the vicinity of the project site was compiled from records in the CNDB (CDFW, 2011), U.S. Fish and Wildlife Service’s (USFWS) Endangered Species List (USFWS, 2011), and the California Native Plant Society’s (CNPS) Rare Plant Inventory (CNPS, 2011). These databases identify how each species is treated under the California Endangered Species Act (CESA) and the federal Endangered Species Act (FESA). All three databases were queried for the Soquel, Watsonville West, Watsonville East, Moss Landing, and Prunedale 7.5-minute USGS topographic quadrangles in order to capture any species that could potentially be present in the project site. The search radius was limited to the five quads listed above due to the relatively small size of the project site. Additionally, sensitive resources in habitats not present at the project site (i.e., sand dunes, maritime chaparral) are abundant in the area, and capturing species in these habitats would not to be relevant to the proposed project. A full list of these species is included in Table 3.4-3. Species were then individually assessed based on their habitat requirements and distribution along with habitats present in and around the project site, and species with a moderate or high potential to occur were assessed in further detail.
### 3.4 Biological Resources

Table 3.4-2 List of Special Status Plant Species Evaluated as to Potential to Occur within the BMP Update Project Area

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Lifeform</th>
<th>Rare Plant Rank</th>
<th>CESA</th>
<th>FESA</th>
<th>Habitat Preference</th>
<th>Closest Known Occurrence</th>
<th>Observed in Project Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Amsinckia lunaris</em></td>
<td>Bent-flowered fiddleneck</td>
<td>annual herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Cismontane woodland, valley and foothill grassland; decomposed shale</td>
<td>SW of Swanton; historic record from Polo Ranch in Scotts Valley</td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Arctostaphylos andersonii</em></td>
<td>Anderson's manzanita</td>
<td>perennial evergreen shrub</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Openings, edges in broadleaved upland forest; chaparral; coniferous forest</td>
<td>Known from Nisene Marks SP and Mt. Madonna area</td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Arctostaphylos hookeri ssp. Hookeri</em></td>
<td>Hooker's manzanita</td>
<td>perennial evergreen shrub</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Sandy, closed-cone coniferous forest; chaparral; cismontane woodland; coastal scrub</td>
<td>Known from Buena Vista Road and Mar Monte areas</td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Arctostaphylos pajaroensis</em></td>
<td>Pajaro manzanita</td>
<td>perennial evergreen shrub</td>
<td>1B.1</td>
<td>None</td>
<td>None</td>
<td>Chaparral (sandy)</td>
<td>Known from 0.75 mile west of Corralitos Lagoon, north of Larkin Valley and northwest of Watsonville and San Miguel Canyon Road Area</td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Arctostaphylos regismontana</em></td>
<td>Kings Mountain manzanita</td>
<td>perennial evergreen shrub</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Granitic or sandstone; broadleaved upland forest; chaparral; coniferous forest</td>
<td>Known along roadside, State Hwy 152, just east of the west entrance of Mt. Madonna County Park</td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Calyptridium parryi var. hesseae</em></td>
<td>Santa Cruz Mountains pussypaws</td>
<td>annual herb</td>
<td>1B.1</td>
<td>None</td>
<td>None</td>
<td>Sandy or gravelly, openings; chaparral; cismontane woodland</td>
<td>Known from Loma Prieta</td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Carex saliniformis</em></td>
<td>Deceiving sedge</td>
<td>perennial rhizomatous herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Mesic; coastal prairie; coastal scrub; meadows and seeps; marshes and swamps (coastal salt)</td>
<td>Historic record from Camp Evers</td>
<td>Suitable habitat within Harkins Slough and Watsonville Slough, yet not observed.</td>
</tr>
<tr>
<td><em>Centromadia parryi ssp. Congdonii</em></td>
<td>Congdon's tarplant</td>
<td>annual herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Valley and foothill grassland (alkaline) Field near Kelly Lake, near Watsonville; Harkins Slough - Ellicott Slough NWR</td>
<td>Suitable habitat in wet depressions in/around College Lake, yet species not observed; long-term agricultural activities reduce potential for occurrence.</td>
<td></td>
</tr>
<tr>
<td><em>Chorizanthe pungens var. hartwegiana</em></td>
<td>Ben Lomond spineflower</td>
<td>annual herb</td>
<td>1B.1</td>
<td>None</td>
<td>FE</td>
<td>Lower montane coniferous forest (maritime ponderosa pine sandhills)</td>
<td>Ben Lomond sandhills, Felton, Bonny Doon</td>
<td>No suitable sandhills habitat in project area; not observed.</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Lifeform</td>
<td>Rare Plant Rank</td>
<td>CESA</td>
<td>FESA</td>
<td>Habitat Preference</td>
<td></td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chorizanthe pungens var. pungens</em></td>
<td>Monterey spineflower</td>
<td>annual herb</td>
<td>1B.2</td>
<td>None</td>
<td>FT</td>
<td>Sandy substrates in coastal scrub, chaparral, grassland&lt;br&gt;Recorded from Soquel Hills, Aptos hills, Pajaro Dunes and Manresa and Sunset State Beaches&lt;br&gt;Sandy substrate observed within Harkins Slough and Watsonville recharge basins areas; not observed; long-term agricultural activities reduce potential for occurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chorizanthe robusta var. hartwegii</em></td>
<td>Scotts Valley spineflower</td>
<td>annual herb</td>
<td>1B.1</td>
<td>None</td>
<td>FE</td>
<td>Meadows and seeps (sandy); valley and foothill grassland (mudstone and Purisima outcrops)&lt;br&gt;Known only from Scotts Valley&lt;br&gt;No suitable habitat in project area; not observed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chorizanthe robusta var. robusta</em></td>
<td>Robust spineflower</td>
<td>annual herb</td>
<td>1B.1</td>
<td>None</td>
<td>FE</td>
<td>Sandy or gravelly; chaparral (maritime); cismontane woodland (openings); coastal dunes; coastal scrub&lt;br&gt;Known from south of entrance to Manresa State Beach; approx. 200 m due south of railroad trestle over San Andreas Rd; along drainage south of Highway 1 about 0.9 mile northeast of Ellicott&lt;br&gt;Sandy substrate observed within Harkins Slough and Watsonville recharge basins areas; yet species not observed; long-term agricultural activities reduce potential for occurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cordylanthus rigidus ssp. Littoralis</em></td>
<td>Seaside bird's-beak</td>
<td>annual herb (hemiparasitic)</td>
<td>1B.1</td>
<td>SE</td>
<td>None</td>
<td>Sandy, often disturbed sites; closed-cone coniferous forest; chaparral (maritime); cismontane woodland; coastal dunes; coastal scrub&lt;br&gt;Known from Monterey Airport, Del Rey Oaks, Seaside&lt;br&gt;Sandy substrate observed within Harkins Slough and Watsonville recharge basins areas; not observed; long-term agricultural activities reduce potential for occurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ericameria fasciculata</em></td>
<td>Eastwood's goldenbush</td>
<td>perennial evergreen shrub</td>
<td>1B.1</td>
<td>None</td>
<td>None</td>
<td>Sandy, openings; closed-cone coniferous forest; chaparral (maritime); coastal dunes; coastal scrub&lt;br&gt;Known from Manzanita County Park, Prunedale&lt;br&gt;Marginal habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; not observed; long-term agricultural activities reduce potential for occurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Erysimum ammophilum</em></td>
<td>Sand-loving wallflower</td>
<td>perennial herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Sandy, openings; chaparral (maritime); coastal dunes; coastal scrub&lt;br&gt;Known from Sunset State Beach, along Shell Road&lt;br&gt;Marginal habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; not observed; long-term agricultural activities reduce potential for occurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Erysimum teretifolium</em></td>
<td>Santa Cruz wallflower</td>
<td>perennial herb</td>
<td>1B.1</td>
<td>SE</td>
<td>FE</td>
<td>Inland marine sands; chaparral; lower montane coniferous forest&lt;br&gt;Known from Felton, Ben Lomond sandhills&lt;br&gt;No suitable habitat in project area; not observed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Fissidens pauperculus</em></td>
<td>Minute pocket moss</td>
<td>moss</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>North Coast coniferous forest (damp coastal soil)&lt;br&gt;Known from Loma Prieta Grade Trail, Forest of Nisene Marks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 3.4-2 List of Special Status Plant Species Evaluated as to Potential to Occur within the BMP Update Project Area

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Lifeform</th>
<th>Rare Plant Rank</th>
<th>CESA</th>
<th>FESA</th>
<th>Habitat Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Fritillaria liliacea</em></td>
<td>Fragrant fritillary</td>
<td>perennial bulbiferous herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>State Park. No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Often serpentinite; cismontane woodland; coastal prairie; coastal scrub; valley and foothill grassland. Known from Rancho San Juan Area, about 2 air miles SE of Prunedale; 1 Mile S of Aromas. No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Gilia tenuiflora ssp. Arenaria</em></td>
<td>Monterey gilia</td>
<td>annual herb</td>
<td>1B.2</td>
<td>ST</td>
<td>FE</td>
<td>Sandy, openings; chaparral (maritime); cismontane woodland; coastal dunes. Known from Sunset Beach State Park, about 1.7 miles S of Sunset Beach Road. No suitable dune habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Hoita strobilina</em></td>
<td>Loma Prieta hoita</td>
<td>perennial herb</td>
<td>1B.1</td>
<td>None</td>
<td>None</td>
<td>Usually serpentinite, mesic; chaparral; cismontane woodland; riparian woodland. Known from Loma Prieta Peak. No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Holocarpha macradenia</em></td>
<td>Santa Cruz tarplant</td>
<td>annual herb</td>
<td>1B.1</td>
<td>SE</td>
<td>FT</td>
<td>Often clay, sandy; coastal prairie; coastal scrub; valley and foothill grassland. Known from west side of East Lake Ave (Highway 152), just SW of Santa Cruz Fairgrounds, College Lake. E of Hwy 1, N of Harkins Slough Rd, S of Hwy 152 (Main St); Watsonville Municipal Airport and just south of Airport, east side of Harkins Slough just south of Harkins Slough Road; west of the Watsonville Airport, on east side of Larkin Valley Road; Spring Hills Golf Course; near the intersection of Pioneers Road and Amesti Road. Marginally suitable habitat in College Lake area, yet long-term agriculture reduces potential for occurrence; not observed.</td>
</tr>
<tr>
<td><em>Horkelia cuneata var. sericea</em></td>
<td>Kellogg's horkelia</td>
<td>perennial herb</td>
<td>1B.1</td>
<td>None</td>
<td>None</td>
<td>Sandy or gravelly, openings; closed-cone coniferous forest; chaparral (maritime); coastal dunes; coastal scrub. Known from NW of Watsonville, about 2 miles west of Watsonville Airport, about 0.7 mile NE of Ellicott reserve. Marginal habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; not observed; long-term agricultural activities reduce potential for occurrence.</td>
</tr>
<tr>
<td><em>Malacothamnus arcuatus</em></td>
<td>Arcuate bush-mallow</td>
<td>perennial evergreen shrub</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Chaparral; cismontane woodland. Known from Loma Prieta Peak. No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Monolopia gracilens</em></td>
<td>Woodland woolythreads</td>
<td>annual herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Serpentine; broadleaved upland forest (openings); chaparral (openings); cismontane woodland; coniferous forest (openings); valley and foothill grassland. Known from east-facing bank just west of summit of Hecker Pass.</td>
</tr>
</tbody>
</table>
### Table 3.4-2 List of Special Status Plant Species Evaluated as to Potential to Occur within the BMP Update Project Area

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Lifeform</th>
<th>Rare Plant Rank</th>
<th>CESA</th>
<th>FESA</th>
<th>Habitat Preference</th>
<th>Closest Known Occurrence</th>
<th>Observed in Project Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pedicularis dudleyi</strong></td>
<td>Dudley’s lousewort</td>
<td>perennial herb</td>
<td>1B.2</td>
<td>SR</td>
<td>None</td>
<td>Chaparral (maritime); cismontane woodland; coniferous forest; valley and foothill grassland Historic record from Apts</td>
<td>1.3 miles below Hecker Pass summit, on Watsonville side No suitable habitat in project area; not observed.</td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><strong>Penstemon rattanii var. kleei</strong></td>
<td>Santa Cruz Mountains beardtongue</td>
<td>perennial herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Chaparral; lower montane coniferous forest; coniferous forest Known from Loma Prieta; ridge at headwaters of Aptos Creek by Sulphur Spring. No suitable habitat in project area; not observed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pentachaeta bellidiflora</strong></td>
<td>White-rayed pentachaeta</td>
<td>annual herb</td>
<td>1B.1</td>
<td>SE</td>
<td>FE</td>
<td>Cismontane woodland; valley and foothill grassland (often serpentine) Historic record from Eagle Rock No suitable habitat in project area; not observed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pinus radiata</strong></td>
<td>Monterey pine</td>
<td>perennial evergreen tree</td>
<td>1B.1</td>
<td>None</td>
<td>None</td>
<td>Closed-cone coniferous forest; cismontane woodland Native stands in Año Nuevo and Monterey Planted specimens in/near project area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Piperia yadonii</strong></td>
<td>Yadon’s rein orchid</td>
<td>perennial herb</td>
<td>1B.1</td>
<td>None</td>
<td>FE</td>
<td>Sandy; coastal bluff scrub; closed-cone coniferous forest; chaparral (maritime) Known from Vierra Canyon, between Canyon and Highway 101, West of Crazy Horse Canyon Road; Manzanita Park, South of Intersection of San Miguel Canyon Road and Castorville Road, North of Long Valley, along South side of Tucker Road, just N of Prunedale, between Prunedale and Berta Canyon; Desmond/Timeview/Avery Road Marginal habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; not observed; long-term agricultural activities reduce potential for occurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plagiobothrys chorisiannus var. chorisiannus</strong></td>
<td>Choris’ popcorn-flower</td>
<td>annual herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Mescic; chaparral; coastal prairie; coastal scrub Known from north end of Watsonville Municipal Airport along Buena Vista Way Marginal habitat in wet depressions near College Lake, yet not observed; long-term agriculture in region reduces potential for occurrence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plagiobothrys diffusus</strong></td>
<td>San Francisco popcorn-flower</td>
<td>annual herb</td>
<td>1B.1</td>
<td>SE</td>
<td>None</td>
<td>Seasonally moist grasslands/prairie Known from Moore Creek Preserve, Parcel along Highway 1, Graham Hill Road, Polo Ranch, Fairway Drive area of Soquel (former Monterey Bay Heights Golf Course), Marginal habitat in wet depression near College Lake, yet not observed; long-term agriculture in region reduces potential for occurrence.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 3.4-2 List of Special Status Plant Species Evaluated as to Potential to Occur within the BMP Update Project Area

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Lifeform</th>
<th>Rare Plant Rank</th>
<th>CESA</th>
<th>FESA</th>
<th>Habitat Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Polygonum hickmanii</em></td>
<td>Scotts Valley polygonum</td>
<td>annual herb</td>
<td>1B.1</td>
<td>SE</td>
<td>FE</td>
<td>Valley and foothill grassland (mudstone and sandstone); Known only from Scotts Valley</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Rosa pinetorum</em></td>
<td>Pine rose</td>
<td>perennial shrub</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Closed-cone coniferous forest; No suitable habitat in project area; not observed.</td>
</tr>
<tr>
<td><em>Trifolium buckwestiorum</em></td>
<td>Santa Cruz clover</td>
<td>annual herb</td>
<td>1B.1</td>
<td>None</td>
<td>None</td>
<td>Gravelly, margins; broadleaved upland forest; cismontane woodland; coastal prairie</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Known from Cusick Meadow in Nisene Marks State Park, Tarpy Flats, South Side of Highway 68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Known From Manzanita (County) Park. Marginal habitat in wet depression near College Lake, yet not observed; long-term agriculture in region reduces potential for occurrence</td>
</tr>
<tr>
<td><em>Trifolium hydrophilum</em></td>
<td>Saline clover</td>
<td>annual herb</td>
<td>1B.2</td>
<td>None</td>
<td>None</td>
<td>Marshes and swamps; valley and foothill grassland (mesic, alkaline); vernal pools</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Known from Soda Lake, just North of Highway 129, Moro Cojo Slough, East of Highway 1; wetlands east of Jetty Road and Highway 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No suitable habitat in project area; not observed.</td>
</tr>
</tbody>
</table>

**STATUS DEFINITIONS**

**Federal**
- FE = Listed as Endangered under the federal Endangered Species Act
- FT = Listed as Threatened under the federal Endangered Species Act
- FC = Candidate for listing under the federal Endangered Species Act

**State**
- SE = Listed as Endangered under the California Endangered Species Act
- ST = Listed as Threatened under the California Endangered Species Act
- SR = Listed as Rare under the California Endangered Species Act
- SC = Candidate for listing under the California Endangered Species Act
- SSC = California Department of Fish and Wildlife Species of Concern
- SFP = California Fully Protected Animal
- WL = California Department of Fish and Wildlife Watch List

**California Native Plant Society**
- List 1B = These plants (predominately endemic) are rare through their range and are currently vulnerable or have a high potential for vulnerability due to limited or threatened habitat, few individuals per population, or a limited number of populations. List 1B plants meet the definitions of Section 1901, Chapter 10 of the CDFW Code.
- List 4 = Limited distribution (CNPS Watch List)
### Table 3.4-3 List of Special Status Wildlife Species Evaluated as to Potential to Occur within the BMP Update Project Area

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Habitat</th>
<th>Occurrence In The Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Red-legged Frog (<em>Rana draytonii</em>)</td>
<td>FT, SSC</td>
<td>Ponds, freshwater marshes, quiet stream pools for breeding or year round. Various mesic habitats during dispersal.</td>
<td>Species known to occur in the project area in the Pajaro River and Watsonville Slough Complex (CNDDB 2012). Adults and subadults have been observed in the mainstem Pajaro River from Pajaro Lagoon to Murphy Crossing, in addition to the upper Corralitos Creek Watershed in Grizzly Flats (KEC, pers. obs). Breeding season surveys conducted by KEC, Biosearch Associates and Bryan Mori Biological Consulting in 2012-2013 have documented CRF breeding activity in Middle Watsonville Slough, lower Harkins Slough, Hanson Slough, and at two ponds at the Land Trust of Santa Cruz - Watsonville Slough Farm. In February and March 2013, CRF were recorded 2000' upstream of the existing Harkins Slough Diversion site in both Watsonville and Harkins Slough. CRF breeding has also been documented within the PVWMA project area in Agricultural ponds on the Springfield Terrace near Salinas Road and in wetland areas and ditches along Tafton Road. Recent surveys indicate greater abundance of CRF on the Monterey County side of the project area, with adults, subadults, metamorphs and abundant egg-masses present in perennial agricultural ditches that drain to Pajaro Lagoon.</td>
</tr>
<tr>
<td>Foothill Yellow-legged Frog (<em>Rana boylii</em>)</td>
<td>SSC</td>
<td>Streams with riffles and cobble substrate in sunny areas.</td>
<td>No CNDDB or museum records for this species in the project area. Species observed in the upper Corralitos Creek watershed in Brown’s Creek (Suddjian, pers. comm.). Perhaps could be present in Corralitos Creek. Pajaro River appears marginal, due to bullfrogs; no observations, despite conducting turtle and CRF surveys.</td>
</tr>
<tr>
<td>California Tiger Salamander (<em>Ambystoma californiense</em>)</td>
<td>FT, SSC</td>
<td>Annual grassland. Breed in vernal pools and other seasonal wetlands.</td>
<td>Ellicott Pond and vicinity, 4 mile W of Watsonville; 1.25 mile N of Moss Landing, near Eldhorn Slough; W of Route 156, .25 S of Barnheisel Road junction Buena Vista Pond and .8 mile NE of Rancho Road</td>
</tr>
<tr>
<td>Santa Cruz Long-toed Salamander (<em>Ambystoma macrodactylum croceum</em>)</td>
<td>FE, SE</td>
<td>Breeding sites known only from S. Santa Cruz and N. Monterey Counties. Aquatic larvae prefer willow areas of ephemeral ponds or pools. Adults spend most of the year underground in mammal burrows.</td>
<td>Breeding has been documented at Buena Vista, Calabasas, Millsap, Ellicott, Green's, Rancho Road, and Seashore Ponds, and Valencia Lagoon in Santa Cruz County and at McClusky Slough, Moro Cojo Slough, and Znudowski State Beach in Monterey County. The species is no longer assumed to be present at Bennett Slough near McClusky due to saline conditions and upland habitat conversion.</td>
</tr>
<tr>
<td>Western Pond Turtle (<em>Actinemys marmorata</em>)</td>
<td>SSC</td>
<td>Inhabits rivers, ponds, reservoirs and lakes. Nests in grasslands and other open vegetation.</td>
<td>Species known to occur in the project area, including the river corridor and Watsonville Slough (CNDDB 2011). Field studies on the Pajaro River conducted from 2009-2012 indicate an estimated population of between 148 and 182 pond turtles in the project area (KEC, pers. comm.). Though not observed to date, this species may occur seasonally at College Lake or in Corralitos and Salsipuedes Creeks during dispersal.</td>
</tr>
<tr>
<td>California Legless Lizard (<em>Amniella pulchra pulchra</em>)</td>
<td>SSC</td>
<td>Inhabits a variety of habitats with sandy or loose loam soils.</td>
<td>Species known to occur in the project area (Hunt 1983; Bury 1985; Jennings and Hayes 1994; CNDDB 2012). Potential habitat in alluvial deposits along the Pajaro River and in dune scrub at the river mouth.</td>
</tr>
<tr>
<td>Black Legless Lizard (<em>Amniella pulchra nigra</em>)</td>
<td>SSC</td>
<td>Inhabits coastal dunes or open habitats with sandy</td>
<td>Species known to occur in the project area (Hunt 1983; Bury 1985; Jennings and Hayes 1994; CNDDB 2012). Potential habitat in dune scrub at the river mouth.</td>
</tr>
</tbody>
</table>
### 3.4 Biological Resources

#### Table 3.4-3 List of Special Status Wildlife Species Evaluated as to Potential to Occur within the BMP Update Project Area

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Habitat</th>
<th>Occurrence In The Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coast Horned Lizard (Phrynosoma blainvillii)</td>
<td>SSC</td>
<td>Inhabits a variety of open habitats with sandy or loose loam soils.</td>
<td>Species thought to be extirpated from the project region (Jennings and Hayes 1994); but one individual observed was observed in July 2012 on the Pajaro levee slope 1.9 miles downstream of Murphy Crossing (KEC, pers. comm.). Potential habitat in alluvial deposits along the Pajaro River and in dune scrub at the river mouth.</td>
</tr>
<tr>
<td>Brandt (Breanta bica)</td>
<td>SSC (wintering)</td>
<td>Offshore and in coastal estuaries with eel-grass beds.</td>
<td><strong>Does not breed in the project region.</strong> Perhaps a rare migrant and winter resident at the river mouth, based on patterns of occurrence (Roberson 2002).</td>
</tr>
<tr>
<td>Redhead (Aythya americana)</td>
<td>SSC</td>
<td>Nests in freshwater marshes with dense emergent vegetation.</td>
<td><strong>Does not nest in the project region.</strong> Occurs along the coast as a rare winter visitor. Has been recorded at the river mouth and at College Lake (Roberson 2002; online data at eBird.org).</td>
</tr>
<tr>
<td>Barrow’s Goldeneye (Bucephala islandica)</td>
<td>SSC</td>
<td>Nests at inland lakes and rivers of forests.</td>
<td><strong>Does not nest in the project region.</strong> Occurs along the coast as a very rare winter visitor. Has been recorded at the river mouth (Roberson 2002).</td>
</tr>
<tr>
<td>Common Loon (Gavia immer)</td>
<td>SSC</td>
<td>Nests in large lakes and coastal waters.</td>
<td><strong>Extirpated as a breeding species in California.</strong> A common winter visitor but rare in summer (Roberson 2002). Individuals have been recorded on the Pajaro River in 1996 and 2007, at College Lake and from the river mouth (eBird.org).</td>
</tr>
<tr>
<td>American White Pelican (Pelecanus erythrorhynchos)</td>
<td>SSC</td>
<td>Nests on the ground at lakes, marshes and bays.</td>
<td><strong>Does not nest in the project region.</strong> Occurs all seasons in the Pajaro Valley as a non-breeding visitor. Flocks of up to 12 have been seen at the river mouth and 160 at College Lake (online data at eBird.org).</td>
</tr>
<tr>
<td>Brown Pelican (Pelecanus occidentalis)</td>
<td>FP</td>
<td>Nests on ground or cliff ledges of coastal islands.</td>
<td><strong>Does not nest in the project region.</strong> A post-breeding visitor along the coast, most abundant in summer and present year-round (Roberson, 2002). Uses the lagoon for foraging, bathing and roosting; may forage upstream for 3.5 miles (Roberson, 2002).</td>
</tr>
<tr>
<td>White-tailed Kite (Elanus leucurus)</td>
<td>FP</td>
<td>Nests in trees of open landscapes.</td>
<td>Individuals have been observed during the nesting season along the Pajaro River (Suddjian 2007; Suddjian 1996), including an individual during this study. All observations have been of aerial transients, but this species may nest in the project area in the future; a nesting pair unsuccessfully attempted breeding in 2012 at nearby Hanson Slough, but the nest was destroyed by raccoons (KEC, pers. obs.). Non-breeding birds have been recorded at College Lake (eBird.org).</td>
</tr>
<tr>
<td>Bald Eagle (Haliaeetus leucocephalus)</td>
<td>FP</td>
<td>Nests along coastal cliffs and in trees at lakes and rivers.</td>
<td>A pair attempted to nest at Pinto Lake during the spring/summer of 2012, but the nest failed in April (D. Suddjian, pers. comm.). In fall 2012 and winter 2013, bald eagles have been regularly observed at College Lake and Harkins Slough. Expected to occur in the project area as a rare, year-round resident.</td>
</tr>
<tr>
<td>Northern Harrier (Circus cyaneus)</td>
<td>SSC</td>
<td>Nests in coastal scrub, tall grasslands and marshes.</td>
<td>Occurs in the project area as a non-breeding visitor in fall and winter (Suddjian et al. 2007). Individuals have been recorded at the river mouth and College Lake (eBird.org).</td>
</tr>
<tr>
<td>Merlin (Falco columbarius)</td>
<td>SSC (wintering)</td>
<td>Along the coast and in open habitats.</td>
<td>Expected as an uncommon winter resident. Most commonly observed at the river mouth and College Lake, but also recorded on the Pajaro River and Corralitos Creek (eBird.org).</td>
</tr>
<tr>
<td>American Peregrine Falcon (Falco peregrinus)</td>
<td>FP</td>
<td>Nests on secluded cliff faces and bluffs, or cliff ledge analogues.</td>
<td><strong>Does not nest in the project region.</strong> Expected to occur uncommonly, but year-round, in the project area. Most commonly observed at College Lake and the river mouth (eBird.org, KEC, pers. obs.).</td>
</tr>
<tr>
<td>Western Snowy Plover (Charadrius nivosus)</td>
<td>FT</td>
<td>Nests on wide, sandy beaches and dunes.</td>
<td>Species is known to nest at the dunes of the Pajaro River mouth (CNDDB, 2012), where up to 400 were observed in late November 2012 (KEC, pers. obs).</td>
</tr>
<tr>
<td>California Least Tern (Sternula antillarum)</td>
<td>FE, SE, FP</td>
<td>On wide, sandy beaches and dunes.</td>
<td><strong>Does not nest in the project region.</strong> An uncommon migrant in spring and fall (Roberson 2002). Individuals have been recorded on the Pajaro River in 1996 and 2007, at College Lake</td>
</tr>
</tbody>
</table>
Table 3.4-3  List of Special Status Wildlife Species Evaluated as to Potential to Occur within the BMP Update Project Area

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<tr>
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<th>Status</th>
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<th>Occurrence In The Project Area</th>
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</thead>
<tbody>
<tr>
<td>Black Tern (Chlidonias niger)</td>
<td>SSC</td>
<td>Nests in marshes on ground or on mats of emergent vegetation.</td>
<td><strong>Does not nest in the project region.</strong> Occurs as a rare spring and summer migrant along the coast. Has been recorded at the Pajaro River mouth (Roberson, 2002) and College Lake (eBird.org).</td>
</tr>
<tr>
<td>Black Skimmer (Rynchops niger)</td>
<td>SSC</td>
<td>Nests on ground on open sandy beaches.</td>
<td><strong>Does not nest in the project region.</strong> Occurs as a rare spring and summer migrant along the coast. Has been recorded at the Pajaro River mouth and Watsonville Slough (Roberson 2002; eBird.org, KEC pers. obs. 2009).</td>
</tr>
<tr>
<td>Long-eared Owl (Asio otus)</td>
<td>SSC</td>
<td>Locally, nests in mixed conifer-hardwood forests, with open fields nearby foraging.</td>
<td><strong>Does not nest in the project area.</strong> A rare migrant or winter visitor in the region (Suddjian 2011). Three observations of long-eared owls have been recorded at College Lake (eBird.org).</td>
</tr>
<tr>
<td>Short-eared Owl (Asio flammeus)</td>
<td>SSC</td>
<td>Nests in tall grasslands, marsh vegetation and open scrub.</td>
<td><strong>Does not nest in the project area.</strong> A rare migrant and winter visitor in the region (Roberson 2002). Two old records from the project area – College Lake and the wastewater treatment plant (eBird.org). Observed recently in Middle Watsonville Slough in September 2012 (KEC pers. obs. 2012).</td>
</tr>
<tr>
<td>Burrowing Owl (Athene cunicularia)</td>
<td>SSC</td>
<td>Open grasslands, fallow fields with sparse vegetation. Uses ground squirrel burrows or burrow analogue.</td>
<td>Occasional non-breeding visitor from October through February (Suddjian et al. 2007). Although not considered a nesting species of the project area, one individual was observed along the Pajaro River levee in January 2007 (KEC, pers. obs.). Elsewhere in the Pajaro Valley, a lone burrowing owl has been observed regularly on conservation lands at Pajaro Valley High School. Also, one old record of two owls at College Lake (eBird.org).</td>
</tr>
<tr>
<td>Black Swift (Cypsiloides niger)</td>
<td>SSC</td>
<td>Nests in caves along coastal cliffs or behind waterfalls inland.</td>
<td><strong>Does not nest in the project region.</strong> Expected to occur as a rare spring and summer migrant in the project area. Species observed along the Pajaro River in 1996 and 2007 during Suddjian et al. surveys (eBird.org).</td>
</tr>
<tr>
<td>Vaux’s Swift (Chaetura vauxi)</td>
<td>SSC</td>
<td>Nests in mature conifer forests in snags and tree hollows.</td>
<td><strong>Does not nest in the project region.</strong> Considered a spring and fall migrant in the project area (Suddjian et al. 2007); individuals observed at College Lake and at the Pajaro River (eBird.org).</td>
</tr>
<tr>
<td>Olive-sided Flycatcher (Contopus cooperi)</td>
<td>SSC</td>
<td>Nests in forest and woodland edges and eucalyptus groves.</td>
<td><strong>Does not nest in the project area.</strong> Closest nest record is ~2 miles from the project area; considered a spring and fall migrant (Suddjian et al. 2007). Nesting habitat may be present at the fairgrounds, where a singing male was observed in 2011 (eBird.org)</td>
</tr>
<tr>
<td>Willow Flycatcher (Empidonax traillii)</td>
<td>SE</td>
<td>Nests largely in willow thickets of riparian and wetland habitats.</td>
<td><strong>Does not nest in the project region.</strong> Considered a rare spring and fall migrant in the project area (Suddjian et al. 2007). Individuals have been recorded along the Pajaro River (Suddjian 1996).</td>
</tr>
<tr>
<td>Loggerhead Shrike (Lanius ludovicianus)</td>
<td>SSC</td>
<td>Nests in scattered shrubs and trees in open habitats.</td>
<td>Considered a rare, non-breeding visitor in the project area (Suddjian et al. 2007), but potential habitat is present at College Lake and along the lower Pajaro River. Individuals have been recorded at the river mouth (Roberson 2002), College Lake (eBird.org), and Middle Watsonville and Harkins Sloughs. (KEC 2005, 2008, respectively)</td>
</tr>
<tr>
<td>Bank Swallow (Riparia riparia)</td>
<td>ST</td>
<td>Nests on steep-faced escarpments and bluffs with friable soils.</td>
<td>Former nesting colony at the Pajaro River mouth has been inactive since 1987 (CNDDB 2012). Individuals have been recorded in migration at College Lake (eBird.org).</td>
</tr>
<tr>
<td>Yellow Warbler (Setophaga petechia)</td>
<td>SSC</td>
<td>Nests in dense willow riparian with overstory of cottonwoods.</td>
<td>A common nesting species and common in spring and fall migration in the project area (Suddjian et al. 2007; Timmer and Suddjian 2011, Mori 2012). Population under significant pressure from predation and cowbird parasitism. Yellow warbler densities appear to be higher upstream of Route 1.</td>
</tr>
</tbody>
</table>
Table 3.4-3 List of Special Status Wildlife Species Evaluated as to Potential to Occur within the BMP Update Project Area

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</thead>
<tbody>
<tr>
<td>Yellow-breasted Chat</td>
<td>SSC</td>
<td>Nests in dense, early-successional riparian habitat.</td>
<td>Considered an occasional nesting species, with one recent record, but largely a rare migrant (Suddjian et al. 2007; Suddjian 1996). Migrants have been observed at College Lake (eBird.org).</td>
</tr>
<tr>
<td>Summer Tanager (Passerina rubra)</td>
<td>SSC</td>
<td>Nests in mature riparian woodlands of southeastern California.</td>
<td>Does not nest in the project region. Expected to occur in the project area as a very rare spring and fall migrant (Suddjian et al. 2007). One record from the Pajaro River in 2010 (eBird.org).</td>
</tr>
<tr>
<td>Savannah Sparrow (Passerculus sandwichensis)</td>
<td>SSC</td>
<td>Nests in coastal marshes and foothill grasslands.</td>
<td>Does not breed in the project area. Fairly common but local in spring and summer and common in winter. Potential nesting habitat present at the lagoon, but no individuals observed during this study. Commonly observed in winter at College Lake, but also recorded at the river mouth (eBird.org).</td>
</tr>
<tr>
<td>Tricolored Blackbird</td>
<td>SSC</td>
<td>Nests in secluded emergent wetlands and dense thicket near wetlands.</td>
<td>Does not nest in the project area. Occurrence in the project area as a non-breeding visitor (Suddjian et al. 2007). Aerial transients observed in Pajaro River Flood Control Channel bird surveys of 1996, 2007 and 2012. Ruderal benches and fallow fields in the project area provide foraging habitat.</td>
</tr>
<tr>
<td>Pallid Bat (Antrozous pallida)</td>
<td>SSC</td>
<td>Roosts in buildings, large tree hollows, rock outcrops and under bridges.</td>
<td>No records of pallid bat are listed in the CNDDDB for the project region. Suitable pallid bat roosting habitat is present along Corralitos Creek and the Pajaro River in large tree hollows, snags and abandoned/lightly used farm buildings.</td>
</tr>
<tr>
<td>Western Red Bat (Lasiurus blossevillii)</td>
<td>SSC</td>
<td>Roosts in the foliage of deciduous trees and shrubs in edge habitats near streams and open fields, and orchards.</td>
<td>No records of western red bat are listed in the CNDDDB for the project region. Suitable red bat roosting habitat may be present along Corralitos Creek and the Pajaro River, especially in the broadleaved deciduous trees.</td>
</tr>
<tr>
<td>San Francisco Dusky-footed Woodrat (Neotoma fuscipes amnectens)</td>
<td>SSC</td>
<td>Found in a variety of wooded habitats with dense understory.</td>
<td>Woodrat houses are present on both sides of the Pajaro River downstream of Highway 1, in the willow-dominated riparian vegetation; dense cape ivy limits visibility of woodrat structures, but the species has been observed throughout. Upstream of Watsonville, woodrat houses are also present along the narrow, vegetated riverbanks, but are limited by intense vegetation management in the riparian zone. No woodrat houses have observed along Corralitos/Salsipuedes Creeks in the project area, but potential habitat is present and the species is known to occur throughout the upper watershed. Species is also present in upper College Lake willow riparian habitat along Paulsen-Whiting Road (KEC pers. obs.).</td>
</tr>
</tbody>
</table>

Key: FE = Federal endangered species; FT = Federal threatened species; SE = State endangered species; ST = State threatened; FP = State fully protected species; SSC = State species of special concern.

Note: Occurrence evaluations are based on previous surveys, interviews with local biologists and literature review. No focused surveys were performed as part of this study.
Regional Setting

Historically, the Pajaro Valley supported a variety of vegetation communities, including extensive riparian forests along waterways, oak savanna intermixed with grasslands in the bottomlands, mixed hardwood forests on hillsides, coastal dunes near the ocean, and coastal scrub on rocky sites (ESA, 2002). Although remnants of these habitats can be seen in isolated patches, much of the valley is now in agriculture.

The Pajaro River Valley is an agricultural area drained by the Pajaro River and two of its major tributaries, Salsipuedes Creek and Corralitos Creek, as well as by Watsonville Slough and Harkins Slough. Portions of these watercourses are bounded by levees to control periodic winter flooding. Smaller drainages also are found in the immediate vicinity of the Pacific Ocean.

The lowest reach of the Pajaro River extends 2.4 miles from the mouth of the river, at the Pajaro Lagoon, to the Thurwacher Bridge. This reach is bounded by levees on the Santa Cruz County side and a mix of levees and coastal bluffs on the Monterey County side and has a U-shaped channel with steep earthen banks. Riparian plant species growing here are tolerant of brackish water conditions. As the river extends upstream to its confluence with Salsipuedes Creek, it has a wider channel, with areas of densely vegetated river terraces and grassy levee slopes. Areas of dense willows and cottonwood trees grow on the terraces.

Salsipuedes Creek enters the Pajaro River in the City of Watsonville. From this creek confluence upstream to Murphy Crossing, the Pajaro River channel morphology and vegetation cover are highly variable, with water flow generally intermittent with the channel bed dry in the summer months. The sediment in the channel bed and banks is unconsolidated coarse sands and gravels and is easily erodible.

Salsipuedes Creek is a perennial stream flowing in a series of high grassy terraces contained by levees. The stream bottom is generally grassy, due to repeated clearing of woody vegetation. There is a sparse tree cover outside the levees.

Corralitos Creek is a major tributary of the Pajaro River. It joins Salsipuedes Creek below College Lake; Salsipuedes Creek then joins the Pajaro River about two miles farther downstream. The watershed for Corralitos Creek extends for a number of miles to the north-northwest of Watsonville. Although Salsipuedes Creek is contained by levees, Corralitos Creek is not, and it supports a band of natural riparian vegetation along much of its length.

To the southwest of Corralitos Creek are the drainages of Watsonville and Harkins Sloughs. The watershed of these two drainages is mostly west of the city of Watsonville and Highway 1. The confluence of Harkins Slough and Watsonville Slough is near San Andreas Road where these two drainages support freshwater marsh and riparian vegetation. From this point, Watsonville Slough flows west in a narrow ditch for about 1.5 miles, and then turns south for about 1.2 miles, where it empties into the Pajaro River Lagoon. The County of Santa Cruz operates a tidal dam/pump structure on Watsonville Slough at Shell Road. The structure was constructed in the 1940s to block saltwater and tidal flows from the middle portion of Watsonville Slough and forms an abrupt hydrologic boundary between saltwater and freshwater, except for winter high tides which can back tidal water up the slough beyond the tidal dam (Swanson Hydrology and Geomorphology, 2001). College Lake is a naturally occurring seasonally wet depression that receives water inflows from the Green Valley, Casserly, and Hughes Creek subwatersheds. Outflows from the lake enter Salsipuedes Creek. In the early 1920s, local farmers reclaimed the area known as College Lake. In 1934, the College Lake Reclamation District (#2049) was formed under California Water Code – Division 15. During the winter months a low flashboard dam causes inundation of approximately 234 acres of the basin. The lake is typically pumped dry mid-March to May 1 to allow...
agricultural use of the lakebed. Emergent wetland vegetation occurs in the seasonally wet depression in the winter/spring; the amount of wetland depends upon the rainfall and the spring-season drawdown. Riparian vegetation occurs along portions of the lake edge and along the contributing tributaries.

**Vegetation Types in the Region**

The BMP Update project area supports eight vegetation types. Table 3.4-1 provides a comparison between the CaCodes used in this document and the WHR units used in previous BMP environmental documents. The distribution of vegetation types at the BMP Update component areas are depicted on Figures 3.4-5 through Figure 3.4-9.

**Central Coast Arroyo Willow Riparian Forest**

Central Coast Arroyo Willow Riparian Forest is found along portions of Harkins Slough and Watsonville Slough, and along the margins and tributaries of College Lake. This broadleaf deciduous forest is dominated by native riparian species including arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*). Associated species include California blackberry (*Rubus ursinus*), nettle (*Urtica sp.*), curly dock (*Rumex crispus*), and coyote brush (*Baccharis pilularis*). Some areas support patches of cattail (*Typha sp.*) and nutsedge (*Cyperus spp.*). Central Coast Arroyo Willow Riparian Forest is described in Holland (1986) and also conforms to the *Salix lasiolepis* Shrubland Alliance in Sawyer et al. (2009).

**Mixed Riparian Forest**

Mixed Riparian Forest occurs along the Pajaro River near the City of Watsonville Wastewater Treatment Plant and extends upstream along the river beyond Murphy Crossing. Mixed Riparian Forest was also observed along portions of College Lake and its tributaries. This broadleaf deciduous forest is dominated by native riparian species including arroyo willow, red willow, black cottonwood (*Populus trichocarpa*), alder (*Alnus sp.*), western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), box elder (*Acer negundo var. californicum*), shining willow (*Salix lucida ssp lasiandra*), and dogwood (*Cornus sp.*). Understory species include poison-oak (*Toxicodendron diversilobum*), mugwort (*Artemisia douglasiana*), California blackberry (*Rubus ursinus*), and stinging nettle (*Urtica sp.*). Stream bed deposits upstream of Murphy Crossing were observed to also support mulefat (*Baccharis salicifolia*), curly dock, and patches of cattail and nutsedge. Invasive, non-native plant species are often found at the edge of the forest, such as adjacent to roadways; non-native species of poison hemlock (*Conium maculatum*), giant reed (*Arundo donax*), and bristle ox-tongue (*Picris echioides*) were observed. Mixed Riparian Forest contains elements of the Central Coast Cottonwood-Sycamore Forest and the North Coast Black Cottonwood Riparian Forest (Holland 1986), as well as the *Populus trichocarpa* Forest Alliance (Sawyer et al. 2009).

**Coyote Brush Scrub**

The project area supports small patches of coyote brush scrub, such as in the Harkins Slough recharge basin. This scrub type is dominated by the native shrub coyote brush (*Baccharis pilularis*); yet other species may also be present such as poison oak and California blackberry. Within the project area, the understory is comprised of non-native grasses, such as wild oat (*Avena spp.*) and ripgut brome (*Bromus diandrus*). It conforms to Northern Coastal Scrub (Holland 1986) and the *Baccharis pilularis* Shrubland Alliance in Sawyer et al. (2009). Coyote brush scrub in/near the recharge basins support sandy substrates which provides marginal habitat for special status
plant species, including: Monterey spineflower (*Chorizanthe pungens* var. *pungens*), robust spineflower (*C. robusta*), seaside birds beak (*Cordylanthus rigidus* ssp. *littoralis*), Eastwood’s goldenbush (*Ericameria fasciculata*), Kellogg’s horkelia (*Horkelia cuneata* var. *sericea*), and Yadon’s rein orchid (*Piperia yadonii*), yet none have been historically recorded from this area. In addition, the long-term cropland agricultural activities in/around this region and periodic recharge basin maintenance reduce the potential for species occurrence.

**Annual Grassland**

This community typically comprises a dense to sparse cover of annual grasses, often associated with numerous species of annual and perennial forbs. These grasslands grow actively during winter and spring and remain dormant during summer and early fall. In the project area, California annual grassland is generally found on fine-textured, clay-rich soils that are not cultivated, such as some slopes abutting College Lake. Plant species typical of the area include annual grasses such as wild oat, farmer’s foxtail (*Hordeum murinum* ssp. *leporinum*), soft chess (*Bromus hordeaceus*), ripgut brome, and foxtail brome (*Bromus rubens*). A number of non-native herbs such as filaree (*Erodium* ssp.), field bindweed (*Convolvulus arvensis*), bur clover (*Medicago polymorpha*), and cut-leaved geranium (*Geranium dissectum*) frequently occur as subdominants. As is typical of soils with high clay content, some areas are strongly dominated by mustards, such as black mustard (*Brassica nigra*) and wild radish (*Raphanus sativus*). Native forbs commonly interspersed among the grasses include lupine species (*Lupinus* ssp.), tarweeds (*Hemizonia* ssp.), California poppy (*Eschscholzia californica*), popcorn flower (*Plagiobothrys* ssp.), owl’s clover (*Orthocarpus* ssp.), common fiddleneck (*Amsinckia intermedia*), and vetch (*Vicia spp.*). Grasslands in the greater Watsonville area provide habitat for special status species, including Santa Cruz tarplant (*Holocarpha macradenia*), Monterey spineflower, Congdon’s tarplant (*Centromadia parryi* ssp. *congdonii*), San Francisco popcorn flower (*Plagiobothrys diffusus*), Choris’ popcorn flower (*Plagiobothrys chorisionus* var. *chorisianus*), Santa Cruz clover (*Trifolium buckwesdiorum*), and Kellogg’s horkelia, yet none have been historically recorded from the BMP Update project area. In addition, the long-term cropland agricultural operations in the project area reduce the potential for species occurrence.

**Coastal Freshwater Marsh**

This vegetation types occurs in portions of Harkins Slough and Watsonville Slough upstream of tidal influence (upstream of the Shell Road tidal dam/pump) and, primarily in areas where a riparian tree canopy is lacking. Fresh emergent wetland vegetation is present in/around the current Harkins Slough and proposed Watsonville Slough diversion pump locations. Dominant species include perennial emergent monocots including narrow-leaved cattail (*Typha angustifolia*), broad-leaved cattail (*Typha latifolia*), bur-reed (*Sparganium eurycarpum*), bulrush (*Schoenoplectus* ssp.), sedge (*Carex* ssp.) watercress (*Nasturtium aquaticum*), nutsedge (*Cyperus* ssp.), and rush (*Juncus* ssp.). In areas with shallow, stagnant water floating pennywort (*Hydrocotyle ranunculoides*), a native aquatic plant, can form dense floating mats. Pennywort can quickly colonize open water areas, propagating itself from its creeping stems and stem fragments. Young willows may also be present along the margins of the freshwater marsh.

In addition, small patches of fresh emergent wetlands are present within a bio swale at the City of Watsonville Wastewater Treatment Plant and in portions of College Lake. Fresh emergent wetland species colonize portions of College Lake during the winter inundation months and may persist within seasonal swales and depressions until the water drawdown occurs and the land is prepared for cropland uses. Wetlands may also occur in agricultural drainage ditches and man-made basins. Dominant species are similar to those found in coastal and
valley freshwater marsh, along with other herbaceous wetland species such as smartweed (*Polygonum* sp.). Coastal and Valley Freshwater Marsh is described in Holland (1986) and also conforms to the *Typha* Herbaceous Alliance in Sawyer et al. (2009).

The seasonally wet depression near College Lake provides marginal habitat for four special status plant species: Choris’s popcorn flower, San Francisco popcorn flower, Congdon’s tarplant, and Santa Cruz clover, yet none have been historically recorded from this area. The long-term cropland agricultural activities in the area reduce the potential for species occurrence.

**Cropland/Agriculture**

The deep alluvial soils along the floodplain of the Pajaro River and tributaries support a variety of row crops as well as orchards and vine/bush crops. The very mild climate in the project area makes it suitable for row crops such as strawberries, bush berries, caneberrys, lettuce, broccoli, cauliflower, and cut flowers. Agricultural habitats are subject to periodic discing, planting, harvesting, and the application of herbicides, pesticides, and fertilizers which prevent the establishment of natural plant species and communities. A number of weedy plant species, including bristly ox-tongue and curly dock, are associated with cultivated lands; many of these are non-native species, and all are adapted to open, bare ground, rapid maturity, and high seed production. No special status plant species would be expected in the active cropland agricultural areas.

**Ruderal**

Ruderal vegetation is present in highly disturbed areas, particularly within areas subject to frequent disturbance, such as along roadsides or areas adjacent to croplands. Ruderal vegetation is dominated by non-native grasses and forbs adapted to disturbance, including wild oats (*Avena* spp.), ripgut brome (*Bromus diandrus*), Italian ryegrass (*Lolium multiflorum*), soft chess (*Bromus hordeaceus*), wild radish (*Raphanus sativus*), and poison hemlock (*Conium maculatum*). Ruderal vegetation does not conform to any recognized natural vegetation classification system, but contains elements of non-native grassland (Holland 1986) and the wild oats grasslands/upland mustard vegetation types (Sawyer et al. 2009). No special status plant species would typically be found in weedy, ruderal areas; although Santa Cruz tarplant and Congdon’s tarplant can grow in previously disturbed areas.

**Urban/Developed and Upland Tree Groves**

Urban development is scattered in the project area. These areas consist of homes, buildings associated with farming, and towns, of which Watsonville is the largest. Urban and developed areas tend to be landscaped with non-native ornamental plant species, including groves of trees. Stands of upland landscape trees, including eucalyptus (*Eucalyptus* spp.), Monterey cypress (*Cupressus macrocarpa*) and coast live oak (*Quercus agrifolia*) occur within the project area, such as along the perimeter of College Lake. No special status plant species occur in these areas, except for planted specimens of Monterey pine (*Pinus radiata*), whose native stands are of special status.

**Aquatic Habitats and Wildlife Resources**

The Pajaro River Valley is a primarily agricultural area drained by the Pajaro River and two of its major tributaries, Salsipuedes Creek and Corralitos Creek, as well as by the Watsonville Slough complex. Portions of
Salsipuedes Creek, the Pajaro River and lower Watsonville Slough are bounded by levees to control periodic winter flooding. College Lake is a formerly natural lake at the base of the Salsipuedes/Casserly subwatershed that is presently drained in summer by the College Lake Reclamation District to provide for intensive row crop agriculture. A concrete dam and pump system at the outlet to the lake allows the lake to be drained, with water pumped over the dam, in early to late spring. Large portions of the formerly seasonal wetlands Watsonville Slough wetland complex were historically farmed in summer, although wetland restoration efforts and changes in stormwater runoff over the past two decades have resulted in perennial persistent ponding.

Corralitos Creek is the largest tributary of the Pajaro River in the BMP Update project area. It joins Salsipuedes Creek below Casserly Creek and College Lake. Salsipuedes Creek flows to the Pajaro River about two miles farther downstream. Although Salsipuedes Creek is contained by levees, Lower Corralitos Creek does not have levees, but is tightly bound by agricultural and residential uses. Despite this encroachment, it supports a band of natural sycamore- cottonwood riparian vegetation along much of its length.

To the southwest of Corralitos Creek are the drainages of Watsonville and Harkins Sloughs. The watershed of these two drainages include other named sloughs, including Struve Slough, West Branch Struve Slough and Hanson Slough. The confluence of Harkins Slough and Watsonville Slough is near San Andreas Road. From this point, Watsonville Slough flows west for about 1.5 miles, then turns south for about 1.2 miles, where it empties into the Pajaro Lagoon.

The aquatic, riparian and wetland habitats in the project area support a diverse assemblage of bird species, in addition to listed steelhead, CRF, and WPT. College Lake and the Watsonville Slough complex are renowned for their wide range of wading bird, waterfowl and raptor species, and serve as important migratory stop over locations. The Pajaro River riparian corridor below Murphy Crossing, though greatly impacted by post 1995 flood-event emergency clearing, has been shown to continue to support regular yellow warbler and raptor nesting.

### Avian Resources

#### College Lake Area Avian Resources

As a managed, seasonal surface water body, College Lake provides a range of habitat conditions that reflect the bird use observed. No formal, systematic bird surveys have been conducted for College Lake, but as a commonly-known birding hotspot for the region, abundant data is available through the Santa Cruz Bird Club and Ebird.com. Based on available, cumulative data, 213 bird species have been documented in the College Lake area (Ebird, 2013). Despite this broad range of species, little active waterfowl and wading bird nesting activity has been documented, possibly due to the level of disturbance caused by annual late spring draining and the onset of farming activities.¹

Because the seasonally flooded bottomlands lands are largely held privately, public access is limited, and the available data may not comprehensively represent specific areas of bird use over the years of record. The data reflect the conversion from deep winter ponding to willow lacustrine habitat to mudflat as the lake bottom is pumped dry for active farming. This conversion appears to have resulted in important wintering and spring migration habitats for waterfowl and wading birds. A paucity of data in June and July corresponds with the

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¹ RCD College Lake Hydrologic Study will evaluate existing and proposed avian conditions; specifically, bird biologist David Suddjian is on the team.
typical onset of active row crop agriculture, following pump out of the basin and its drainage channels. A histogram of the available Ebird survey data for College Lake is included in Appendix C.

Downstream of the existing inundation area, in the College Lake outflow channel and pump station reach, 2012 nesting season surveys were conducted for the USACE Flood Control Project EIR/EIS by Mori and KEC for the County of Santa Cruz. Twenty-eight bird species, 21 residents and seven migrants, were recorded at that study site, which included the potential College Lake Project diversion and pump station construction envelopes.

**Pajaro River and Corralitos Creek/Salsipuedes Creek Avian Resources**

The bird community of the Lower Pajaro River was investigated by KEC in May and June of 2007, 2010, and 2012 to document the current status of populations using the project area during the breeding season. The purpose of the ongoing County bird investigations is to assist in the assessment of potential impacts that may result from the Pajaro River Levee Bench Sediment Excavation Project and provide current field data to the USACE Pajaro River Flood Control Project environmental impact report process. Although the surveys were done for Pajaro River and Corralitos/Salsipuedes Creek flood control management projects, the data and observations are applicable to BMP Update efforts.

A total of 64 bird species were observed during the 2007, 2010, 2012 study periods on the Pajaro River downstream of Murphy Crossing. The special-status species observed during the 2007, 2010, 2012 study periods within the boundaries of the Pajaro River and Corralitos Creek/Salsipuedes Creek study area were limited to yellow warbler (Dendroica petechia) and white-tailed kite (Elanus leucurus). Yellow warbler was confirmed as a nesting species throughout the willow riparian habitats in the lower Pajaro during general and plot surveys. White tailed kite was regularly observed, but no nesting was confirmed on the Pajaro. Swainson’s thrush, a proposed California Species of Special Concern, was observed to be a fairly common nesting species.

**Watsonville Slough System Avian Resources**

The Watsonville Slough system includes some of the most important bird habitat areas in the Monterey Bay area and the most extensive wetland habitat areas in Santa Cruz County. The overall value of the slough system is highlighted by the great variety of bird species (279) and varied wetlands and open water habitats that support significant numbers of migratory and wintering waterbirds. Numbers of winter waterfowl in the sloughs are usually second in the county only to those using College Lake, and in some years the sloughs rank first in numbers of ducks. (Suddjian, 2003)

Of the 279 species identified in 2003 Watsonville Sloughs Watershed Resource Conservation and Enhancement Plan, 37 species occur primarily at the Pajaro River mouth and lowermost tidally-influenced reach of the sloughs. These are waterbirds associated with ocean and littoral habitats, such as snowy plover, brown pelican, sanderling and elegant tern. In addition, 94 species are considered rarities, and occur fewer than five times a year, and 171 species are considered regular visitors or breeding species. (Suddjian, 2003)

Like College Lake, the seasonal draw down and associated exposure of low-gradient mudflats and flooded fields attracts spring migrant shorebirds in large numbers. Wintering waterfowl, herons, take advantage of the mosaic of open water, emergent marsh, upland grassland, and seasonal mudflats. Unlike College Lake, the freshwater wetland and open water habitats of the sloughs support significant breeding populations for pie-billed grebe, American bittern, green heron, gadwall, mallard, cinnamon teal, ruddy duck, black-necked stilt, common yellowthroat, red-winged blackbird and great-tailed grackle. (Suddjian, 2003)
Changes in land use and hydrologic conditions within the Watsonville Slough system in recent decades are being documented and evaluated in the Watsonville Slough Hydrologic Study, under the direction of the County of Santa Cruz Resource Conservation District. This study is underway and is planned to be completed by the fall of 2013. Hydrologic and hydraulic flow models of the lower slough system will be developed as a component of the study. These tools will enable a more complete understanding of flow regimes in the slough, and their relationship to avian use.

**Yellow Warbler**

The yellow warbler is a common breeding bird in the Pajaro River flood control channel, with confirmed breeding in 2007 and 2010 bird surveys in the dense willow riparian habitat below the benches throughout the project area. Currently considered a Bird Species of Special Concern (breeding), priority 2, the yellow warbler has been included on both prior special concern lists (Remsen 1978, 2nd priority; CDFW 1992). This species breeds from April to late July and was a common nester in the willow riparian habitats adjacent to the proposed bench excavation sites. Despite many local declines, Yellow Warblers currently occupy much of their former breeding range, except in the Central Valley, where they are close to extirpation. Broad-scale significant declines have been documented for the U.S. Pacific Northwest region (1979–1999, Ballard et al. 2003) and declines approaching significance in California (1968–2004, Sauer et al. 2005). Both local abundance and long-term trends, however, vary greatly by region.

Yellow warblers generally occupy riparian vegetation in close proximity to water along streams and in wet meadows (Lowther et al. 1999). Throughout, they are found in willows (*Salix* spp.) and cottonwoods (*Populus* spp.). Based on the location of, and limit to, riparian habitat impacts, yellow warbler is not expected to be adversely affected by the proposed BMP Update components.

**Western Snowy Plover**

The western snowy plover (*Charadrius nivosus*) is listed as threatened under the FESA as a result of the loss of nesting habitat to urban development, nest predation, and human disturbance. The USFWS designated critical habitat for this species on December 7, 1999, and again on September 29, 2005. In 2012, USFWS revised the critical habitat maps yet again. Under the most recent revision, approximately 24,527 acres of critical habitat for the Pacific Coast distinct population segment of the western snowy plover in Washington, Oregon, and California, fall within the boundaries of the critical habitat designation. Designated critical habitat includes unique and increasingly rare coastal beach-dune ecosystem habitat along the Pacific Coast essential to the survival and recovery of the plover. The final designation represents a reduction from the 28,379 acres initially proposed by the Service in 2011, but an increase from the 12,150 acres designated in 2005. A total of 47 units have been designated in California, nine in Oregon, and four in Washington. The USFWS designated the beaches (Sunset State Beach and Zmudowski State Beach) on either side of the mouth of the Pajaro River as critical habitat (64 Federal Register 68507).

The Pacific coast population of the snowy plover breeds primarily on coastal beaches from southern Washington to southern Baja California. Sand spits, dune-backed beaches, unvegetated beach strands, open areas around estuaries, and beaches at river mouths are preferred nesting habitats. The breeding season is from March through late September. The incubation period is typically 24 days and the chicks fledge within 30 days. After loss of clutch or brood or successful hatching, plovers may re-nest in the same area or move up to several hundred miles to another site. The snowy plovers are opportunistic feeders and prey on a variety of common food items such as...
aquatic insects, crustaceans and invertebrates. The Pajaro River Lagoon, surrounding beaches and flooded agricultural fields provide favorable foraging and nesting habitat for the Western snowy plover. This species has not been recorded in the project area.

**Least Bell’s Vireo**

Least Bell’s vireo (*Vireo bellii pusillus*) is listed as endangered under both the CESA and FESAs. The population and geographic range of the species has decreased due to loss of riparian habitat, habitat fragmentation and nest parasitism by brown-headed cowbirds (*Molothrus ater*).

Least Bell’s vireo preferred habitat is a well-developed riparian canopy with a dense shrub understory. Least Bell’s vireos arrive at their breeding habitat in mid to late March and typically leave by the end of September. Breeding occurs April through August. Foraging typically occurs in habitats that are close to nesting sites in riparian habitat and adjacent chaparral, scrub and oak woodlands. The Pajaro River is not within the breeding range of least Bell’s vireos. The species was not observed in KEC's 2007 or 2010 bird surveys. Due to a paucity of mature riparian habitat, potential for Least Bell's vireo in the project area is limited.

**California Red-legged Frog**

The CRF (*Rana draytonii*) is listed as threatened under the federal Endangered Species Act. CRF are present in the Pajaro River in the project area. CRF have been observed at 19 distinct locations in the Pajaro River downstream of Murphy Crossing since 2009 (KEC, personal observations). They are also known from Soda Lake and Chittenden Pass upstream of the project site, the Watsonville Slough system to the north and the Elkhorn Slough system to the south.

Eight known breeding locations are within the general BMP Update project area, with four on the Monterey County side at the Salinas Road pond complex and along the Trafton Road ditch system and two on the Santa Cruz County side at ponds at the Land Trust of Santa Cruz County Watsonville Slough Farm (KEC, personal observations). The 2013 CRF breeding season surveys conducted in Middle Watsonville Slough, Harkins Slough and the Land Trust of Watsonville Slough Farms property ponds revealed nighttime CRF breeding activity in Middle Watsonville Slough and lower Harkins Slough within 2,000 feet of the existing Harkins Slough pump station. Ongoing surveys will include aquatic sampling in summer 2013, which will provide the PVWMA additional data and information on CRF breeding success, and the species distribution and population dynamics. **Figures 3.4-3 and 3.4-4** illustrate pertinent project-area CRF observations.

Bullfrogs are locally abundant within the Pajaro River and Corralitos Creek/Salsipuedes Creek corridor in the project area and often appear nearby California red-legged frogs on the Pajaro River Mainstem. Bullfrogs were observed in upper College Lake, Salsipuedes Creek, Green Valley Creek and ditchlines along Paulsen-Whiting Road in 2013. California red-legged frogs have not been observed in College Lake, or the Corralitos Creek/Salsipuedes Creek corridor, nor have they been observed in previous annual daytime surveys conducted in those areas by KEC for flood control maintenance from 2001 to 2011.

**Western Pond Turtle**

Western pond turtle (*Actinemys marmorata*) (WPT) occurs in the Pacific Coast region, of North America from Washington State to Baja California, west of the Cascade Mountains and Sierra Nevada Range (Bury 1970; Nussbaum et al. 1983; Iverson 1986; Stebbins 2003). The major portion of the distribution is in California...
3.4 Biological Resources

(Warthurn et al. 2002). It is the only native turtle in California. Recent genetic studies indicate the presence of four groups or clades within the species; although historically there were two recognized subspecies. (Bury and Germano, 2008) The species appears to be declining in abundance in the northernmost and southernmost portion of its range; but not in the core of its range from central California to southern Oregon. The primary threats are loss and alteration of both aquatic and terrestrial habitats. These losses fragment remaining populations and, perhaps, magnify the effects of introduced species through predation, competition, and epidemic diseases (Bury and Germano, 2008).

WPT inhabits the Pajaro River throughout the project area. They are commonly observed during warm, sunny days basking on submerged wood and mud banks from Thurwacher Bridge upstream to Murphy Crossing. From 2009-2013, KEC and Biosearch Associates have collected data from a mark-recapture study to estimate a population of approximately 150 WPT at over 20 trap locations within the Pajaro River study area below Murphy Crossing to the Pajaro Lagoon. Although the population appears to be skewed towards adults with a male-biased sex ratio, enough juveniles and subadults have been observed to confirm that a reproducing population inhabits the lower Pajaro River watershed. Potential and confirmed nesting habitat is present in the non-native grassland and weedy, ruderal habitat near the river and within the channelized floodplain. All age classes, from hatchling to adult, have been documented. Currently, KEC and Biosearch are conducting a radio-telemetry study of the Pajaro River turtle population. That study will continue through 2013.

Elsewhere in the general BMP Update area, individual WPTs have been observed in Struve Slough, Watsonville Slough, Hanson Slough and at the Salinas Road Pond. No WPT have been observed by KEC in or downstream of College Lake, and in the Corralitos/Salsipuedes Creek corridor within the BMP Update area. While previously known to occur in a pond near Atkinson Lane in Watsonville, that population appears to have been lost (Mori, Biosearch Associates, pers. comm., May 2013). Despite the paucity of WPT data in the Interlaken area water bodies, WPT may be expected to occur throughout the BMP Update area riparian/wetland system. Figure 3.4-2 illustrates WPT sightings at existing trap sites in the Pajaro River and in nearby waters.

San Francisco dusky-footed Woodrat

San Francisco dusky-footed woodrat (Neotoma fuscipes annectens) is a common rodent species in riparian woodlands, oak woodland and oak scrub habitats in the Monterey Bay region, where it build large, long lasting house structures from sticks and woody material. It is currently listed as a California species of special concern and is present in low numbers throughout the project area riparian corridor. Arboreal woodrat nests have been observed in the bench excavation areas within the willow-covered banks on the Santa Cruz County side.

Fishery Resources

Pajaro River and the Eastern Watershed Fisheries

The Pajaro River provides habitat for at least nine documented fish species. The Pajaro River watershed is one of the major components of the South-central California Coast Evolutionarily Significant Unit (ESU) of steelhead (Oncorhynchus mykiss, or O. mykiss) and includes the entire watershed of the Pajaro River, as defined by National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) (Federal Register, 1997). Coastal steelhead are anadromous fish, spawning in coastal ocean tributaries but migrating to ocean waters as one- to two-year-old juveniles (smolts). Most of their adult life is spent in ocean waters, but they
return to coastal tributaries to spawn. Steelhead in this ESU have been listed as a federal threatened species and a California species of special concern.

In South-Central California, near the southern limit of the range for anadromous *O. mykiss* in North America, it is estimated that annual runs have declined dramatically from an estimated 25,000 returning adults historically, to currently less than 500 returning adults (Williams et al. 2011, Good et al. 2005, Helmbrecht and Boughton 2005, Boughton and Fish 2003) Studies from the 1960s report steelhead runs in the Pajaro River ranging from 1,000 to 2,000 individuals (Federal Register, 1997). Current runs are undoubtedly smaller due to habitat quality declines stemming from water quality changes in the wake of land development along the watershed and loss of vegetation and channelization along riparian corridors. Habitat was also affected by the 1987-1991 drought.

The Pajaro River serves as a migration pathway for adult steelhead migrating upriver to spawning and nursery habitat in the upper watershed, and for steelhead smolts migrating downriver from that habitat to the ocean. Adult steelhead enter the river from late December through April, with spawning taking place from January through April. Most smolts migrate to the Pacific Ocean in April and May (HRG, 1997).

In the upper watershed, Pescadero, Uvas, Llagas, and Pacheco creeks and their tributaries provide potential spawning and rearing habitat. Pescadero and Uvas creeks provide access, spawning, and rearing in all but extreme drought years. Llagas and Pacheco creeks tend to be drier, and use of those streams is less frequent and less extensive.

During periods of lower flows beginning in late spring, the water temperatures of local streams increase. Part of this increase is due to the seasonal increase in day length and air temperatures, and part is due to the reduced temperature buffering provided by the reduced streamflows. Smolts can suffer from heat stress at higher temperatures; however, since smolts travel mostly at night when water temperatures are cooler, heat stress probably is minor for short migrations. Migrating smolts travel relatively quickly; therefore, temperature probably is not a problem at times when the flows are sufficient to allow easy passage through riffles. No steelhead spawning or rearing is likely to naturally occur in the Pajaro River downstream of Murphy Crossing because of the lack of spawning gravels and low and warm summer streamflows.

Since 2007, NOAA Fisheries, CDFW, and volunteers from the local steelhead advocacy group Coastal Habitat Education Environmental Restoration (CHEER) have rescued steelhead from drying reaches in lower Uvas Creek and transported them for release in the Pajaro River at Rogge Lane and Murphy Crossing. Data available from the 2007-2011 rescue efforts indicate a total of 1,288 steelhead were relocated to the BMP project area, with 64 adult fish released during those years (Casagrande, 2013, pers. comm.). Notably in 2008, 42 adult steelhead were released in the CHEER efforts, and in May/June of that year, KEC observed two steelhead spawning redds and young of the year approximately 0.5 miles upstream of the Highway 1 Bridge.

Fresh/brackish water fish species present in the Pajaro River downstream of Murphy Crossing and in Salsipuedes Creek include Sacramento sucker (*Catostomus occidentalis*), Sacramento squawfish (*Ptychocheilus grandis*), hitch (*Lavinia exilicauda*), Sacramento blackfish (*Orthodon microlepidotus*), prickly sculpin (*Cottus asper*), golden shiner (*Notemigonus crysoleucas*) and threespine stickleback (*Gasterosteus aculeatus*). None of these species require April to June streamflows for passage, spawning, or rearing in excess of those required for steelhead smolt passage.

Non-native striped bass (*Morone saxatilis*) are present in the lagoon and the main stem Pajaro River in South Santa Clara Valley (Casagrande and Smith, pers. comm.) Striped bass have also been found in drawdown pools
near Murphy Crossing, indicating migration through the project area. The spawning period for striped bass is similar to steelhead and usually extends from April to mid-June.

The Pacific lamprey (*Lampetra tridentata*) is an anadromous fish that, like the steelhead, migrates into freshwater to spawn. Lamprey juveniles later migrate downstream to the ocean to mature. Adult migration times for lamprey tend to occur somewhat later than the peak of the steelhead adult migration (March and April). However, lamprey adults are able to negotiate relatively willow riffles. Juvenile lampreys migrate to the ocean with peak winter flows, and rarely suffer migration blockage.

Although once present in this area, the coho salmon (*O. kisutch*), a federally and state-listed anadromous species north of the project area, has not been present in the Pajaro River system since at least the late 1960s. Occasional sightings in the 1960s may have been due to fish released from a hatchery in the San Lorenzo River to the north that inadvertently strayed into the Pajaro River as adults (HRG, 1997). Scarcity of suitable cool, low-gradient rearing habitat and lack of regular access preclude sustaining runs of coho in the watershed.

**Corralitos/Salsipuedes Creek Sub-Watershed Fisheries**

Steelhead and Pacific lamprey regularly use the watershed of Corralitos Creek, which joins Salsipuedes Creek downstream of College Lake at Highway 152. Diversion dams on Corralitos and Browns creeks and wells downstream of their confluence (operated by the City of Watsonville) affect spring and summer streamflows which limits fish passage in lower Corralitos Creek and in Salsipuedes Creek.

In Santa Cruz County, steelhead regularly spawn and rear in the Corralitos Creek watershed in Corralitos Creek, Shingle Mill Creek, Browns Creek, and Ramsey Creek. The Casserly Creek watershed, which includes College Lake and Green Valley Creek, also supports steelhead and resident rainbow trout. From the confluence of the College Lake outflow channel and lower Corralitos Creek, the levied channel reach is referred to as Salsipuedes Creek and is considered a migration corridor, due to high water temperatures, low flows and dry reaches upstream of Highway 152 in Corralitos Creek, and periodic fluctuations in flows resulting from College Lake drainage pumping.

Corralitos Creek has long been recognized as a regionally important steelhead resource, and has recently been the beneficiary of several significant steelhead enhancement projects. Since 2008, four steelhead passage improvement projects have been completed by the County of Santa Cruz and Resource Conservation District of Santa Cruz County at partial-barrier culverts on Corralitos Creek and its tributary Shingle Mill Creek. In addition, in 2008 the City of Watsonville rebuilt the fish ladder and screens to NOAA Fisheries criteria at their Corralitos Creek diversion.

Inflows to College Lake come primarily from Casserly Creek and from Green Valley Creek, which enters Casserly Creek immediately upstream of College Lake. However, smaller tributaries and ground water also provide inflow to the lake. During early season storm peaks like those in December 2012, Corralitos Creek can also provide substantial inflow to the lake basin by pushing water up the College Lake outlet channel, before the lake fills and spills.

Green Valley Creek has two partial barriers to adult steelhead upstream migration, but more importantly, has low spring stream flows in its lower reaches by spring of even wet years. Poor smolt outmigration conditions appear to prevent maintenance of a steelhead run in Green Valley Creek. A healthy resident rainbow trout, rather than steelhead, population is apparently present in Green Valley Creek, based upon lack of smolt colors or smolt-sized fish in spring, presence of abundant smolt-sized fish in late spring, abundance of resident adults...
in the population, and distinctive genetic structure compared to Corralitos Creek (Sundermeyer, 1999; Smith, 2007). Casserly Creek and two of its tributaries, Banks Creek and Gaffney Creek, do support a steelhead population, and flows sufficient for smolt migration to the lake are present in Casserly Creek through May in most years (Smith 2007).

While College Lake and its tributary streams, Casserly and Green Valley Creeks, support steelhead, the size and condition of the steelhead run is less studied, and consequently less understood. It has been unclear whether College Lake simply constitutes a migratory corridor for adult and smolt steelhead, or whether juvenile steelhead are actually utilizing the lake as seasonal rearing habitat in late winter/early spring prior to outmigration in late spring. A steelhead smolt outmigration study was conducted in the spring of 2011 at the outlet of College Lake in order to gather pertinent data on relative population size, seasonal use, and general condition of the steelhead population in this subbasin. (Podlech, 2011)

The 2011 smolt outmigration study was compromised by overwhelming high flows and tampering of the trap, and it must be considered limited and therefore inconclusive. Scale samples, however, were collected and recent growth rates of approximately 130% were evident from the scales of two fish. Upper watershed streams are typically not sufficiently productive to support such rapid growth rates in winter. Based on the limited data available from this study, it appears very likely that at least some juvenile steelhead from the upper watershed spend time rearing in College Lake during the winter and early spring prior to migrating out to the ocean. (Podlech, 2011)

College Lake is quite turbid in winter and spring, because much of its stored water is turbid storm runoff and because the bare, fine-grained soils of the willow lakebed are easily stirred up by wind and wave action. The College Lake Reclamation District has historically pumped the lake dry in late spring to allow agricultural use of the lakebed. The water stored in College Lake for flood control in winter is pumped into Salsipuedes Creek in spring.

If left full, rather than annually drained, the lowland lake would be too warm to allow summer rearing by steelhead, especially in the presence of warm water fishes. Therefore, draining it in summer does not affect summer steelhead rearing habitat. Draining the lake down to residual canals also means that when the lake is reflooded by winter runoff, resident fishes, including any predatory species that might feed on juvenile steelhead, such as largemouth bass, crappie, catfish or Sacramento pikeminnow, would be very scarce in winter and spring. The lake presently appears to provide very good feeding habitat for (mostly two year old) steelhead smolts migrating downstream in spring. In addition, in Casserly Creek, as in most small steelhead streams, 70-90% of young of year (YOY) steelhead disappear over winter with large winter storms. In most systems, these fish perish. However, it is possible that YOY fish rinsed out of the upper watershed can find refuge in College Lake against winter storms and grow to smolt size over the winter; this may add substantially (500% or more) to the number of steelhead smolts produced from the watershed. (Smith, 2010)

To drain the lake, the Reclamation District uses a board (i.e., flashboard) that is inserted in the notch at the top of the concrete outlet dam, and water is pumped from the lake over the dam. This blockage of smolt outmigration has traditionally started in April (or earlier) through May, during the peak of the normal smolt migration period. (Smith, 2010)

The maintenance of a steelhead run in Casserly Creek despite the regular truncation of the normal smolt outmigration period suggests that many smolts may migrate to the lake for winter and spring rearing and migrate downstream from the lake early or migrate very early out of the upper watershed and through the lake.
Delaying pumping until mid-May would prevent impacts to smolt outmigration, but would also eliminate up to 6 or more weeks of agricultural production (Smith, 2010)

**Pajaro River Lagoon Fisheries**

Pajaro River and Salsipuedes Creek streamflows can provide for steelhead passage and also supply freshwater to the Pajaro River estuary. In spring, the freshwater inflow provides a surface wedge of lighter freshwater on top of the salt water in the Pajaro River estuary. This freshwater wedge allows steelhead smolts to move up and down in the water column to aid in gradually adjusting to seawater. When flows are sufficient for passage to the estuary, the inflows are probably adequate to provide a good freshwater to saltwater transition zone. Migrating smolts may spend several weeks feeding in the estuary and adjusting to seawater. This transition may not be required, as many central California streams lack good transitional estuaries while sustaining steelhead populations. However, the transition may improve survival of smolts, especially smaller smolts, upon their entering the ocean.

A sandbar forms across the mouth of the Pajaro River in most years. Bar formation is primarily a function of beach-building processes produced by low-energy summer waves. Spring and early summer freshwater inflows are not an important factor in bar formation in a large estuary like that of the Pajaro River (Smith, 1990). Tidal flux through the mouth is substantially higher than freshwater inflows; even after the sandbar forms, seepage through the large sandbar probably is sufficient to prevent overtopping and sandbar breaching.

After sandbar formation, freshwater inflows lower the salinity of the summer lagoon and may be important to lagoon ecology (Smith, 1990). However, at the Pajaro River, even in most years when the sandbar forms, the formation is usually in mid- to late summer. This is much later than the period of steelhead smolt passage and estuary adjustment and is also later than the present practice of pumping water from College Lake.

Tidewater gobies (*Eucyclogobius newberryi*), a federal endangered species currently proposed for delisting (Federal Register, 2001), are present in the Pajaro River estuary and up to a mile upstream. Sandbar formation is important for providing the calmer lagoon conditions favored by tidewater gobies (Smith, 1990), but the salinity of the lagoon generally is not important to goby viability. Tidewater gobies in central California maintain highly localized populations in lagoons ranging from freshwater (Soquel Creek in 1988, Pescadero Creek in 1985) to ocean salinities (Corcoran and Moran lagoons in 1996). After partial sandbar formation in late spring and summer, lagoon height increases, backing brackish water upstream to above Highway 1. Tidewater gobies possibly can be found that far upstream in years of high abundance; however, in years of heavy winter floods, this species probably is confined to the downstream portion of the Pajaro River estuary and to Watsonville Slough (Smith, 1990).

Aquatic sampling and surveys in the Pajaro Lagoon conducted in fall 2012 found tidewater gobies widely distributed in the Pajaro Lagoon, as far upstream as the City of Watsonville wastewater plant (Alley, pers. comm. KEC, pers. obs.). Tidewater goby is also known to use the lowermost reach of Watsonville Slough, downstream of the Shell Road pump station. No tidewater goby studies have been conducted in the slough reaches areas upstream of Shell Road and San Andreas Road in Watsonville Slough. The species was not found during aquatic sampling for CRF in 2012 freshwater marsh habitats in Middle Watsonville Slough and Hanson Slough upstream of the proposed Harkins and Watsonville Slough Diversion and Recharge projects.
3.4 Biological Resources

3.4.1.2 Regulatory Setting

**Special-Status Species and Sensitive Habitats**

Several plant species known to occur on or in the vicinity of the project site are accorded “special-status” because of their recognized rarity or vulnerability to various causes of habitat loss or population decline. Some of these receive specific protection defined in federal or state endangered species legislation. Others have been designated as “sensitive” on the basis of adopted policies and expertise of CDFW or organizations with acknowledged expertise, such as plants designated as rare (List 1 and 2) by the CNPS. The various categories encompassed by the term, and the legal status of each, are summarized below.

**Federal Endangered Species Act**

Under the FESA, the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered (16 United States Code [USC] 1533[c]). Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed threatened or endangered species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3], [4]). Therefore, project-related impacts to these species or their habitats would be considered significant.

Under the FESA, the NOAA Fisheries and USFWS have regulatory authority over projects that may affect the continued existence of a federally listed species. Under the FESA, a permit to “take” a listed species is required for any project that may harm or harass an individual of that species. For the proposed BMP Update components that include diversion of freshwater, federal interagency consultation under Section 7 of the FESA (16 U.S.C. 1531 et seq.) is required, because the components would require a federal wetland fill permit from the ACOE. There is the potential to take a federally listed species as a result of the proposed components.

The USFWS also publishes a list of candidate species. Species on this list receive special attention from federal agencies during environmental review, although they are not protected otherwise under FESA. The candidate species are taxa for which the USFWS has sufficient biological information to support a proposal to list as endangered or threatened. Project impacts to such species would be considered significant in this EIR.

Plant species listed under FESA that have potential to occur in the project area and that may be affected by the BMP Update include the Monterey spineflower, robust spineflower, Yadon’s rein orchid, and Santa Cruz tarplant, if present (Table 3.4-2). Within the greater Watsonville region critical habitat has been designated for the Santa Cruz tarplant and Monterey spineflower; however, none of the proposed BMP Update projects are located within these designated areas, as per current critical habitat maps (USFWS Critical Habitat Mapper, 2013).

Although populations of Monterey spineflower and designated critical habitat lie approximately 2 miles south and west of the BMP Update project area (in stabilized sand dunes), Monterey spineflower has not been reported from the project area. Robust spineflower has been recorded approximately 2 miles west of the BMP Update project area on stabilized sand dunes; however, the species has not been recorded from the project area. Yadon’s piperia has been recorded from maritime chaparral approximately 4 miles southeast of the BMP Update project area; however, the species has not been recorded from the project area. Although Santa Cruz tarplant and
3.4 Biological Resources

designated critical habitat lie approximately 0.5 mile north and west of the BMP Update project area, Santa Cruz tarplant has not been recorded from the project area.

Wildlife species listed under the FESA that have potential to occur in the project area and that may be affected by the proposed project are described in the following section and a more comprehensive list of potential species and their potential to be present is provided in Table 3.4-3.

Federally Listed Wildlife Species Considered

The occurrence and/or potential occurrence of federally listed marine species, including anadromous species, in the proposed action area (e.g., steelhead) requires consultation with NOAA Fisheries to obtain an incidental take permit for activities that may affect the species and/or their critical habitat. The occurrence of federally listed terrestrial and freshwater aquatic species (e.g., CRF and tidewater goby) in the project areas requires consultation with USFWS to obtain an incidental take permit for each affected species.

Several BMP Update components would place fill (i.e., diversion structures, temporary dewatering systems, instream habitat enhancement features) in jurisdictional wetlands and/or waters of the U.S., specifically, Salsipuedes Creek/College Lake, Watsonville Slough, Harkins Slough, and the Pajaro River. The proposed BMP Update has the potential to affect listed species in these habitat areas.

There are five species listed as threatened or endangered under the FESA that are present or for which suitable habitat exists in or adjacent to the BMP Update component project areas. Three of these species occur in or adjacent to the Project area: the South-Central California Coast steelhead trout, the CRF, and the tidewater goby. Brief consideration is also given to the western snowy plover, which nests at the Pajaro rivermouth (3 miles downstream) and Least Bell’s vireo, which is not known to occur in the project area.

Designated Critical Habitat for California Red-Legged Frog

The project area is within the boundaries of final designated critical habitat for the CRF (USFWS, 2010). The final designation states that red-legged frogs can use “virtually any aquatic system” provided that a permanent water source is nearby. Upland and riparian habitat associated with breeding sites is also considered essential for the maintenance of CRF populations. These frogs can be found in streams more than 1.8 miles from their breeding sites, have been found in riparian habitat more than 100 yards from water, and can travel 2.25 miles across upland habitats from nonbreeding to breeding habitat (USFWS, 2001). Thus, critical habitat will include any portion of the project area close to water. Specifically, within the critical habitat boundaries, three elements must co-occur for an area to qualify as critical habitat: suitable aquatic habitat, associated uplands, and suitable dispersal habitat connecting aquatic habitats (USFWS, 2001).

The aquatic habitat must consist either of (1) two or more breeding sites, at least one of which is a permanent water source, within 1.25 miles of each other; or (2) two or more breeding sites and a permanent water source, all within 1.25 miles of each other if none of the breeding sites is a permanent water source (USFWS, 2001). Suitable upland habitat consists of all upland areas within 500 feet of the edge of suitable aquatic habitat. If the watershed boundary is less than 500 feet from the aquatic habitat edge, then the watershed boundary forms the edge of suitable habitat (USFWS, 2001). Suitable dispersal habitat must provide connectivity between aquatic habitats; it must be at least 300 feet wide and free of barriers to dispersal. These barriers include roads with more than 30 cars per hour as well as “moderate to high” density urban or industrial development (USFWS, 2001).
Designated Critical Habitat for Steelhead

South - Central California Coast Steelhead (SCCCS) comprise a “distinct population segment” (“DPS”) of the species O. mykiss that is ecologically discrete from the other populations of O. mykiss along the West Coast of North America. Under the FESA, this DPS qualifies for protection as a separate species. In 1997, the SCCCS DPS - originally referred to as an Evolutionarily Significant Unit (ESU) - was listed as a “threatened” species - a species that is likely to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range. The project area is within the boundaries of final designated critical habitat for the South - Central California Coast DPS.

The FESA requires NOAA Fisheries to designate critical habitat for all listed species. Critical habitat is defined as specific areas where physical or biological features essential to the conservation (recovery) of the species exist and may require special management considerations or protection. For recovery planning and implementation purposes, these physical or biological features can be viewed as the set of habitat characteristics or conditions that are the end goal of many recovery actions. When designating critical habitat, NOAA Fisheries considers certain habitat features called “Primary Constituent Elements” (PCEs) that are essential to support one or more life history stage(s) of the listed species (50 CFR 424.12b). PCEs considered essential for the conservation of the SCCCCS DPS are those sites and habitat components that support one or more life stages and contain physical or biological features essential to survival, growth, and reproduction.

These PCEs include the following:

- Freshwater spawning sites with sufficient water quantity and quality as well as adequate substrate (i.e., spawning gravels of appropriate sizes) to support spawning, incubation and development.
- Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow development and mobility; sufficient water quality to support growth and development; food and nutrient resources such as terrestrial and aquatic invertebrates and forage fish; and natural cover such as shade, submerged and overhanging large wood, log jams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction and excessive risk of predation with adequate water quantity to allow for juvenile and adult mobility; cover, shelter, and holding areas for juveniles and adults; and adequate water quality to allow for survival.
- Estuarine areas that provide uncontaminated water and substrates; food and nutrient sources to support growth and development; and connected willow water areas and wetlands to conceal and shelter juveniles. Estuarine areas include coastal lagoons that are seasonally stable, predominantly freshwater - flooded habitats that remain disconnected from the marine environment except during high streamflow events, and tidally-influenced estuaries that provide a dynamic willow water environment.
- Marine areas with sufficient water quality to support growth, development and mobility; food and nutrient resources such as marine invertebrates and forage fish; and nearshore marine habitats with adequate depth, cover and marine vegetation to provide shelter. The final critical habitat designation for the SCCCCS DPS was issued on September 2, 2005 (70 FR 52488).

A total of 1,240 miles of stream habitat and three square miles of estuarine habitat were designated as critical habitat from the 28 watersheds within the range of this DPS. Critical habitat for the SCCCCS DPS includes most, but not all, occupied habitat from the Pajaro River, including Salsipuedes Creek, Casserly Creek, Corralitos Creek, but excludes the Watsonville Slough complex (see the hydrology and surface water quality section). The
stream channels with designated critical habitat are listed in 70 FR 52488 (Published in Federal Register on Sept. 2, 2005 (70FR52488 - 52627).

**California Endangered Species Act**

Under the CESA, the CDFW has the responsibility for maintaining a list of threatened species and endangered species (Cal. Fish and Game Code 2070). The CDFW also maintains a list of “candidate species,” which are species that the CDFW has formally noticed as under review for addition to the threatened or endangered species lists. The CDFW also maintains lists of “species of special concern,” which serve as watch lists. Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the CDFW encourages informal consultation on any proposed project that may impact a candidate species. Project-related impacts to species on the CESA endangered list and threatened list would be considered significant. Impacts to species of concern would be considered significant under certain circumstances, discussed below.

Plant species listed under CESA that have potential to occur in the project area and that may be affected by the proposed project include the Santa Cruz tarplant, San Francisco popcorn flower, and seaside bird’s beak, if present (Table 3.4-2). See the discussion of Santa Cruz tarplant under FESA, above. Populations of San Francisco popcorn flower occur approximately 10 miles northwest of the BMP Update project area (in mesic coastal prairie); however, the species has not been reported in the project area. Seaside bird’s beak has been recorded approximately 20 miles south of the BMP Update project area (Monterey Airport); the species has not been recorded in the project area.

There are six wildlife species designated as CA "species of concern" that regularly occur and/or breed in the project area. Three federally listed species (i.e., steelhead, red-legged frog, and snowy plover) are also designated as state species of concern. WPT are state species of special concern and are present throughout the project area. Pallid bat is a state special concern mammal species that may make use of the remnant, mature riparian trees in the project areas. Burrowing owl state species of special concern, an infrequent winter visitor to the lower Pajaro and College Lake, and is not known to nest in the project area. See Table 3.4-3 for more information on presence of other state listed wildlife species.

**CEQA Guidelines Section 15380**

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines Section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in the guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a candidate species that has not yet been listed by either the USFWS or CDFW. Thus, CEQA provides the ability to protect a species from potential project impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

CEQA also calls for the protection of other locally or regionally significant resources, including natural communities. Although natural communities do not at present have legal protection of any kind, CEQA calls for an assessment of whether any such resources would be impacted, and requires a finding of significance if there
will be substantial losses. Natural communities listed by CNDDB as sensitive are considered by CDFW to be significant resources and fall under the CEQA Guidelines for addressing impacts. Local planning documents such as general plans often identify these resources as well. Resources covered under this protection that occur in the project area include riparian forests and wetlands.

**Other Statutes, Codes, and Policies Affording Limited Species and Habitat Protection**

Vascular plants listed as rare or endangered by the California Native Plant Society (CNPS) (Skinner and Pavlik, 1994), but which have no designated status or protection under federal or state endangered species legislation, are defined as follows:

- **List 1A.** Plants Believed Extinct.
- **List 1B.** Plants Rare, Threatened, or Endangered in California and elsewhere.
- **List 2.** Plants Rare, Threatened, or Endangered in California, but more numerous elsewhere.
- **List 3.** Plants About Which More Information is Needed - A Review List.
- **List 4.** Plants of Limited Distribution - A Watch List.

In general, plants appearing on CNPS List 1 and 2 are considered to meet CEQA’s Section 15380 criteria and impacts to these species are considered significant in this EIR.

Although there are a number of special-status plants meeting these criteria that are known to occur within the PVWMA service area, non-federal or state-listed CNPS List 1 and 2 species that have potential to occur within the project area include Santa Cruz clover, Congdon’s tarplant, Eastwood’s goldenbush, Choris’ popcorn flower, deceiving sedge (*Carex saliniformis*), and sand-loving wallflower (*Erysimum ammophilum*) (**Table 3.4-2**). Populations of Santa Cruz clover are known to occur approximately 10 miles northwest of the BMP Update project area (in mesic coastal prairie); however, the species has not been reported from the project area. An historic record of Congdon’s tarplant has been documented approximately 0.5 mile southeast of the BMP Update project area (in the greater Kelly Lake/Santa Cruz Fairgrounds region); however, the species has not been recorded from the project area. Eastwood’s goldenbush has been recorded from maritime scrub and chaparral approximately 2 miles southeast of the BMP Update project area; however, the species has not been recorded from the project area. An historic record of Choris’s popcorn flower has been documented approximately 0.5 mile southeast of the BMP Update project area (in the greater Kelly Lake/Santa Cruz Fairgrounds region); however, the species has not been recorded from the project area. Sand-loving wallflower has been recorded from stabilized sand dunes approximately 2 miles west of the BMP Update project area; however, the species has not been recorded from the project area.

**Wetlands**

Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance and sensitivity of wetlands have increased as a result of their value as recharge areas and filters for water supplies and widespread filling and destruction to enable urban and agricultural development. In a jurisdictional sense, there are two definitions of a wetland: one definition adopted by federal agencies and a separate definition adopted by the State of California. Both are presented below.
Federal Wetland Definition

Wetlands are a subset of “waters of the United States” and receive protection under Section 404 of the Clean Water Act (CWA). The term “waters of the United States” as defined in Code of Federal Regulations (33 CFR 328.3[a]; 40 CFR 230.3[s]) includes:

- All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- All interstate waters including interstate wetlands. (Wetlands are defined by the federal government [CFR, Section 328.3(b), 1991] as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions);
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce;
- All impoundments of waters otherwise defined as Waters of the United States under the definition;
- Tributaries of waters identified in paragraphs (1) through (4);
- Territorial seas; and
- Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6).
- Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area’s status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with EPA [328.3(a)(8) added 58 CFR 45035, Aug. 25, 1993].

The BMP Update Facilities subject to the federal wetland standard only are those facilities east of State Highway 1.

Coastal Review Wetland Definition

Unlike the federal government, CDFW and the California Coastal Commission have adopted the Cowardin et al. (1979) definition of wetlands:

- Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface of the land or is covered by willow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (at least 50 percent of the aerial vegetative cover); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by willow water at some time during the growing season of each year.

Under normal circumstances, the federal definition of wetlands requires all three wetland identification parameters to be met, whereas the Cowardin definition requires the presence of at least one of these parameters. For this reason, identification of wetlands by CDFW consists of the union of all areas that are periodically inundated or saturated, or in which at least seasonal dominance by hydrophytes may be documented, or in which hydric soils are present. The proposed BMP Update projects subject to the coastal review wetland standard are those facilities west of State Highway 1.
Regulation of Activities in Wetlands

The regulations and policies of various federal agencies (e.g., USACE, USDA Natural Resources Conservation Service [NRCS], U.S. Environmental Protection Agency [EPA], USFWS, NOAA Fisheries) mandate that the filling of wetlands be avoided unless it can be demonstrated that no practicable alternatives exist. USACE has primary federal responsibility for administering regulations that concern waters and wetlands for this project. In this regard, the USACE acts under two statutory authorities, the Rivers and Harbors Act (Sections 9 and 10), which governs specified activities in “navigable waters,” and the Clean Water Act (Section 404), which governs specified activities in “waters of the United States,” including wetlands. The USACE requires that a Section 10 and/or Section 404 permit be obtained if a project proposes placing structures within navigable waters and/or alteration of waters of the U.S. below the ordinary high-water mark in non-tidal waters. The Pajaro River, Harkins Slough, Watsonville Slough, and College Lake are considered to be defined as navigable waters under USACE. Open water below Ordinary High Water Mark and associated vegetated wetlands would be jurisdictional under Section 404 of the Clean Water Act. The USFWS may provide comment on ACOE permit applications as they pertain to federally-listed species.

The state’s authority in regulating activities in wetlands and waters in the project area resides primarily with CDFW and the Regional Water Quality Control Board (RWQCB). The CDFW provides comment on ACOE permit actions under the Fish and Wildlife Coordination Act. CDFW is also authorized under the California Fish and Game Code Sections 1600-1607 to develop mitigation measures and enter into a Streambed Alteration Agreement (SAA) with applicants that propose a project that would obstruct the flow or alter the bed, channel, or bank of a river or stream in which there is a fish or wildlife resource, including intermittent and ephemeral streams. The RWQCB must certify that a ACOE permit action meets state water quality objectives (Section 401, Clean Water Act). The Central Coast Region RWQCB will be reviewing this project. Within the Coastal Zone, the County’s Local Coastal Program would apply and wetlands may be subject to review by Santa Cruz County and/or the California Coastal Commission through a Coastal Development Permit process.

Applicable Plans and Policies

Relevant local standards are summarized below for Santa Cruz County and the City of Watsonville. Although the larger study area of the BMP Update includes northern portions of Monterey County, BMP Update does not propose any physical components within Monterey County, and, therefore, its policies related to biological resources are not provided herein.

Santa Cruz County General Plan

The Santa Cruz County General Plan (Chapter 5 Conservation and Open Space), adopted in 1994 (County of Santa Cruz, 1994), identifies sensitive habitats and provides objectives and policies for their management.

Objective 5.1: To maintain the biological diversity of the County through an integrated program of open space acquisition and protection, identification and protection of habitat and wildlife corridors and habitats, low-intensity and resource-compatible land uses in sensitive habitats and mitigations on projects and resource extraction to reduce impacts on plant and animal life.

Policy 5.1.1: The following areas are among those designated as sensitive habitat:
a) Areas which provide habitat for locally unique biotic species/communities, including, but not limited to, coastal scrub.

b) Areas adjacent to essential habitats or rare, endangered or threatened species as defined below.

c) Areas which provide habitat for Species of Special Concern as listed by California Department of Fish and Game in the Special Animals List, Natural Diversity Data Base.

d) Areas which provide habitat for rare or endangered species which meet the definition of Section 15380 of the California Environmental Quality Act.

e) Areas which provide habitat for rare, threatened or endangered species as designated by the State Fish and Game Commission, U.S. Fish and Wildlife Service or the California Native Plant Society.

f) All lakes, wetlands, estuaries, lagoons, streams and rivers.

g) Riparian corridors.

Policy 5.1.4: Implement the protection of sensitive habitats by maintaining the existing Sensitive Habitat Protection ordinance. The ordinance identifies sensitive habitats, determines which uses are allowed in and adjacent to sensitive habitats, and specifies required performance standards for land in or adjacent to those areas. Any amendments to this ordinance will require a finding that sensitive habitats will be afforded equal or greater protection by the amended language.

Policy 5.1.6: Sensitive habitats will be protected against any significant disruption of habitat values: and any proposed development within or adjacent to these areas must maintain or enhance the functional capacity of the habitat. Reduce in scale, redesign, or if no other alternative exists, deny any project which cannot sufficiently mitigate significant adverse impacts on sensitive habitats unless approval of a project is legally necessary to allow a reasonable use of the land.

Policy 5.1.11: For areas which may not meet the definition of sensitive habitat, yet contain valuable wildlife resources (such as migration corridors or exceptional diversity), protect these wildlife habitat values and species and use other mitigation measures identified through environmental review process.

Policy 5.1.12: Require as a condition of development approval, restoration of any areas of the subject property which is identified as degraded sensitive habitat, with the magnitude of restoration to be commensurate with the scope of the project. Such conditions may include erosion control measures, removal of non-native or invasive species, planting with characteristic native species, diversion of polluting run-off, water impoundment, and other appropriate means. The object of habitat restoration activities will be to enhance the functional capacity and biological productivity of the habitat(s) and whenever feasible, to restore them to a condition which can be sustained by natural occurrences, such as tidal flushing of lagoons.

Objective 5.2: To preserve, protect and restore all riparian corridors and wetlands for the protection of wildlife and aquatic habitat, water quality, erosion control, open space, aesthetic and recreational values and conveyance and storage of flood waters.

Policy 5.2.1: Designate the following areas as Riparian Corridors:

a) 50 feet from the top of a distinct channel or physical evidence of high water mark on perennial stream;
b) 30 feet from the top of a distinct channel or physical evidence of high water mark of an intermittent stream as designated from the General Plan maps and through field inspection of undesignated intermittent and ephemeral streams;

c) 100 feet of the high water mark of a lake, wetland, estuary, lagoon, or natural body of standing water;

d) The landward limit of a riparian woodland community;

e) Wooded arroyos within urban areas.

Transitional areas between terrestrial and aquatic systems are where the water table is usually at or near the surface, or the land is covered by water. Under a unified methodology now used by all federal agencies, wetlands defined as “those areas meeting certain criteria for hydrology, vegetation, and soils.” Examples of wetlands are saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.

**Policy 5.2.2:** Implement the protection of Riparian Corridors and Wetlands through the Riparian Corridor and Wetland Protection ordinance. The ordinance identifies and defines riparian corridors and wetlands, determines the uses which are allowed in and adjacent to these habitats, and specifies required buffer setbacks and performance standards for land in and adjacent to these areas. Any amendments to this ordinance will require a finding that riparian corridors and wetlands will be afforded equal or greater protection by the amended language.

**Policy 5.2.3:** Development activities, land alteration and vegetation disturbance within riparian corridors and wetlands and required buffers will be prohibited unless an exception is granted per the Riparian Corridor and Wetlands Protection Ordinance.

**Policy 5.2.4:** Require a buffer setback from riparian corridors in addition to the specified distances found in the definition of riparian corridor. This setback will be identified in the Riparian Corridor and Wetland Protection ordinance and established based on stream characteristics, vegetation and slope. Allow reductions to the buffer setback only upon approval of a riparian exception. Require a 10-foot separation from the edge of the riparian corridor buffer to any structure. For wetlands, the buffer setback is included in the riparian corridor which surrounds the wetland.

**Policy 5.2.5:** Prohibit development within the 100-foot riparian corridor of all wetlands. Require measurements to prevent water quality degradation from adjacent land uses, as outlined in the Water Resources section.

**Policy 5.2.7:** Allow compatible uses in and adjacent to riparian corridors that do not impair or degrade the riparian plant and animal systems, or water supply values, such as non-motorized recreation and pedestrian trails, parks, interpretive facilities and fishing facilities.

**Policy 5.2.9:** Require development in or adjacent to wetlands to incorporate the recommendations of a management plan which evaluates: migratory waterfowl use December 1 to April 30; compatibility of agricultural use and biotic and water quality protection; and the protection of adjoining lands.

**Policy 5.3.5:** Require new water diversions, dams, and reservoirs which are constructed on anadromous fish streams to be designed to protect fish populations and to provide adequate flow levels for successful fish production.
Policy 5.6.1: Pending a determination based on a biological assessment, preserve perennial stream flows at 95 percent of normal levels during summer months and at 70 percent of the normal winter baseflow levels. Oppose new water rights which would diminish the instream flows necessary to maintain anadromous fish runs and riparian vegetation below the 97 percent/70 percent standard.

City of Watsonville General Plan

The City of Watsonville Vista 2030 General Plan Update, approved in January 2013 (City of Watsonville, 2013), has a planning area that includes the city limits plus a large planning envelope around it. The planning boundaries are from Carlton Road on the east to San Andreas Road on the west, and from Corralitos, Pioneers, and Casserly Roads on the north to the Pajaro River and southward a short distance into Monterey County on the south.

The Environmental Element of the General Plan states that the important ecologically sensitive areas in Watsonville and the vicinity are largely associated with water resources, including the Pajaro River, Salsipuedes Creek, Corralitos Creek, and wetlands and sloughs. Ecologically sensitive areas also include upland and riparian habitat adjacent to these waterways.

Goal 11.1: The City will encourage protection of ecologically sensitive areas in the various environmental settings found in Watsonville.

Policy 11.1.1: The City will seek to protect ecologically sensitive areas, including the Pajaro River, Salsipuedes Creek, Corralitos Creek, and wetlands of Watsonville. The wetlands of Watsonville include Watsonville Slough, Struve Slough, and the West Branch of Struve Slough. Ecologically sensitive areas are not only the listed waterways, but also the upland and riparian habitat adjacent to these waterways.

The City has established implementation actions, including designated environmentally sensitive areas, preparing an ordinance for determining appropriate environmental buffers. The wetland/riparian buffer will be no less than 100 feet from the edge of the riparian area, or of sufficient size to protect wetland/riparian area species and their habitat from the impacts of human and urban activity. No development is to occur in the buffer area. The buffer requirements may be reduced to below 100 feet in extraordinary circumstances following a resource analysis by a qualified biologist and based on the criteria defined in the buffer ordinance. Implementation actions also includes the City’s use of native plants for the maintenance and operation of its properties, removal of invasive, non-native plant species, use of integrated pest management, and support ecological restoration of riparian and wetland habitat.

3.4.1.3 Setting by Component

The proposed BMP Update consists of seven components: 1) Conservation, 2) Increased Recycled Water Deliveries, 3) Increased Recycled Water Storage at Treatment Plant, 4) Harkins Slough Recharge Facilities Upgrades, 5) Watsonville Slough with Recharge Basins, 6) College Lake with Inland Pipeline to Coastal Distribution System, and 7) Murphy Crossing with Recharge Basins. The Conservation and Increased Recycled Water Deliveries components do not result in any direct or indirect physical changes to the environment that would affect biological resources, and, therefore, are not discussed further in this section. The vegetation

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2 For a discussion of location of wildlife species in the PVWMA service area, please see previous discussion within Section 3.4.1.1 Regional Setting.
resources at each of the other components’ facilities is described below and the distribution of vegetation types shown on Figures 3.4.5 through Figure 3.4.9.

**Increased Recycled Storage at Treatment Plant**

Two one-million gallon storage tanks would be constructed in an approximately 0.5-acre area that was previously disturbed during development of the WWTF. The undeveloped portions of the project area support annual grassland that is comprised of, non-native vegetation typical of disturbed sites. A man-made drainage swale (biofiltration swale) is located adjacent to the proposed tank site, which supports plants associated with coastal freshwater marshes. Nearby is the lowest reach of the Pajaro River that supports mixed riparian forest. Vegetation types within this proposed facility site are depicted on Figure 3.4.5. No special status plant or wildlife species would be expected to occur at this facility area due to the previously disturbed condition the area and lack of substrate and micro-habitat conditions conducive to such species. The proposed storage tanks would be located over 100 feet from the riparian corridor of the Pajaro River and in-channel wetlands occurring within the River, consistent with County of Santa Cruz and Coastal Act regulations.

**Harkins Slough Recharge Facilities Upgrades**

Proposed improvements to the existing diversion and pumping system would include replacement of the pump station and construction of coagulant treatment facilities and additional filters at Harkins Slough and 4,000 feet of pipeline to connect the pumping station to the sanitary sewer system. The sanitary sewer connection would be constructed for the discharge of filter waste backwash. The waste backwash discharge line would be located within the dirt access road that leads to the existing pump station and within San Andreas Road, a public roadway. The diversion and pump upgrades would occur in the vicinity of the existing facilities which are located on Harkins Slough, immediately upstream of the confluence of Harkins Slough and Watsonville Slough northeast of San Andreas Road. This component would also include new extraction wells at the existing recharge basin that is located northwest of San Andreas Road and Dairy Road.

At the existing diversion and pump site, Harkins Slough is a channelized waterway and is considered to meet the requirements of jurisdictional wetland/waters of the U.S. and Waters of the State. Willow-dominated riparian vegetation grows upstream of the project site; however, at the existing pump station, herbaceous wetland species typical of freshwater coastal marsh grow within and along the edges of the channelized slough, including at the confluence with Watsonville Slough. The project site is located upstream of the Shell Road tidal dam/gate; therefore, this portion of the slough is primarily freshwater although recent high wave action storm events have caused stratified salinity profile within the sloughs. A dirt road provides access to the existing pump site and filtration plant; ruderal vegetation grows adjacent to these facilities. Willow-dominated riparian vegetation grows along the access road from San Andreas Road. The waste backwash discharge line would be located within the dirt access road that leads to the existing pump station and within San Andreas Road, a public roadway. The waste backwash discharge line will cross an agricultural drainage ditch which runs along the northwest side of Beach Road; the Beach Road ditch may potentially be considered jurisdictional wetlands/waters of the U.S. due to the fact that wetland indicator species, including common horsetail (Equisetum arvense) and cattail (Typha latifolia) were observed growing within and along its banks and the drainage appears to be hydrologically connected to Watsonville Slough.

Vegetation types at the Harkins Slough diversion area and pipeline route along a portion of San Andreas Road are depicted on Figure 3.4.6. The vegetation at the recharge basin northwest of San Andreas Road and Dairy Road is
depicted on Figure 3.4.7. No special status plant species would be expected to occur at the sites proposed for these facilities due to the previously disturbed condition the area and lack of substrate and micro-habitat conditions conducive to such species. However, there are known localities (and designated critical habitat) for Santa Cruz tarplant on the grassy eastern side slopes of Harkins Slough near Harkins Road (approximately 1.5 miles northeast of the Harkins Slough diversion), and for Monterey and robust spineflower, sand gilia, and sand-loving wallflower in stabilized sand dunes west of Shell Road (approximately 2 miles west of the Harkins Slough diversion) (CNDDB, 2013). Critical habitat for the Monterey spineflower has been designated within these stabilized dunes. The proposed recharge basin area supports sandy soils which may be suitable for species status plant species, such as Monterey and/or robust spineflower; however, the long-term cropland use within the area reduces the potential for occurrence.

The proposed pump upgrades at Harkins Slough would be located within the riparian and wetland development setback area as designated by the County of Santa Cruz. The pump upgrade would also occur within the 100-foot coastal wetland setback required under Coastal Act regulations. The proposed recharge basin facilities are located outside any habitat setback/buffer areas.

See Section 3.4.1.1 for a description of the wildlife species with the potential to be found in the project area of the Harkins Slough Recharge Facilities Upgrades component, that include fisheries, avian, and other aquatic species, such as CRF.

**Watsonville Slough with Recharge Basins**

The proposed facilities for this component would include a new diversion facility on Watsonville Slough, additional filters at the existing Harkins Slough filtration plant, one or more new recharge basins with extraction wells, and use of existing and proposed pipelines to send water to the recharge basins and subsequent recovery.

The proposed diversion site along Watsonville Slough will be located between the sloughs confluence with Harkins Slough and the Union Pacific Railroad crossing; the exact location has not yet been determined. This section of Watsonville Slough is a channelized waterway and is considered to meet the requirements of jurisdictional wetland/waters of the U.S. and Waters of the State. Willow-dominated riparian vegetation grows downstream of the slough confluence with Harkins Slough; however, the vegetation along the upper slough is limited to herbaceous wetland species typical of freshwater coastal marsh. The low gradient of the slough results in slow-moving to stagnant water for much of the year, such that aquatic plants, such as pennywort, are common. This section of the slough is upstream of the Shell Road tidal dam; therefore the slough is primarily freshwater although winter season high tides can cause a stratified salinity profile within the slough. A dirt road provides access to the existing pump site and filtration plant; ruderal vegetation grows adjacent to these facilities. Willow-dominated riparian vegetation grows adjacent to the dirt access road from San Andreas Road. The pipeline to send water to the recharge basins would be located within the dirt access road, within San Andreas Road, and along private dirt farm roads.

Vegetation types within this proposed component site are depicted on Figures 3.4.6 and Figure 3.4.7. No special status plant species would be expected to occur at these facility areas due to the previously disturbed condition the area and lack of substrate and micro-habitat conditions conducive to such species. However, there are known localities (and designated critical habitat) for Santa Cruz tarplant on the grassy eastern sides slopes of Harkins Slough near Harkins Road (approximately 1.5 miles northeast of the proposed diversion), and for Monterey and robust spineflower, sand gilia, and sand-loving wallflower in stabilized sand dunes west of Shell Road (approximately 2 miles west of the proposed diversion) (CNDDB, 2013). Critical habitat for the Monterey
spineflower has been designated within these stabilized dunes. The proposed recharge basin areas supports sandy soils which may be suitable for species status plant species, such as Monterey and/or robust spineflower; however, the long-term cropland use within the area reduces the potential for occurrence. The proposed diversion on Watsonville Slough would be located within the riparian and wetland development setback area as designated by the County of Santa Cruz. The diversion would also occur within the 100-foot coastal wetland setback required under Coastal Act regulations. The proposed recharge basin facilities are located outside any habitat setback/buffer areas.

See Section 3.4.1.1 for a description of the wildlife species with the potential to be found in the project area of the Watsonville Slough with Recharge Basins component that include fisheries, avian, and other aquatic species, such as CRF.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

This component would include a new outlet weir to increase the maximum (seasonal) College Lake surface area by approximately 38 acres to a total inundation area of approximately 272 acres, a pump station, treatment plant, and approximately six miles of water main to send pumped water to the existing CDS. The treatment plant is expected to be located immediately east of the College Lake outlet channel. From this location the water would be conveyed to filtration and disinfection facilities, and then pumped along existing roads or farmland southward to join the connecting pipeline. Pipeline construction would be along public roads and farmland.

College Lake is a seasonal lake that receives water from an approximately 11,000-acre watershed. Winter flows are held in the lake/depression by a managed weir system. For many years its accumulated water has been pumped into Salsipuedes Creek to allow farming of the lake bed during the dry season. Remnants of the former natural hydrology are evident in the persistence of groves of willow riparian and mixed riparian forest along the lowest reaches of Casserly Creek, and along the smaller tributaries that empty into College Lake. During the winter and early spring months, open water and varying amounts of freshwater emergent plant species, occupy the lake. As water evaporates and/or is pumped out of the lake, emergent wetlands form along the lake’s perimeter, as currently observed near Paulsen Road. Wet-tolerant plant species, such as bristly ox-tongue, colonize these areas and remain until the land is prepared for crops/agricultural uses. In late spring, summer and until the winter rains, part of the lake is in cropland agricultural use; surrounding land uses are residential and agricultural; PVWMA owns 80 acres in the northeastern portion of the lake that currently supports willows (since 2002 when farming ceased). Some areas of College Lake also support large stands of giant reed (Arundo donax), an invasive weed. **Figure 3.4.8** show the type and location of vegetation types in the College Lake area.

No special status plants were observed in the College Lake component area. There are historic records for two special status plants south of the College Lake area: Congdon’s tarplant and the Santa Cruz tarplant. However, previous floristic surveys failed to re-locate these species and it is believed that the plants had been extirpated due to residential development in the area (CNDDB, 2013). The emergent wetland areas may provide suitable habitat for species such as San Francisco popcorn flower, Choris’ popcorn flower and Santa Cruz clover; however, the long-term cropland use within the area reduces the potential for occurrence.

The proposed new outlet weir, pump station and treatment plant would be located within the riparian and wetland development setback area as designated by the County of Santa Cruz.
See Section 3.4.1.1 for a description of the wildlife species with the potential to be found in the project area of the College Lake with Inland Pipeline to Coastal Distribution System component, that include fisheries, avian, and other aquatic species.

**Murphy Crossing with Recharge Basins**

This BMP Update component would divert and recharge water from the Pajaro River upstream of Murphy Crossing between December and May. The project would include an infiltration gallery under the streambed, a pump station, connector pipeline, recharge basins, and monitoring wells. The recharge basins would be located north of State Route 129 within existing agricultural areas. The pipeline from the diversion to the recharge basins would be within/along Murphy Road and farm roads.

Murphy Crossing is located near the eastern end of the Pajaro Valley, about 1.5 miles downstream from Chittenden Pass. This project component would include two alternative diversion facilities. The first is an infiltration gallery within the bed of the Pajaro River near Murphy Crossing, with a connecting pipeline to the proposed recharge basin north of Highway 129. With the exception of the infiltration gallery (including pump and pump station), the proposed facilities would be located in areas now under agriculture. The infiltration gallery would occupy up to 900 linear feet along the sandy bed of the Pajaro River, with perforated pipes sunk 6-10 feet below the surface of the riverbed. Up to 10 pipes would extend up to 150 feet across the channel and would be spaced up to 100 feet apart.

The Pajaro River upstream of Murphy Crossing supports mixed riparian forest. The forest grows along both river banks as well as portions of the channel bed. Mature willow and black cottonwood trees dominate the banks, while the channel bed supports open water and vegetated sediment deposits. At the time of the 2013 site visits, sediment deposits along the northern portion of the channel bed supported a moderately dense growth of mule fat, nutsedge, curly dock, and young willows. **Figure 3.4.9** displays the type and location of vegetation types in the vicinity of the project.

No special status plant species have been recorded at this portion of the project area and none are expected due to a lack of substrate and micro-habitat conditions conducive to such species.

The proposed diversion facility on the Pajaro River would be located within the riparian corridor development setback area as designated by the County of Santa Cruz.

See Section 3.4.1.1 for a description of the wildlife species with the potential to be found in the project area of the Murphy Crossing with Recharge Basins component that includes SCCCS (steelhead), and WPTs.

**3.4.2 SIGNIFICANCE CRITERIA**

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Section 15065 (Mandatory Findings of Significance): “…substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species,…”
3.4 Biological Resources

- Section 15206 (b) (5) (Projects of Statewide, Regional, or Areawide Significance): “…substantially affect sensitive wildlife habitats including but not limited to riparian lands, wetlands, bays, estuaries, marshes, and habitats for endangered, rare, and threatened species as defined by Section 15380…”; Section 15380 (Endangered, Rare or Threatened Species); and
- Section 15382 (Significant Effect on the Environment): “…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.”

These criteria are related to definitions and policies under the Federal Endangered Species Act (FESA) and California Endangered Species Act (CESA). Project-related impacts to species on the CESA and FESA endangered list and threatened lists would be considered “significant” in this EIR. Impacts to “species of concern” would be considered “significant” under certain circumstances.

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), City of Watsonville and Santa Cruz County plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Have a substantial adverse effect, either directly or through habitat modifications on; or substantially reduce the number or restrict the range of any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Substantially reduce the habitat of a fish or wildlife species; cause a fish or wildlife population to drop below self-sustaining levels or threaten to eliminate a plant or animal community;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan.

3.4.3 Impacts and Mitigation Measures by Component

Potential impacts associated with BMP Update components are identified below. Because the Conservation and Increased Recycled Water Deliveries would not have any physical effects on biological resources, those are not included in the project components evaluated herein. Mitigation measures that would apply to multiple or all components are identified for each general potential impact area. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are identified.
None of the proposed BMP Update project components will substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, or threaten to eliminate a plant or animal community. None of the BMP Update project components conflicts with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance, except for impacts to riparian and wetland resources, as addressed under BIO-3.1. The BMP Update would not conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan, because there are no adopted HCP’s, NCCP’’s or other approved habitat conservation plans within the BMP Update project area.

3.4.3.1 Riparian Habitat and Sensitive Natural Communities, including Wetlands

Impact BIO-1: Construction of BMP Update components could result in impacts to potentially jurisdictional wetlands/waters of the U.S. and streambeds and banks under the jurisdiction of the U.S. Army Corps of Engineers, Department of Fish and Wildlife, Regional Water Quality Control Board, and/or California Coastal Commission. Potential direct impacts could occur from the loss of riparian or wetland vegetation and/or fill of wetlands or waters. Indirect impacts could occur due to sedimentation of rivers, creeks, or channels during or following construction activities, and impacts to and their function as wildlife and fishery habitat. This represents a potential significant impact which can be reduced to a less-than-significant level with the following mitigation measures.

No operational impacts to wetlands or riparian vegetation are anticipated due to the BMP Update.

Mitigation Measure(s):

*Mitigation Measure BIO-1a:* Wetlands and riparian habitat will be avoided by project construction activities. All facilities and construction activities will be maintained outside the jurisdictional area defined by riparian or emergent wetland vegetation and applicable setbacks and buffers where feasible. Within the Coastal Zone, project improvements will be located 100 feet from coastal review wetlands. Within the City of Watsonville, development will be located 100 feet from riparian areas. Within the unincorporated areas of the County, yet outside the Coastal Zone, a setback of 30 feet and 50 feet will be established adjacent to intermittent and perennial streams, respectively. If complete avoidance of wetlands and riparian areas is infeasible and/or development occurs within a regulated buffer/setback area, impacts would be minimized through implementation of Mitigation Measures BIO-1b, BIO-1c BIO-1d, and BIO-1e.

*Mitigation Measure BIO-1b:* Standard measures to maintain water quality and to control erosion and sedimentation will be implemented. These measures include:

- Restrict trenching across all waterways to low-flow periods.
- Exclude water from around the section of trench that is within the actively flowing channels. This will further reduce the potential for sediment or other pollutants to enter the waterways and impact downstream resources. The diversion will consist of water pillows, rock, sandbags, or other structural methods deemed most effective by the project engineer.
• Place sediment curtains downstream of the construction zone to prevent sediment disturbed during trenching activities from being transported and deposited outside of the construction zone.
• Locate spoil sites so they do not drain directly into the waterways. If a spoil site drains into a channel, catch basins will be constructed to intercept sediment before it reaches the channels. Spoil sites will be graded to reduce the potential for erosion.
• Prepare and implement a spill prevention plan for potentially hazardous materials. The plan will include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channels.
• Store equipment and materials away from the waterways, outside existing levees or at least 50 feet from waterways, but within the pipeline right-of-way. No equipment or materials will be deposited within 100 feet of wetlands.
• Provide proper and timely maintenance for vehicles and equipment used during construction to reduce the potential for mechanical breakdowns leading to a spill of materials into or around the creeks. Maintenance and fueling will be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from the creeks).
• Prior to construction, install temporary construction fencing at the perimeter of the construction zone to prevent inadvertent equipment access or construction staging within adjacent riparian forest and/or coastal marsh habitats. This fencing will be signed in the field as “SENSITIVE HABITAT AREA — NO CONSTRUCTION ACCESS”. Monitor construction activities to verify compliance with the perimeter fencing and limits of construction access and staging and implement remedial action if non-compliance is noted.
• Restrict limbing of riparian forest trees; if trees are limbed for construction access, document the impact and provide compensation as per Mitigation Measure BIO-1c.

Mitigation Measure BIO-1c: Where impacts to mixed riparian or willow riparian forest occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, and if applicable, USACE and/or California Coastal Commission, pursuant to regulatory agency permitting. The revegetation plan will include specific plans for the revegetation of impacted riparian forest, and for restoration of nearby creek riparian habitat, as appropriate. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required riparian revegetation, including providing funds to the RCD for their implementation of the revegetation. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PVWMA and regulatory agencies) for all trees lost as result of the project to account for the reduced habitat values of smaller trees compared with mature vegetation. Success criteria for replanting will be less than 20 percent mortality of individual species yearly for 5 years.

Mitigation Measure BIO-1d: Where impacts to coastal freshwater marsh occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB,
USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required wetland revegetation, including providing funds to the RCD for their implementation of the revegetation. The revegetation plan will include specific plans for the revegetation of impacted coastal marsh, and for restoration of nearby wetland habitat, as appropriate. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PVWMA and regulatory agencies) for impacted wetlands. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50% should be attained after two growing seasons. Mitigation may occur via restoration, creation, or preservation of wetlands. Mitigation will occur at a site acceptable to permitting agencies and pursuant to Project permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts to wetlands and other waters.

**Mitigation Measure BIO-1e:** Where construction and/or facilities are placed within a riparian or wetland development setback area, indirect impacts to adjacent riparian and wetland vegetation will be minimized. Where feasible, buffer plantings of native trees and shrubs will be installed between the facility and the adjacent wetland or riparian resource to provide a vegetated buffer. A buffer planting plan will be prepared as part of a revegetation plan approved by CDFW, RWQCB, USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. The buffer planting plan will include specific revegetation measures, including the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met.

**Increased Recycled Water Storage at Treatment Plant**

No direct or indirect significant impacts to riparian or wetland resources would occur due to construction or operation of the Increased Recycled Water Storage at Treatment Plant.

**Harkins Slough Recharge Facilities Upgrades**

Wetland resources would be directly impacted during replacement and upgrading of the pump facility on Harkins Slough. Herbaceous marsh species and/or open water will be impacted to accommodate replacement of the diversion pump. The exact amount of disturbance will be calculated upon development of construction plans; however, the impact area would be less than 0.1 acre. A temporary water diversion during the construction period would also directly impact vegetated marsh area and/or open water habitat. Pipeline construction may require trenching across drainage channels located along San Andreas Road and/or Beach Road. The exact amount of disturbance will be calculated upon development of construction plans; however, the pipeline impacts to wetlands
would be less than 0.1 acre. Implementation of mitigation measures BIO-1b through BIO-1e would reduce these direct impacts to a less than significant level.

Upgrades to the pump and to the adjacent filtration plant as well as pipeline crossing of drainage channels along San Andreas Road and Beach Road would occur within the County and Coastal Commission development setback areas for riparian habitat and coastal review wetlands. Implementation of mitigation measures BIO-1b through BIO-1e would reduce these direct impacts to a less than significant level.

Construction at the pump site and filtration plant, including equipment access to the site, may impact willow riparian forest that grows adjacent to the access road if this vegetation requires removal or limbing for equipment clearances and/or equipment staging and if construction inadvertently enters riparian and wetland areas. Implementation of Mitigation Measure BIO-1b would reduce these indirect impacts to a less than significant level.

No direct or indirect impacts to riparian or wetland resources would occur at the recharge basin project area.

**Watsonville Slough with Recharge Basins**

Wetland resources would be directly impacted during construction of a diversion structure on Watsonville Slough. Herbaceous marsh species and/or open water would be impacted for the new diversion structure. The exact amount of disturbance will be calculated upon development of construction plans; however, the impact area would be less than 0.1 acre. A temporary water diversion during the construction period would also directly affect vegetated marsh area and/or open water habitat. Implementation of mitigation measures BIO-1b through BIO-1e would reduce these direct impacts to a less than significant level.

Upgrades to the adjacent filtration plant would occur within the County and Coastal Commission development setback areas for riparian habitat and coastal review wetlands. Implementation of mitigation measures BIO-1b through BIO-1e would reduce impacts to wetland a less than significant level.

Construction at the diversion site and filtration plant, including equipment access to the site may impact willow riparian forest that grows adjacent to the access road if this vegetation requires removal or limbing for equipment clearances and or equipment staging and if construction inadvertently enters riparian and wetland areas. Implementation of Mitigation Measure BIO-1b would reduce this impact to a less than significant level.

No direct or indirect impacts to riparian or wetland resources would occur at the recharge basin project area.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

Construction of a new weir and pumping facility would directly impact herbaceous marsh vegetation and/or open water that occurs at the weir construction site. The exact amount of disturbance would be calculated upon development of construction plans; however, the impact area would be less than 0.1 acre. A temporary water diversion during the construction period would also directly affect vegetated marsh area and/or open water habitat at this location. Implementation of mitigation measures BIO-1b through BIO-1e would reduce these direct impacts to a less than significant level.

The proposed dam elevation of 62.5 feet (an increase from the existing level of 60.2 feet) will increase the inundation area of College Lake. Approximately 272 acres of land will be inundated, which is approximately 37 acres more than the existing condition. Currently, the inundation area varies each year depending upon rainfall and flows entering the College Lake depression with the lake typically drying out in late spring to summer. The
project would increase the inundation area for normal and above normal rainfall years and prolong the inundation period, as the lake would not be dry until September or October. The increased inundation level and prolonged inundation period would affect areas supporting mixed riparian forest, willow riparian forest, seasonal croplands, and annual grassland. Willows and cottonwoods that comprise the riparian forest around College Lake are tolerant of seasonal inundation and are dependent on periodic flooding for seed germination and soil nutrient supply. Their roots tolerate a variety of soil types to maintain contact with the water table and/or to persist on residual soil moisture left from a retreating water table. Both willows and cottonwoods are fast-growing trees and may experience increased growth from the projects proposed longer inundation and/or soil saturation period compared to existing conditions. This growth could be moderated, however, if there is stagnant water that drops fine sediments; fine sediments can reduce soil aeration and shorten a plant’s growth period. The health and vigor of the existing willow and cottonwood trees is not expected to be significantly compromised by the extended period of inundation. The areal extent of willow-cottonwood riparian vegetation, including herbaceous wetland plant species, would be expected to colonize the perimeter of the lake basin as lake water recede in September/October, particularly if these areas are not cultivated for agricultural, resulting in an increase in riparian vegetation within the College Lake area. The perimeter of the lake also supports trees adapted to drier growing conditions, such as coast live oak and western sycamore. These species can tolerate seasonal flooding and soil saturation for periods of 3-4 months; however, longer soil saturation around these trees could result in plant stress, die-back, and a drop in plant health and vigor. The exact extent of where these trees occur and the inundation line is not known at this time. The project will also inundate annual grassland or cropland that, if left untended or uncultivated, may over time convert to seasonal freshwater marsh or riparian vegetation.

Construction of the weir, pumping facility and water treatment facility would occur within the County development setback areas for riparian habitat. Implementation of mitigation measures BIO-1b through BIO-1e would reduce impacts to riparian and wetlands to a less than significant level.

Murphy Crossing with Recharge Basins

Riparian resources would be directly impacted during construction of an infiltration gallery within the bed of the Pajaro River and construction of a pipeline on the creek bank to a pump facility. Mixed riparian forest, including seasonally vegetated sand and gravel deposits within the river channel and/or open water, would be impacted to accommodate construction of the infiltration gallery and connecting pipe to the pump station. Approximately three acres of the river bed will be excavated to place the series of perforated pipes five to six feet below the river bottom if vegetation is allowed to recolonize the river bed above the infiltration gallery, impacts to vegetation from construction of the infiltration gallery would be temporary. Riparian plant species would be expected to naturally recolonize the river bottom each spring/summer similar to existing conditions. As the infiltration gallery diversion will only extract water during the winter months (December and May) when there is sufficient surface flow bypassed for fish and aquatic resources, no adverse impacts are anticipated to the surrounding riparian vegetation from the removal of this water are expected. Roots of the surrounding riparian trees and shrubs will retain contact with the river’s water table and/or will access soil moisture at a level to prevent drought stress or die-back. Permanent impacts to creek bank vegetation may occur from the pump station. A temporary water diversion during the construction period would also directly affect vegetated river area and/or open water habitat.

Construction of the infiltration gallery and pump station would occur within the County development setback areas for riparian habitat. Implementation of mitigation measures BIO-1b through BIO-1e would reduce impacts to wetland a less than significant level.
Construction at the infiltration and pump station site, including equipment access to the site may indirectly impact willow riparian forest that grows nearby if vegetation requires removal or limbing for equipment clearances and or equipment staging and if construction inadvertently enters adjacent riparian areas. Implementation of Mitigation Measure BIO-1b would reduce this impact to a less than significant level.

No direct or indirect impacts to riparian or wetland resources would occur at the recharge basin project area.

### 3.4.3.2 Special Status Wildlife Species and Their Habitat

**Impact BIO-2:** Construction and operation of BMP Update components could result in a substantial adverse effect, either directly or through habitat modifications on; or substantially reduce the number or restrict the range of any wildlife species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. Impacts could occur due to increased sedimentation in streams, dewatering of pools, reducing the wetted extent (including exposing CRF egg masses to desiccation or predation), habitat loss through vegetation removal, destruction of nests and burrows, and other construction disturbance. This represents a potentially significant impact; however, the impact would be reduced to a less-than-significant level with incorporation of the following mitigation measures.

**Mitigation Measure(s):**

**Mitigation Measure BIO-2:** During the development of BMP Update components, PVWMA will implement conservation measures during construction activities to avoid and minimize incidental take and significant impacts on individuals, populations, or habitat of special-status wildlife species to the maximum extent practicable. The following general measures will be incorporated into the planning and construction of BMP Update components, as appropriate, to ensure that the effects of the BMP Update are avoided, minimized, and mitigated.

Suggested species-specific measures for CA red-legged frog, WPT, and steelhead are included, as well, although BMP Update components that proposed to divert surface waters beyond existing entitlements would require future additional project-level CEQA analyses of specific diversion and operation plans to support water rights application and environmental permits. It is assumed that project-level biological studies and analysis for these BMP Update components will be required to support those future permits and biological opinions.

**Mitigation Measure BIO-2a:** During project activities, all trash that may attract predators will be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris will be removed from work areas.

**Mitigation Measure BIO-2b:** All refueling, maintenance, and staging of equipment and vehicles will occur at least 65 feet from any riparian habitat or water body. The Agency will ensure contamination of habitat does not occur during such operations. Prior to the onset of work, the Agency will ensure that the contractor has prepared a plan to allow a prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.
Mitigation Measure BIO-2c: The spread or introduction of invasive exotic plant species will be avoided to the extent practicable. When practicable, invasive exotic plants in the project areas will be removed.

Mitigation Measure BIO-2d: Prior to any on-site work in areas where special-status species may occur, a qualified biologist will conduct a tailgate training session in which all construction personnel will receive training regarding measures (below) that are to be implemented to avoid environmental impacts. This training will include a presentation of the potential for sensitive species to occur at the site and measures to protect habitat including aquatic habitat and avoid impacts to the species. All personnel working on the site will receive this training, and will sign a sign-in sheet showing they received the training.

Mitigation Measure BIO-2e: Prior to the commencement of work, the limits of the work area (including haul routes, access ramps, storage areas and material stockpiles) will be clearly marked with orange construction fencing to prevent workers from impacting habitat outside the work area. No work will occur outside the designated marked work areas.

Mitigation Measure BIO-2f: Each morning before work begins on any components in or within 100 feet of a suitable habitat area (defined as: riparian habitat, USACE jurisdictional wetlands or "other waters" of the U.S., or sensitive habitats identified in subsequent USFWS Biological Opinions and CDFW 1600 Lake and Streambed Alteration Agreements), a qualified monitor will survey the work site and habitat immediately surrounding the active work site for conditions that could impact special-status species, and will remain on-site whenever work is occurring that may adversely impact special-status species and their habitats. No work will be allowed to begin each morning until the monitor has inspected the work site.

Mitigation Measure BIO-2g: A USFWS-approved biologist or biological monitor will permanently remove from within the project area(s), any individuals of exotic species, such as bullfrogs, crayfish, and centrarchid fishes to the extent practicable.

Mitigation Measure BIO-2h: Upon locating individuals of special-status species that are dead or injured as a direct result of activities conducted by the City, initial notification will be made to the USFWS’s Division of Law Enforcement at (916) 978-4861 (Sacramento) within three working days of its finding. The USFWS Field Office within whose area of responsibility the specimen is recovered will also be notified. Written notification will be made within five calendar days and include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Mitigation Measure BIO-2i: Nesting Bird Surveys. Prior to any project construction activities, the project proponent will take the following steps to avoid direct losses of nests, eggs, and nestlings and indirect impacts to avian breeding success:

- If construction activities occur only during the non-breeding season, between August 31 and February 1, no surveys will be required.
- During the breeding bird season (February 1 through August 31), a qualified biologist will survey construction areas in the vicinity of the project site for nesting raptors and passerine birds not more than 14 days prior to any ground-disturbing activity or vegetation removal.
Surveys will include all potential habitats within 500 feet (for raptors) of activities and all on-site vegetation including bare ground within 250 feet of activities (for all other species).

- If results are positive for nesting birds, avoidance procedures will be adopted, if necessary, on a case-by-case basis. These may include implementation of buffer areas (minimum 50-foot buffer for passerines and 250-foot minimum buffer for raptors) or seasonal avoidance.

**Mitigation Measure BIO-2j (CRT):** The following measures for avoidance and minimization of adverse impacts to California Red-Legged Frog (*Rana draytonii*) (CRF) during construction of the BMP projects are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on scheduling activities at certain times of year, keeping the disturbance footprint to a minimum, and monitoring. Consultation with the USFWS will be conducted and a Biological Opinion developed for each BMP Update component that requires a USACE Section 404 Wetland Permit. Ongoing and future CRF studies in the project area may result in site-specific conditions that would be integrated into the future project-level BMP component designs, permitting and operations.

**CRF-1.** The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until the Agency receives approval from the Service that the biologist(s) is qualified to conduct the work.

**CRF-2.** A USFWS-approved biologist will survey the work site 48 hours prior to the onset of activities. If CRF, tadpoles, or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only USFWS-approved biologists will participate in activities associated with the capture, handling, and moving of CRF.

**CRF-3.** Before any activities begin on a project, a USFWS-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the CRF and its habitat, the importance of the CRF and its habitat, general measures that are being implemented to conserve the CRF as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

**CRF-4.** A USFWS-approved biologist will be present at the work site until such time as all removal of CRF, instruction of workers, and disturbance of habitat have been completed. After this time, the biologist will designate a person to monitor on-site compliance with all minimization measures and any future staff training. The USFWS-approved biologist will ensure that this individual receives training outlined in measure WPT-2 and in the identification of CRF. The monitor and the USFWS-approved biologist will have the authority to stop work if CRF are in harm’s way.

**CRF-5.** The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Routes and boundaries will be clearly demarcated, and these areas will be outside of riparian and wetland areas to the extent practicable.
CRF-6. Work activities will be completed between April 1 and November 1 to the extent practicable. Should the Agency demonstrate a need to conduct activities outside this period, the Agency may conduct such activities after obtaining the Service’s approval.

CRF-7. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than five millimeters (mm) to prevent CRF from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.

CRF-8. The Declining Amphibian Populations Task Force’s Fieldwork Code of Practice will be followed to minimize the possible spread of chytrid fungus or other amphibian pathogens and parasites.


Mitigation Measure BIO-2k (WPT): The following measures for avoidance and minimization of adverse impacts to western pond turtle (Actinemys marmorata) (WPT) during construction of the BMP project elements are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on keeping the disturbance footprint to a minimum and aggressive monitoring of WPTs before vegetation removal and during the construction and revegetation phase.

WPT-1. The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until proponents have received approval from CDFW that the biologist(s) is qualified to conduct the work.

WPT-2. A CDFW-approved biologist will survey the work site 48 hours prior to the onset of activities. If WPT adults, juveniles or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only CDFW-approved biologists will participate in activities associated with the capture, handling, and moving of WPT.

WPT-3. Before any activities begin on a project, a CDFW-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the WPT and its habitat, the importance of the WPT and its habitat, general measures that are being implemented to conserve the WPT as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

WPT-4. A CDFW-approved biologist will be present at the work site until such time as all removal of WPT, instruction of workers, and disturbance of habitat have been completed.

WPT-5. The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the project plans. Routes and boundaries will be clearly demarcated.
Where impacts occur in these staging areas and access routes, restoration will occur as identified in the general BMP measures above.

**Mitigation Measure BIO-2l (FISH):** The following measures are required to reduce impacts to special status fisheries, including steelhead and resident rainbow trout, to a less-than-significant level:

FISH-1. A NOAA Fisheries-approved, qualified fisheries biologist would be onsite to provide preconstruction training on steelhead life-history to construction crews and to provide daily monitoring during construction activities.

FISH-2. If the preliminary construction concept proposes the use of temporary coffer dams for isolating the work areas at the upstream and downstream extent of the project, installation and removal of the temporary coffer dams would be monitored by the qualified fisheries biologist.

FISH-3. Following initial construction of the coffer dam bypass system, isolated standing water would be pumped from the work area to adjacent vegetated terraces, settling tanks or back into the river, if turbidity is not elevated more than 10% of background turbidity levels.

FISH-4. If a work site is to be temporarily de-watered by pumping, intakes will be completely screened with wire mesh not larger than 0.2 inch to prevent steelhead or other native fish from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.

FISH-5. The installation and removal of the coffer dam structures would be controlled to minimize turbidity in the water.

FISH-6. The use of best management practices would be implemented to reduce the probability of sediment and/or contaminated material from entering the creek.

**Increased Recycled Water Storage at Treatment Plant**

No habitat or known occurrences of special status wildlife species were identified at the treatment plant site proposed for this component.

**Harkins Slough Recharge Facilities Upgrades**

The proposed facilities for this component would include upgrades to the existing diversion facility on Harkins Slough, upgrades to the existing Harkins Slough filtration plant, a new recharge basin with extraction wells, and a pipeline to send filter backwash water to the sewer system. At present, PVWMA is allowed to divert up to 2,000 AFY from Harkins Slough and Watsonville Slough between November 1 and May 31 (Permit for Diversion and Use of Water #21039 from the State Water Resources Control Board). Harkins Slough supports CRF, WPT, and a wide range of waterfowl and wetland associated avian species that breed in and around the slough during this period. Wetland resources that may support CRF, WPT, and waterfowl/avian species would be directly affected during replacement and upgrading of the pump facility on Harkins Slough and may be affected during operation of the pump station/diversion facility. Potential operational impacts could occur through diversion of water leading to changes or decreases in water levels during waterfowl nesting and CRF breeding period, potentially...
resulting in decreased available aquatic habitat and increased predation of nests and CRF. Additionally, associated noise and vibration due to pumping may result in longer term operational impacts.

**California red-legged frog.** Habitat for CRF would be impacted to accommodate replacement of the diversion pump; the exact amount of disturbance would be calculated upon development of construction plans; however, the impact area would be less than 0.1 acre. A temporary water diversion during the construction period would also directly impact vegetated marsh area and/or open water habitat. Pipeline construction may require trenching across a small drainage channel located along San Andreas Road and/or Beach Road. The exact amount of disturbance would be calculated upon development of construction plans; however, the impact area would be less than 0.1 acre. During the 2013 CRF breeding season, surveys conducted for the Land Trust of Santa Cruz County in Middle Watsonville Slough and Lower Harkins Slough found evidence of CRF breeding activity within 2,000 feet upstream of the existing Harkins Slough facility in both Harkins Slough and Watsonville Slough. Additional research, particularly the impact of predatory fish and bullfrogs on breeding CRF, is ongoing will inform future design and permit processes for the Harks Slough Recharge Facilities Upgrades. The construction and operation of the Harks Slough Recharge Facilities Upgrades component may result in a potentially significant impact to CRF. Implementation of mitigation measures BIO-2a through BIO-2h and BIO-j will reduce impacts on CRF a less than significant level. Project-level, operational mitigation measures will be developed in consultation with USFWS in the Section 7 Biological Opinion.

**Western pond turtle.** WPT is not a commonly observed aquatic species in the Watsonville Slough/Harkins Slough system. Between 2000 and 2013 only two observations of WPT have been made in Harkins Slough by KEC during field surveys for the County of Santa Cruz, the Land Trust of Santa Cruz, the Resource Conservation District of Santa Cruz County; however, the construction and operation of the Harks Slough Recharge Facilities Upgrades would have a potentially significant impact on WPT and their habitat due to the direct disturbance of individuals and disturbance of potential suitable habitat. This represents a significant impact on WPT that would be reduced to less than significant levels with implementation of Mitigation Measures BIO-2a through BIO-2h and BIO-2k at a minimum.

**Waterfowl and wetland associated avian species.** Project avoidance of the suitable yellow warbler nesting habitat and breeding season work limitations would prevent significant impacts on the yellow warbler and its habitat. The construction and operation of the Harks Slough Recharge Facilities Upgrades would however, have a potentially significant impact on other waterfowl and wetland-associated avian species, including pie-billed grebe, American bittern, black-crowned night heron, green heron, mallard, gadwall, cinnamon teal, marsh wren black-necked stilt and ruddy duck and their habitat, due to the presence of equipment and disturbance of potential suitable habitat necessary for this project. This represents a significant impact on waterfowl and other avian species that would be reduced to less than significant levels with implementation of Mitigation Measures BIO-2a through BIO-2i, at a minimum.

**Fisheries.** Steelhead and resident rainbow trout are not known to occupy the Watsonville Slough system in the vicinity, or upstream, of the existing Harkins Slough diversion points. Fishes encountered in previous studies are predominantly non-native, warm-water species that are considered predators to juvenile steelhead. These non-native species include carp, largemouth bass, brown bullhead, bluegill, green sunfish, mosquitofish and black crappie. Native, potentially predatory fish include Sacramento pikeminnow, and Sacramento blackfish. For these reasons, the Harks Slough Recharge Facilities Upgrades component would not result in a significant impact on steelhead or rainbow trout.
3.4 Biological Resources

**Watsonville Slough with Recharge Basins**

The proposed facilities for this component would include a new diversion facility on Watsonville Slough, additional filters at the existing Harkins Slough filtration plant, one or more new recharge basins with extraction wells, and a pipeline to send water to the recharge basins and subsequent recovery.

At the proposed diversion site, Watsonville Slough is channelized and streambank habitats are disturbed by agricultural uses. It is considered jurisdictional wetland/waters of the U.S. and Waters of the State. A mix of willow riparian on the right bank (looking downstream) and active row-crop agriculture on the left bank herbaceous wetland species typical of freshwater coastal marsh grow within and along the edges of the channelized slough. The project site is located upstream of the Shell Road tide gates; therefore, this portion of the slough is primarily freshwater although recent high wave action storm events have cause stratified salinity profile within the sloughs as far north as this component project area. A dirt road provides access to the existing pump site and filtration plant; ruderal vegetation grows adjacent to these facilities. Willow-dominated riparian vegetation grows along the access road from San Andreas Road.

Wetland resources that may support CRF, WPT, and waterfowl/avian species will be directly affected during construction of the pump facility on Watsonville Slough and may be affected during operation of the pump station/diversion facility. Potential operational impacts could occur through diversion of water leading to changes or decreases in water levels during waterfowl nesting and CRF breeding period, potentially resulting in decreased available aquatic habitat and increased predation of nests and CRF. Additionally associated noise and vibration due to pumping may result in operational impacts. The Watsonville Slough with Recharge Basin component would result in a significant impact on aquatic wildlife resources.

**California red-legged frog.** Habitat for CRF would be impacted to accommodate construction of the diversion pump; the exact amount of disturbance will be calculated upon development of construction plans; however, the impact area would be less than 0.1 acre. A temporary water diversion during the construction period would also directly affect vegetated marsh area and open water habitat. Pipeline construction may require trenching across a drainage channels located along the pipeline routes to the new recharge basins. The exact amount of disturbance will be calculated upon development of construction plans; however, the impact area would be less than 0.1 acre.

During the 2013 CRF breeding season, surveys conducted for the Land Trust of Santa Cruz County in Middle Watsonville Slough and Lower Harkins Slough found evidence of CRF breeding activity within 2,000 feet upstream of the existing Harkins Slough facility in both Harkins Slough and Watsonville Slough. Additional research is ongoing and will inform future design and permits processes for the Harkins Slough Recharge Facilities Upgrades. The construction and operation of the Watsonville Slough with Recharge Basins component would result in a potentially significant impact to CRF. Implementation of mitigation measures BIO-2a through BIO-2h and BIO-j would reduce impacts to CRF to a less than significant level.

**Western pond turtle.** WPT is not a commonly observed aquatic species in the Watsonville Slough/Harkins Slough system. Between 2000 and 2013 only two observations of WPT have been made in Harkins Slough by KEC during field surveys for the County of Santa Cruz, the Land Trust of Santa Cruz, the Resource Conservation District of Santa Cruz County; however, no focused WPT studies have been done in the sloughs and their presence may be under reported. The construction and operation of the Harkins Slough Recharge Facilities Upgrades may have a potentially significant impact on WPT and their habitat due to the direct disturbance of individuals and disturbance of potential suitable habitat. This represents a significant impact on WPT that would
be reduced to less than significant levels with implementation of Mitigation Measures BIO-2a through BIO-2h and BIO-2k at a minimum.

**Waterfowl and wetland associated avian species.** Project avoidance of the suitable yellow warbler nesting habitat and breeding season work limitations would prevent significant impacts on the yellow warbler and its habitat. The construction and operation of the Harkins Slough Recharge Facilities Upgrades would however, have a potentially significant impact on other waterfowl and wetland-associated avian species, including pie-billed grebe, American bittern, black-crowned night heron, green heron, mallard, gadwall, cinnamon teal, marsh wren black-necked stilt and ruddy duck and their habitat, due to the presence of equipment and disturbance of potential suitable habitat necessary for this project. This represents a significant impact on waterfowl and other avian species that would be reduced to less than significant levels with implementation of Mitigation Measures BIO-2a through BIO-2i.

**Fisheries.** Steelhead and resident rainbow trout are not known to occupy the Watsonville Slough system in the vicinity, or upstream, of the existing Harkins Slough diversion points. Fishes encountered in previous studies are predominantly non-native, warm-water species that are considered predators to juvenile steelhead. These non-native species include carp, largemouth bass, brown bullhead, bluegill, green sunfish, mosquitofish and black crappie. Native, potentially predatory fish include Sacramento pikeminnow, and Sacramento blackfish. For these reasons, the Watsonville Slough with Recharge Basins component would not result in a significant impact on steelhead or rainbow trout.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

College Lake is a seasonal lake that receives water from an 11,000-acre watershed during the rainy season. As a long-term agricultural practice, College Lake is pumped dry in the spring (typically by late May) and the lakebed is farmed and harvested before winter runoff begins filling the lake (typically in November). Several special status wildlife species are known to occur or may have potentially suitable habitat in the vicinity of the proposed College Lake component. Aquatic habitat suitable for the California red-legged frog and the WPT is present in College Lake, as well as in Corralitos and Salsipuedes Creeks downstream and south of College Lake. Upland habitat is limited in the agricultural and levee-confined areas of these downstream creeks, and intensive agricultural production in summer and fall may adversely impact their life history in the area. Both species are, however, present in the mainstem Pajaro River, upstream and downstream of the confluence of Salsipuedes Creek and the Pajaro River.

Suitable nesting habitat for raptors such as red-tailed hawks, red-shouldered hawks and white-tailed kites is present in the riparian vegetation along the northern side of the lake, and particularly in the area of the Casserly Creek delta. An osprey pair has attempted to nest in middle College Lake in 2012 and 2013, but has not yet been successful.

The lake, when filled with rainfall runoff in winter and during the spring drainage period, supports a significant variety of waterbirds, such as ducks, herons, gulls and terns. The lake is especially noted for waterfowl abundance and diversity during the winter and migrant shorebirds during spring drawdown. Based on available, cumulative data, 213 bird species have been documented in the College Lake area (Ebird, 2013).

The Pajaro River and Corralitos and Salsipuedes Creeks support a variety of common fish species, and all three support a threatened run of south-central California coast steelhead. Spawning and rearing habitat for this species is present in the upper reaches of Corralitos Creek, and the upper tributaries of Casserly Creek above College.
Lake. Conditions for steelhead passage to and from spawning and rearing habitats are the primary fish habitat factor potentially affected by the proposed College Lake with Inland Pipeline to Coastal Distribution System component. The presence of sufficient stream flows for down-migration of smolts is critical.

The fisheries conditions in the vicinity of the College Lake diversion and outflow channel were surveyed in the spring of 1997 (Habitat Restoration Group, 1997; Smith, 1999; Appendix C). The analysis concluded that during the period of March 15 through May 31 (the primary smolt migration period), a minimum flow of 7.5 cfs would be required in Salsipuedes Creek at its confluence with Corralitos Creek for steelhead smolts to be able to reach the Pajaro River. Furthermore, at least 2.0 cfs of the total 7.5 cfs would need to be provided by the reach of Salsipuedes Creek upstream of the confluence, that is, from College Lake. After informal consultations with CDFW and NOAA Fisheries, it was agreed that this 2.0 cfs bypass flow from College Lake would be provided March 15th through June 15th, a more conservative estimate of the end of the smolt down-migration period (Environmental Science Associates, 1999).

Potential impacts to steelhead may result from construction and operations of water diversions at College Lake. Construction of a new College Lake diversion structure may require localized dewatering, temporary loss of available steelhead habitat, sedimentation, and other water quality impacts. Relocation of steelhead from dewatered areas may be necessary. In addition, changes in flow regimes in the area of the College Lake outlet weir and downstream in Corralitos and Salsipuedes Creeks would potentially result in reduced ability for fish to pass through the watershed.

Proposed diversions could reduce the amount or duration of streamflows adequate for steelhead passage, particularly for down-migrating smolts in spring months, specifically, excluding bypass flows, the 600 acre-foot increase in storage capacity will delay outflows from the lake, and particularly during drought years, limit the occurrence of outflows. On average, the loss of 2,400 acre-feet from College Lake represents approximately 40 to 50 percent of the mean annual flow into the lake, and about 15 percent of the flow in Salsipuedes Creek downstream of Corralitos Creek on an annual average basis. 3

Construction and operation of the proposed College Lake with Inland Pipeline to Coastal Distribution System component could result in disruption to special status fish and wildlife species that breed in the riparian, wetland, and aquatic habitats present in the College Lake basin, resulting in a potentially significant impact that would be reduced to less than significant levels with mitigation measures BIO-2a through BIO-2l and the following mitigation measure:

**Mitigation Measures BIO-2m:** No water shall be diverted from College Lake from the time the lake begins filling in late fall/early winter through the end of the smolt outmigration period (approximately May 31 or June 15) unless sufficient bypass flows are provided at the dam for unimpeded adult upstream migration through March 31, and sufficient bypass flows are provided at the dam for unimpeded smolt outmigration through May 31. The precise bypass flow levels required to achieve unimpeded migrations are not known at this time. After May 31 or June 15, the entire storage of College Lake could potentially be diverted. College Lake would likely be too warm to allow summer rearing by steelhead, especially in the presence of warm water predatory fishes.

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3 Mean annual flow in Corralitos Creek at Freedom (USGS gage 11159200) is 16.1 cfs or 11,652 acre-feet for the period of record 1956 to 2012, and mean annual flow into College Lake was estimated at 5,800 acre-feet (Hecht and others, 1984) and at 4,600 acre-feet (CH2MHill, 1994, based on Rantz, 1974).
Mitigation Measures BIO-2n: Protection of Steelhead Migratory Habitat - Impacts to steelhead migration passage shall be minimized by carrying out construction in College Lake/Casserly Creek/Salsipuedes Creek after June 1 and prior to November 1, during which time adults and smolts do not migrate through the area.

Mitigation Measure BIO-2o: Protection of Steelhead Migratory Habitat - The proposed College Lake with Inland Pipeline to Coastal Distribution System component shall be operated such that it complies with all minimum required bypass flow requirements during the steelhead migration period, including those developed through a new bypass flow study to be conducted by a qualified fisheries biologist in consultation with the relevant regulatory agencies.

Mitigation Measures BIO-2p: The PVWMA shall install and operate surface-water streamflow gaging stations on Casserly Creek upstream and on Salsipuedes Creek downstream of the proposed College Lake diversion structure to monitor available diversion inflows and to provide and document future Biological Opinion-required fish bypass flows.

Murphy Crossing with Recharge Basins

Yellow warblers and a variety of raptors may breed in the Pajaro River adjacent to the area proposed for construction of this project. Construction noise could cause these birds to abandon their nests, resulting in reproductive failure for the season. This impact can be avoided through timing of construction activities near the riparian habitat. Other special status species likely to breed in the area, CFRs and WPTs, are less sensitive to noise, providing their habitat is not directly impacted. However, construction of the infiltration gallery at Murphy Crossing could adversely affect these species through direct loss of habitat.

Steelhead (Oncorhynchus mykiss) and/or resident rainbow trout inhabit the Pajaro River and its tributaries in the Corralitos-College Lake-Casserly Creek subwatersheds. Construction and operations of water diversions at Murphy Crossing could result in potentially significant impacts to steelhead. Placement of subsurface water collection structures at Murphy Crossing may require localized dewatering and temporary loss of available steelhead habitat, increased sedimentation, and potentially other water quality impacts. Relocation of steelhead from dewatered areas may be necessary.

The Murphy Crossing infiltration gallery would generally divert Pajaro River water from late December through mid-May, when flows are highest in the Pajaro River. The infiltration gallery would consist of 18-inch-diameter perforated pipe placed approximately 5 to 6 feet below the river bottom, forming a water collection grid. The infiltration gallery would cover approximately 2 acres of the riverbed just upstream of the Murphy Crossing bridge. River water collected in the perforated pipe would flow by gravity into a sump on the north side of the river. Pumps would convey the water from the sump into the conveyance pipeline to the recharge basins. Proposed operational diversion of up to 5 cfs of water when flows are between 45 and 90 cfs at Murphy Crossing would not be anticipated to result in significant impacts, unless the project does not comply with regulatory-required flow criteria.

Future refinement of bypass flow requirements would be done in the project-level planning, design and permitting process. Formal consultation with NOAA Fisheries Service and the development of a Biological Opinion for steelhead will be required for final permitting of any new Pajaro River diversion facility.

Construction of the proposed project could result in disruption to special status fish and wildlife species that breed in the riparian, wetland and aquatic habitats present in the Pajaro River, resulting in a potentially significant
impact that would be reduced to less than significant levels with mitigation measures BIO-2a through BIO-2l and the following mitigation measure:

**Mitigation Measure BIO-2q:** Protection of Steelhead Migratory Habitat - Impacts to steelhead migration passage shall be minimized by carrying out construction in the Pajaro River after June 1 and prior to November 1, during which time adults and smolts do not migrate through the area.

Mitigation Measure BIO-2r: Protection of Steelhead Migratory Habitat - The proposed Murphy Crossing with Recharge Basins component shall be operated such that it complies with all minimum required bypass flow requirements during the steelhead migration period.

**Mitigation Measures BIO-2s:** The PVWMA shall install and operate surface-water streamflow gaging stations on the Pajaro River both upstream and downstream of the proposed Murphy Crossing infiltration gallery to monitor available diversion inflows and to provide and document future Biological Opinion-required fish bypass flows.

### 3.4.3.3 Special-status Plant Species

**Impact BIO-3:** Construction of BMP Update component facilities could adversely affect special status plant species, either directly or through habitat modifications on; or substantially reduce the number or restrict the range of any plant species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service, if species are found to be present within the component-specific construction areas. This represents a potential significant impact that can be reduced to a less-than-significant level with mitigation identified in this EIR. No operational impacts to special status plant species are anticipated from the project.

**Mitigation Measure(s):**

**Mitigation Measure BIO-3a:** Occurrences of special status plant species shall be avoided by project construction activities to the extent feasible. All facilities and construction activities will be maintained outside habitats supporting special status plant species where feasible. Prior to construction, a qualified biologist will conduct a survey of the project area to ascertain the presence or absence of special status plant species. If no species are encountered, no mitigation is required.

If a special status species is found within a BMP Update component project area, a setback of 50 feet will be established between the occurrence and the BMP Update construction activities. Prior to construction, PVWMA will install temporary construction fencing at the 50-foot setback line to prevent inadvertent equipment access or construction staging within the special status plant habitat. This fencing will be signed in the field as “SENSITIVE HABITAT AREA — NO CONSTRUCTION ACCESS”. A qualified biologist will inspect the temporary construction barrier fence and monitor the contractor’s compliance with this avoidance measure.

If complete avoidance of special status plant species is infeasible, impacts would be minimized through implementation of Mitigation Measure BIO-3b
Mitigation Measure BIO-3b: Prior to clearing and grubbing in areas where impacts to special status plant species cannot be avoided, PVWMA will consult with applicable resource agencies (i.e., CDFW and/or USFWS) prior to implementing salvage and revegetation actions. A qualified biologist will collect any available above-ground seed pods/seed heads for their use in future revegetation efforts. During construction, the upper 6 inches of topsoil from areas supporting the plant species will be stripped from the construction area and stored for later use. The topsoil will be used in future revegetation efforts which may be on-site (if feasible) or at an off-site location approved by permitting agencies (i.e., USFWS, CDFW). At the designated revegetation area, all stockpiled topsoil will be placed on site and finish graded to blend with surrounding topography. Under direction of a qualified biologist, the areas will be revegetated with locally native herbaceous plant species compatible with natural regeneration of the special status plant species. The qualified biologist will hand broadcast any seeds collected from the special status plant species into the appropriate habitat areas. The revegetation will achieve a minimum of 2:1 plant replacement (i.e., re-establish two plants for every plant impacted). The qualified biologist will monitor the revegetation areas for two years after construction to ascertain if the special status plant species re-established within the revegetation area. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the revegetation measures, for a period of 5 years.

Increased Recycled Water Storage at Treatment Plant

If special status plant species are found to occur at this BMP Update component site and would be directly affected during construction, implementation of mitigation measures BIO-3a and BIO-3b would be necessary to reduce significant impacts on special status plant species to a less than significant level.

Harkins Slough Recharge Facilities Upgrades

If special status plant species are found to occur at this BMP Update component site and would be directly affected during construction, implementation of mitigation measures BIO-3a and BIO-3b would be necessary to reduce significant impacts on special status plant species to a less than significant level.

Watsonville Slough with Recharge Basins

If special status plant species are found to occur at this BMP Update component site and would be directly affected during construction, implementation of mitigation measures BIO-3a and BIO-3b would be necessary to reduce significant impacts on special status plant species to a less than significant level.

College Lake with Inland Pipeline to Coastal Distribution System (CDS)

If special status plant species are found to occur at this BMP Update component site and would be directly affected during construction, implementation of mitigation measures BIO-3a and BIO-3b would be necessary to reduce significant impacts on special status plant species to a less than significant level.
Murphy Crossing with Recharge Basins

If special status plant species are found to occur at this BMP Update component site and would be directly affected during construction, implementation of mitigation measures BIO-3a and BIO-3b would be necessary to reduce significant impacts on special status plant species to a less than significant level.

3.4.3.4 Fish Migration Analysis

Impact BIO-4: Construction and operation of BMP Update components may interfere substantially with the movement of native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery site. Specifically, the College Lake with Inland Pipeline to Coastal Distribution System and the Murphy Crossing with Recharge Basin components may reduce streamflows for steelhead passage, particularly for down-migrating smolts in spring months. This is a significant impact that can be reduced to a less than significant level with implementation of the following mitigation.

Mitigation Measure(s):

See Component Specific Mitigation Measures referenced below and provided in the previous section.

Increased Recycled Water Storage at Treatment Plant

The Increased Recycled Water Storage at Treatment Plant component would have no significant impacts to steelhead, rainbow trout, or other migrating species.

Harkins Slough Recharge Facilities Upgrades

Harkins Slough is not known to support steelhead or resident rainbow trout. Fishes encountered in previous studies are predominantly non-native, warm-water species that are considered predators to juvenile steelhead and resident rainbow trout. These non-native species include carp, largemouth bass, brown bullhead, bluegill, green sunfish, mosquitofish, and black crappie. Native, potentially predatory, fish include Sacramento pikeminnow and Sacramento blackfish. For this reason, the Harkins Slough Recharge Facilities Upgrades component would have no significant impacts to fisheries or other migrating species.

Watsonville Slough with Recharge Basins

Watsonville Slough is not known to support steelhead or resident rainbow trout. Fishes encountered in previous studies are predominantly non-native, warm-water species that are considered predators to juvenile steelhead and resident rainbow trout. These non-native species include carp, largemouth bass, brown bullhead, bluegill, green sunfish, mosquitofish, and black crappie. Native, potentially predatory, fish include Sacramento pikeminnow and Sacramento blackfish. For this reason, implementation of the Watsonville Slough with Recharge Basins component would not have a significant impact on fisheries or other migrating species.
3.4 Biological Resources

College Lake with Inland Pipeline to Coastal Distribution System (CDS)

College Lake and the Casserly Creek subwatershed are known to support steelhead. Spring outmigration through the Salsipuedes/Corralitos Creek system can potentially be affected by the magnitude, timing, and reliability of outflows from College Lake. No new fisheries studies were done in the development of the BMP Update EIR, but based on a previous assessment of downstream critical riffles, the College Lake with Inland Pipeline to Coastal Distribution System would likely be required to maintain a minimum bypass flow of 2 cfs from College Lake and 7.5 cfs in Salsipuedes Creek downstream of its confluence with Corralitos Creek during the normal period for smolt outmigration, March 15 to May 31 (Carollo, 2013; ESA, 2001; ESA, 1999). A new bypass flow study will be required to be conducted prior to implementation of this project.

The estimated College Lake outflow requirement is based on a minimum flow requirement of 7.5 cfs in Salsipuedes Creek immediately downstream of the Corralitos Creek confluence. This flow is supplemented by the estimated minimum of 300 AF (2 cfs) coming from College Lake over the weir from March 15 to May 31 for steelhead smolt outmigration (ESA 2002). These minimum flow estimates were derived from a 1997 channel configuration (critical riffle) assessment that requires updating and refinement, due to periodic flood control channel management activities done by the County of Santa Cruz in Salsipuedes Creek since that time. Since the existing College Lake basin and dam structure is typically fully inundated during the winter adult steelhead upmigration/spawning period (approximately January through March) under current conditions, it does not present an adult migration impediment under existing conditions. However, depending on hydrologic conditions, the proposed raising of the dam by 2.3 feet may delay its overtopping. This could impede adult upmigration and necessitate an adult passage structure and adult bypass flows that were not evaluated during the 1997 investigations. Based on this information, the College Lake with Inland Pipeline to Coastal Distribution System component would potentially result in a significant impact due to reduced streamflows for steelhead passage, particularly for down-migrating smolts in spring months that can be reduced to less than significant with implementation of Mitigation Measures BIO-2m, BIO-2n, BIO-2o and BIO-2p, above.

Murphy Crossing with Recharge Basins

The Murphy Crossing infiltration gallery would generally divert Pajaro River water from late December through mid-May, when flows are highest in the Pajaro River. The average annual volume of water proposed to be diverted from the Pajaro River and recharged to groundwater is estimated at 500 acre-feet (Carollo, 2013). The duration of flows exceeding 45 to 90 cubic feet per second (cfs) vary substantially with water year type and diversions may be limited during critically dry years and multiyear droughts when additional recharge from the proposed project is most needed. The proposed operational diversion of up to 5 cfs of water when flows are between 45 and 90 cfs at Murphy Crossing would not be anticipated to result in significant impacts assuming this component is operated in compliance with regulatory-required flow criteria.

Potential impacts to steelhead resulting from operation of the Murphy's Crossing infiltration gallery are most likely to occur in the late spring and/or during drought periods. During these low and declining flow conditions, under operational conditions, outmigrating smolts are the most likely life history stage at risk. Three characteristics of smolt migration make it more precarious than adult migration: 1) it occurs in late spring, when streamflows are naturally low and declining, rather than during the high flows of winter; 2) it does not appear to occur much earlier in dry years, despite the more rapid decline in spring streamflows; and 3) it is a more continuous, prolonged migration, rather than an episodic dash. The relatively fixed, prolonged migration period is apparently due to the importance of size of emigrating smolts; larger juveniles migrate earlier, and many later fish
apparently require spring growth to achieve a size sufficient to successfully enter the ocean. The relatively fixed late spring migration means that in dry years a large portion of late-migrating steelhead smolts may be blocked from migration due to low flows. Avoiding predation is also apparently an important factor in smolt migration, as almost all migration occurs at night (Smith, unpublished San Lorenzo River trapping results, in ESA 2001). Future refinement of bypass flow requirements would be done in the project-level planning, design, and permitting process. Formal consultation with NOAA Fisheries and the development of a Biological Opinion for Steelhead will be required for final permitting of any new Pajaro River diversion facility. Murphy Crossing with Recharge Basin component may reduce streamflows for steelhead passage, particularly for down-migrating smolts in spring months resulting in a significant impact that can be reduced to less than significant with implementation of Mitigation Measures BIO-2q, BIO-2r, and BIO-s, above.

3.4.4 IMPACTS AND MITIGATION MEASURES OVERALL COMBINED BMP UPDATE

As identified in this section, implementation of the overall combined BMP Update would have potential significant impacts based on impacts to biological resources. However, as previously identified, potential impacts would be less than significant or reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.
Lower Pajaro Valley Raptor Nests Observations

Date: June 2013
Project: 2012-48

Locations of raptor nests observed during 2007, 2010, and 2012 Nesting Bird Surveys and 2013 KEC Field Studies

- Red-tailed hawk
- White-tailed kite
- Coopers Hawk
- Osprey
Lower Pajaro Valley Western Pond Turtle Observations by KEC 2009-2013

Date: June 2013
Project: 2012-48

File: P:\DDA Current Projects\2012-48 PVWMA BMP CEQA\ADEIR\biological section tables figures\Figure 3.4.2 WPT Map_Updated May 2013
Figure 3.4-3

CNDDB Locations
Breeding Area (Calls, egg masses, larvae, and/or metamorphs detected)
Adults, subadults
Adults, subadults, metamorphs
Recycled Water Storage at Treatment Plant Vegetation Types

Source: BRG, 2013
Slough diversion location and vegetation type continues to railroad track.

**Figure 2012-48**
June 2013

Source: BRG, 2013

Harkins Slough and Watsonville Slough Diversion Vegetation Types
Title: Harkins Slough and Watsonville Slough Recharge Basins Vegetation Types

Date: June 2013

Project: 2012-48

Source: BRG, 2013

Legend:
- Cropland/Agriculture
- Upland Tree Groves
- Coyote Brush Scrub
- Ruderal
- Urban/Developed

Source: BRG, 2013
College Lake Improvements and Surrounding Vegetation Types

Date: June 2013

Project: 2012-48

File: P:\DDA Current Projects\2012-48 PVWMA BMP CEQA\ADEIR\biological section tables figures\fig3.4.9.13.pdf

Source: BRG, 2013
3.5 CULTURAL RESOURCES

3.5.1 ENVIRONMENTAL SETTING

3.5.1.1 Regional Setting

This section summarizes the information from a cultural resources survey and literature review for prehistoric and historic resources conducted by Pacific Legacy, Inc. (1997). Because of the sensitivity of cultural resources, specific details regarding the location and nature of identified cultural resources are kept confidential at the Pajaro Valley Water Management Agency (PVWMA).

Archaeology

Breschini and Haversat (1992) have proposed two archaeological population patterns within the Middle Period for the Monterey Bay region: the Sur Pattern (appears by 3000 B.P.) and the Monterey Pattern (after 2450 B.P.). The Sur Pattern is thought to correspond with “Hokan” ancestors of the Esselen and represents an early “forager” subsistence strategy. The Monterey Pattern corresponds with “Penutian” ancestors of historic Costanoan and represents a “collector” subsistence strategy pursued by Costanoan speakers.

In addition, investigations by Dietz and Jackson (1981) identified the existence of two different subsistence strategies. The first population was identified as foragers that utilized the project area approximately 4,000 years ago. The second population was identified as collectors that utilized temporal and seasonal residential bases and camps. Archaeologically, the two populations represent a distinct shift in settlement, subsistence, and use of the region through time.

Ethnography

The ethnographically documented aboriginal inhabitants of the project area were part of the Ohlone, or Costanoan, language group, which extended from the San Francisco Bay area south to the southern Monterey Bay and lower Salinas River areas. Ethnographic information regarding people in this group is obtained from records of early Spanish explorers, documents maintained at missions, the works of ethnographers and linguists, and from Native American descendants.

The Ohlone/Costanoan languages belong to the Utian family, of the Penutian language stock (Shipley, 1978). Ohlone/Costanoan languages were spoken in a large area extending from the San Francisco Bay area, southward along the coast to Point Sur, and inland to the Diablo Range and portions of the northern San Joaquin Valley. Four groups are noted within the project area: Tiuvta, Unijaima, Motsun, and Ausaima (Milliken et al., 1993). The Tiuvta were a tribelet within the Calendrical tribe that occupied the Pajaro River, Elkhorn Slough, and lower Salinas River areas. The Unijaima lived in the mountains and plains of southwestern Santa Clara Valley, north of the Pajaro River, while the Motsun lived in the San Juan Valley and in the mountains southwest of the valley. The Ausaima lived in the eastern portion of the San Felipe Sink and the hills on the west side of Pacheco Pass.
Historical Overview

Spanish Arrival and Colonization

Colonization by the Spanish in what was then known as Alta California occurred in the late 1700s. Captain Gaspar de Portola led the earliest land expedition along the coast in 1769 (Hoover et al., 1990), followed by Pedro Fages in 1770 and 1772, Fernando Javier de Rivera in 1774, and Juan Bautista de Anza in 1776. All except Portola’s expedition traveled on the east side of the Santa Cruz Mountains, along a route later to become known as El Camino Real.

Soon after the first of these expeditions, Missions San Carlos de Borromeo (1770), Santa Clara (1777), and Santa Cruz (1791) were founded. The mission closest to the project area, San Juan Bautista, was founded in 1797. The mission system was an important institution in the colonization process of Alta California. The purposes of the system were to Christianize native people and incorporate them into the Hispanic culture of the colonizers. A process of culture change occurred that brought most of the native peoples in the area into the mission system by 1810. At the expense of traditional skills, the native peoples were taught the horticultural and pastoral skills of the Hispanic tradition.

Mexican Independence and Ranchos

A process of land granting was instituted soon after the mission system began (the first grant was made in 1775) (Hoover et al., 1990). Granting of land, called ranchos, continued throughout the Spanish Period and created the beginning of the cattle industry in California. Within a few years, ranchos occupied large tracts in the vicinity of the missions, and a pastoral economy involving the missions, the rancheros, and the neophytes was established. With the declaration of Mexican independence in 1821, Spanish control of Alta California ceased. Political change did not begin in earnest until mission secularization in 1834, when the native peoples were freed from missionary control, and mission lands were granted to private individuals.

During this time period, cattle hides and tallow were the medium of exchange in local business transactions and with international trading ships. The Mexican population continued to grow and the native population continued to decline. Anglo-Americans began to settle in Alta California, often marrying into Mexican families, becoming Mexican citizens, and receiving land grants.

Anglo-American Expansion

After the Mexico-U.S. War, the 1848 Treaty of Guadalupe Hidalgo formalized Mexico’s capitulation, and Alta California was annexed by the United States. News of the gold strike in the Sierra Nevada mountains that same year sparked a huge migration into California, beginning the Anglo-American occupation of California. Due to a combination of Gold Rush-related immigration and land ownership disputes resulting from the transition from Mexican to U.S. authority, the project area began to change rapidly.

The latter half of the 19th century saw a continued Anglo-American immigration into the project area, and consequent changes in the culture and economy of the area. Anglo-American culture steadily became the predominant culture in California, though the Hispanic culture continued to exist. Dispersed farmsteads slowly replaced the immense Mexican ranchos. The farming of wheat, sugar beets, and other specialized crops eventually replaced cattle ranching as the primary economic activity in the project area.
With the introduction of the railroad to the project area in the late 1800s and the mechanization of farming with steam-driven machinery, agricultural activities in the region were altered. Larger tracts of land were farmed, often on land reclaimed from the sloughs and lowlands adjacent to the Pajaro River. Tar and asphalt were commercially exploited during the 1860s, while granite mining was started in 1900 in the Pajaro Gap area. By the 20th century, farming activities predominated the Pajaro Valley.

### 3.5.1.2 Regulatory Setting

Applicable programs, goals and policies from the Santa Cruz County General Plan/Local Coastal Program and the City of Watsonville General Plan are presented below. Because the only BMP Update component that is located within Monterey County is the Murphy Crossing diversion (land underlying the Pajaro River active channel), Monterey County’s General Plan policies are not included.

#### County of Santa Cruz General Plan/Local Coastal Program

5.19.1 Evaluation of Native American Cultural Sites (LCP). Protect all archaeological resources until they can be evaluated. Prohibit any disturbance of Native American Cultural Sites without an appropriate permit. Maintain the Native American Cultural Sites ordinance.

5.19.2 Site Surveys (LCP). Require an archaeological site survey (surface reconnaissance) as part of the environmental review process for all projects with very high site potential as determined by the inventory of archaeological sites, within the Archaeological Sensitive Areas, as designated on General Plan and LCP Resources and Constraints Maps filed in the Planning Department.

5.19.3 Development Around Archaeological Resources (LCP). Protect archaeological resources from development by restricting improvements and grading activities to portions of the property not containing these resources, where feasible, or by preservation of the site through project design and/or use restrictions, such as covering the site with earthfill to a depth that ensures the site will not be disturbed by development, as determined by a professional archaeologist.

5.19.4 Archaeological Evaluations (LCP). Require the applicant for development proposals on any archaeological site to provide an evaluation, by a certified archaeologist, of the significance of the resource and what protective measures are necessary to achieve General Plan and LCP Land Use Plan objectives and policies.

5.19.5 Native American Cultural Sites (LCP). Prohibit any disturbance of Native American Cultural Sites without an archaeological permit which requires.

5.20.3 Development Activities. For development activities on property containing historic resources, require protection, enhancement and/or preservation of the historic, cultural, architectural, engineering or aesthetic values of the resource as determined by the Historic Resources Commission. Immediate or substantial hardship to a project applicant shall be considered in establishing project requirements.

#### City of Watsonville Vista 2030 General Plan

The General Plan does not contain any policies related to archaeological resources. The following policy relates to historical resources.

Goal 8.6 Retention of Historic Resources. Protect historic structures, whether designated to a historic register or not, from demolition, neglect, and development pressures.
3.5.1.3 Setting by Component

**Increased Recycled Water Storage at Treatment Plant**

According to the County's GIS mapping system, the area surrounding the treatment plant is not identified as having potential archaeological resources. Archaeological surveys of the component area were conducted by Pacific Legacy in November 1997 and March 1999. No cultural resources were identified or recorded in or near this project component.

**Harkins Slough Recharge Facilities Upgrades**

According to the County's GIS mapping system, the area adjacent to the existing diversion pump station and existing and planned recharge basins, including the basins, are identified as having potential archaeological resources. Three previously recorded prehistoric cultural resources (CA-SCR-60, CA-SCR-61, CA-SCR-130) have been identified in the project area: CA-SCR-60, CA-SCR-61, and CA-SCR-130 sites are similar in nature and consist of marine shell fragments, groundstone scatter, flaked-stone debitage, and fire-cracked rock (Edwards and Holson, 1997). In 2005, further review and testing of two of these sites was conducted in which it was determined that the site is a pre-contact Native American midden (Pacific Legacy, September 2005). In addition to the constituents identified above, pestles, shell beads, bone tools and invertebrate and vertebrate faunal remains were also found, as well as human remains. Additionally, the site is one of only several others in the Monterey Bay region that have radiocarbon age estimates on the order of 7000 years BP (before present), and is one of the earliest know prehistoric settlements on the central California coasts. Thus due to its antiquity, the site has potential to provide information important to the understanding of the Native American past (Ibid.).

**Watsonville Slough with Recharge Basins**

According to the County's GIS mapping system, the area adjacent to the existing diversion and existing recharge basins are identified as having potential archaeological resources. However, the North Dunes Recharge Basin proposed as part of this component is not within an area mapped as having potential archaeological resources. Cultural resource surveys have been conducted for areas adjacent to this project component with recorded cultural resources identified the same as for the Harkins Slough Recharge Facilities Upgrades component as described above as the two components are located in the same area.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

According to the County's GIS mapping system, the area surrounding College Lake generally is identified as having potential archaeological resources. The proposed new pipeline to connect to the CDS pipeline generally is not located within an area mapped as having potential archaeological resources.

Archaeological surveys of the College Lake area were conducted by Pacific Legacy in November 1997 and March 1999, which included surveys of areas that would be affected by the proposed College Lake improvements.

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1 This report is not available for public review due to confidentiality considerations and is available on an as-needed basis to qualified individuals, the information in this Draft EIR was screened to redact confidential information.
Three existing previously recorded archaeological sites were identified near College Lake, which include CA-SCR-44H, CA-SCR-104H, and CA-SCR-150. The CA-SCR-44H site, located along the proposed alignment for the College Lake with Inland Pipeline to Coastal Distribution System component, is approximately 40 acres in size and consists of flaked stone debris, faunal shell, bone, and groundstone artifacts. Historic components of this site include two houses and two barns dating from the 1890s to the early 1900s. CA-SCR-150 consists of a large flaked stone debris and faunal bone and shell.

In addition to these cultural resources in the component area, one new archaeological site was identified in the 1997 surveys. This site (identified as CL-2) was found to contain shell, groundstone, and chert flakes. The survey also identified two other areas, based on interviews with landowners, which are likely to contain cultural resource sites. One landowner had plowed up mortars and pestles on his land and the other remembered Native American artifacts being collected from this area. Additionally, a previously unrecorded site, P-1H, was identified along the alignment by the surveys. This site is a historic period trash scatter (glass, ceramic, clam shell, cut bone) that was not fully investigated due to the landowner's request at the time of the survey.

**Murphy Crossing with Recharge Basins**

According to the County's GIS mapping system, it appears that the Murphy Crossing with Recharge Basins component and surrounding area may be located within an area mapped as having potential archaeological resources. Two sites, CA-SCR-103 and CA-SCR-105, are reported to be within the Murphy Crossing with Recharge Basins component area. CA-SCR-103 is reported to be a prehistoric site containing shell scatter fragments and ceramic fragments (Edwards and Holson, 1997). However, the site was not located during the surveys conducted by Pacific Legacy for the area and may have been destroyed. CA-SCR-105, which reportedly also contains shell scatter fragments, was found by the survey to be heavily disturbed (Pacific Legacy, 1999).

**3.5.2 Significance Criteria**

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5 to include physical demolition, destruction, relocation, or alteration of historic resources or of the immediate surroundings of historic resources, such that the significance of the resources would be materially impaired (see definition below);
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5 or to a unique archaeological resources;
- Disturb any human remains, including those interred outside of formal cemeteries; or
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

CEQA Guidelines Section 15064.5 defines historical resources as:
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3.5 Cultural Resources

1. A resource listed in the California Register of Historical Resources, or determined to be eligible by the State Historical Resources Commission

2. A resource included in a local register of historical resources

3. Any object, building, structure, site, area, record, or manuscript which a lead agency determines to be “historically significant” or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California. Generally a resource is considered historically significant if it meets criteria for listing in the California Register of Historical Resources, including one or more of the following:

   A. is associated with events that made a significant contribution to the broad patterns of California’s history and cultural heritage,

   B. is associated with the lives of people important in our past,

   C. embodies the distinctive characteristics of a type, period, region, or method of construction, and represents the work of an important creative individual, or possesses high artistic values, or

   D. has yielded or may be likely to yield information important in prehistory or history;

OR

4. A resource determined to be a historical resource by a project's lead agency as defined in Public Resources Code sections 5020.1(j) or 5024.1

CEQA Guidelines Section 15064.5(b) defines a “substantial adverse change” to a historical resource as: “physical demolition, destruction, relocation or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired. The significance of an historical resource is materially impaired when a project demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in, the California Register of Historical Resources or in registers meeting the definitions in Public Resources Code 5020.1(k) or 5024.1(g).

When a project would adversely affect an archaeological site, a lead agency shall first determine whether the site is a historical resource, as defined above. If it is determined that the archaeological site is a historical resource, the provisions of Public Resources Code Section 21084.1 (Historical Resources) apply. If an archaeological site does not meet the criteria, but does meet the definition of a “unique archaeological resource” in Public Resources Code Section 21083.2 (Archaeological Resources), the site must be treated in accordance with the provisions of Section 21083.2. Section 21083.2(g) defines a unique archaeological resource as “an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information

2. It has a special and particular quality, such as being the oldest of its type or the best available example of its type

3. Is directly associated with a scientifically recognized important prehistoric or historic event or person
3.5.3 IMPACTS AND MITIGATION MEASURES BY COMPONENT

Potential impacts associated with the implementation and construction of the BMP Update components are identified below. Mitigation measures that would apply to all or multiple components are identified for each potential impact. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are identified by component.

There are no buildings or other structures on any of the sites within the proposed BMP Update component sites other than PVWMA facilities to be updated and/or replaced. Implementation of the BMP Update would not result in impacts to historical structures. In addition, the project components are located within areas characterized by relatively level agricultural land and areas of wetland. There are no recorded or observed unique paleontological or geologic resources or features present in the area. Thus, implementation of the proposed BMP Update is not expected to result in direct or indirect impacts to any paleontological features.

3.5.3.1 Potential Disturbance to Archaeological Resources

*Impact CR-1: Construction activities associated with implementation of BMP Update components may result in the alteration or destruction of recorded archaeological sites or encounter unknown, buried resources during ground disturbing activities, which is a potentially significant impact. With mitigation identified in this EIR, the impacts would be reduced to less-than-significant levels.*

**Mitigation Measure(s):**

*Mitigation Measure CR-1a:* Final pipeline and facility plans shall locate facilities and pipeline alignments away from identified and recorded archaeological sites in each component area based on a site reconnaissance and archaeological investigation conducted by a qualified archaeologist at the time site-specific construction plans are developed. The archaeologist shall identify the areal extent of potential recorded sites, assess potential significance to identified resources, recommend adjustment to siting of improvements, facilities and/or pipeline alignments, if necessary, and provide other recommendations to avoid impacts to identified significant resources. If a significant or potentially significant archaeological or historic resource is identified pursuant to the definitions in the State CEQA Guidelines as identified above, the consulting archaeologist shall develop an appropriate mitigation plan for the cultural resource. Possible mitigation measures for important cultural resources may include monitoring by a qualified archaeologist during construction at identified sensitive sites, documentation and recordation of the resource, recovery and relocation, or stabilization of the resource.

*Mitigation Measure CR-1b:* The cultural resource boundaries of potentially significant sites shall be marked as exclusion zones both on ground and on construction maps prior to the commencement of construction activities on component sites. Construction supervisory personnel shall be notified of the existence of cultural resources in each component area and will be required to keep personnel and equipment away from these cultural resources sites. During construction and operational phases, personnel and equipment will be restricted to each surveyed corridor for each component.
Mitigation Measure CR-1c: Should any as yet undiscovered cultural resources be uncovered at any component site, such as structural features, or unusual amounts of bone or shell, artifacts, human remains, or architectural remains be encountered during any development activities, work will be suspended and PVWMA staff will be contacted. A qualified professional archaeologist shall be retained and will perform any necessary investigations to determine the significance of the find. PVWMA will then implement any mitigation deemed necessary for the recordation and/or protection of the cultural resources. In addition, pursuant to Sections 5097.97 and 5097.98 of the State Public Resources Code and Section 7050.5 of the State Health and Safety Code, in the event of the discovery of human remains, all work must be halted and the County Coroner shall be immediately notified. If the remains are determined to be Native American, guidelines of the Native American Heritage Commission shall be adhered to in the treatment and disposition of the remains.

Increased Recycled Water Storage at Treatment Plant

No known or previously recorded cultural resources sites were identified in the component area, and construction of the proposed increase in recycled water storage at the treatment plant would not result in the alteration or destruction of known, identified cultural resources. The planned pipeline would be constructed within or adjacent to an existing farm road, and ground disturbance has occurred with agricultural operations that have occurred in the area. Construction of this component may result in a significant impact on cultural resources. However, Mitigation Measure CR-1c would apply in the event that unknown cultural resources are inadvertently discovered during construction of the proposed component could result in degradation and destruction of undiscovered cultural resources.

Harkins Slough Recharge Facilities Upgrades

Construction of the proposed Harkins Slough Recharge Facilities Upgrades component could result in potential alteration or destruction of known, identified cultural resources due to presence of recorded archaeological sites in and/or adjacent to the site of the planned improvements. The project includes installation of new shallow extraction wells at the recharge basin and upgrading the pump station and filters at the slough diversion to improve system operation and recharge percolation rates, which would be located at the existing diversion site. The project also includes construction of a new recharge basin at one of two alternative sites (the Southeast Recharge Basin or Monitoring Well #7 Recharge Basin site), both of which appear to be within County-mapped areas of potential archaeological resources. Construction of this component may result in a significant impact on cultural resources. However, further site-specific investigation would be conducted at the time the project is proposed for implementation to determine whether adjacent recorded sites may extend into this component site and to provide specific recommendations if needed as set forth in Mitigation Measure CR1a. Mitigation Measure CR-1b would protect any identified sites during construction, and Mitigation Measure CR-1c would apply in the event that unknown resources are inadvertently encountered during construction.

Watsonville Slough with Recharge Basins

Construction of the proposed Watsonville Slough with Recharge Basins component could result in potential alteration or destruction of known, identified cultural resources due to presence of recorded archaeological sites in and/or adjacent to the site of the planned improvements. The diversion point for this BMP Update component is
located in the area near and north of the confluence of Watsonville Slough and Harkins Slough and would divert Watsonville Slough water during winter high flows from December to May. The water would be stored in the surficial groundwater aquifer at the proposed North Dunes Recharge Basin and/or at alternative locations near the existing Harkins Slough Recharge Basin (the Southeast Recharge Basin and the Monitoring Well #7 Recharge Basin). Filtration facility improvements associated with this component likely would not result in impacts to known cultural resources as these elements would occur at the existing Harkins Slough filtration facilities. The alternative recharge basins (except for the Southeast Basin) appear to be outside County-mapped areas of potential archaeological resources. In the event that the North Dunes Recharge Basin is developed as a recharge basin for this component, new conveyance pipeline would be required for installation; however, the conceptual alignment does not appear to be within areas of potential archaeological resources. Construction of this component may result in a significant impact on cultural resources. However, further site-specific investigation would be conducted at the time the project is proposed for implementation to determine whether adjacent recorded sites may extend into this component site and to provide specific recommendations if needed as set forth in Mitigation Measure CR-1a. Additionally, Mitigation Measures CR-1b would protect any identified sites during construction, and Mitigation Measure CR-1c would apply in the event that unknown resources are inadvertently encountered during construction.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

Four cultural resources (prehistoric and historic) sites were identified adjacent to College Lake, which could be impacted by construction of this component. Data potentials of these sites could be altered or destroyed by construction activities and/or flooding from lake capacity expansion. Flooding could cause erosion and/or deterioration of cultural material at these cultural resources sites. Additionally, construction activities associated with this component could potentially impact an historic site, CA-SCR-44/H. Two cultural resource sites (prehistoric and historic) were identified adjacent to and/or within the Inland Pipeline to CDS segment of this component. Construction of this pipeline alignment may directly impact (alter or destroy) archaeological sites P-1H and CA-SCR-44H. Construction of this component may result in a significant impact on cultural resources. However, further site-specific investigation would be conducted at the time the project is proposed for implementation to determine whether adjacent recorded sites may extend into this component site and to provide specific recommendations if needed as set forth in Mitigation Measure CR-1a. Additionally, Mitigation Measures CR-1b would protect any identified sites during construction, and Mitigation Measure CR-1c would apply in the event that unknown resources are inadvertently encountered during construction.

**Murphy Crossing with Recharge Basins**

Based on known cultural resources sites in the component area, construction of the proposed project could result in degradation and destruction of potential known and/or undiscovered cultural resources. Construction of this component may result in a significant impact on cultural resources. However, further site-specific investigation would be conducted at the time the project is proposed for implementation to determine whether adjacent recorded sites may extend into this component site and to provide specific recommendations if needed as set forth in Mitigation Measure CR-1a. Additionally, Mitigation Measures CR-1b would protect any identified sites during construction, and Mitigation Measure CR-1c would apply in the event that unknown resources are inadvertently encountered during construction.
3.5.4 **OVERALL COMBINED BMP UPDATE**

As identified in this section, implementation of the overall combined BMP Update would have potential significant impacts to cultural resources. However, all potential impacts would either be less than significant or reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.
3.6 ENERGY, UTILITIES, AND SERVICES

3.6.1 ENVIRONMENTAL SETTING

3.6.1.1 Regional Setting

Energy

Pacific Gas & Electric Co. (PG&E) provides gas and electric service to the Pajaro Valley area. Natural gas is measured in British thermal units (Btu). Electricity is measured in kilowatt hours (kWh). In 2011, total energy electricity consumption in Santa Cruz County was 1,253.02 million kWh (California Energy Commission, Energy Consumption Data Management System, accessed online at www.ecdms.energy.ca.gov). In 2011, total natural gas consumption in Santa Cruz County was 58.49 million Btu.

Utilities

Water

The City of Watsonville (Watsonville Water District) provides water to Watsonville and surrounding areas, including the areas of Freedom, Corralitos, Green Valley Road, Salispuedes, and Pajaro Dunes. The Pajaro/Sunny Mesa Community Services District (PSMCS) serves Pajaro and the surrounding communities of Sunny Mesa, and Hillcrest Bay Farms. The PVWMA is responsible for managing water resources within the greater Pajaro Valley. The Soquel Creek Water District (SCWD) serves the unincorporated areas of southern Santa Cruz County and overlaps with the PVWMA service area in the La Selva area. An overview of water use is provided in Section 2, Project Description.

Wastewater

Septic tanks are the most prevalent means of sewage disposal within the outlying areas of the PVWMA service area. The wastewater treatment plant (WWTP), operated by the City of Watsonville, collects and treats wastewater for the southern portion of Santa Cruz County. The plant contracts with the Pajaro County Sanitation District, the Salsipuedes Sanitary District, and the Freedom County Sanitary District. The WWTP has the capacity to treat 12 million gallons per day (mgd) average dry weather flow of wastewater to a secondary level of treatment.

Storm Drains

Santa Cruz County and the City of Watsonville maintain pipelines for storm water drainage throughout the Pajaro Valley area to collect and convey storm water runoff to appropriate discharge locations.

Solid Waste

Santa Cruz Waste Management has a contract with Santa Cruz County to provide solid waste collection and disposal in unincorporated areas of the county. Solid waste generated in the Pajaro Valley area would generally
be disposed of at the Buena Vista Landfill. The City of Watsonville has its own solid waste management company and landfill located on San Andreas Road. The Buena Vista Landfill is a Class III landfill operating under State of California Solid Waste Facilities Permit, and accepts an average of 350 tons of solid waste per day. According to the County, the landfill has less than 16 years of remaining capacity. State law requires that counties and cities with less than 15 years of landfill space must investigate garbage disposal solutions. The County of Santa Cruz and the cities of Scotts Valley, Capitola, Santa Cruz, and Watsonville have joined together to consider a variety of options for handling garbage disposal and recycling needs in the future, including continued waste reduction, non-disposal components such as large-scale composting or waste conversion technologies, and out-of-county disposal options.

Other Utilities

AT&T, Pacific Gas and Electric Company, Caltrans, and Union Pacific Railroad maintain utilities within the PVWMA service area.

3.6.1.2 Regulatory Setting

State of California

*California Integrated Waste Management Act.* The California Integrated Waste Management Act requires every county to adopt an Integrated Waste Management Plan (IWMP) that describes county objectives, policies, and programs relative to waste disposal, management, source reduction, and recycling. All solid waste management in Santa Cruz County is governed by the adopted IWMP. In addition, each city and the county have adopted a Source Reduction and Recycling Element for inclusion in the IWMP.

*California Code of Regulations - Utility Notification Requirements.* California law (Code Section 4216 et seq.) requires owners and operators of underground utilities to become members of and participate in a regional notification center. “Operators of subsurface installations who are member of, participate in, and share in, the costs of a regional notification center, including but not limited to … Underground Service Alert -- Northern California … are in compliance with this section” (California Government Code Section 4216.1). According to Underground Service Alert North (USA North), its “purpose is to receive planned excavation reports from public and private excavators and to transmit those planned excavation reports to all participating members of USA who may have underground facilities at the location of excavation. The USA Members will either mark, or stake their facility, provide information or give clearance to dig” (USA North, 2009).

*County of Santa Cruz General Plan/Local Coastal Program*

Applicable objectives, goals and policies from the Santa Cruz County General Plan/Local Coastal Program are presented below.

Objective 7.27 Public Services and Facilities. To promote the improvement of public services and facilities in areas already committed to development, and to spread the costs of needed services and facilities equitably among present and future residents and others who benefit.

Policy 7.25.7 Hazardous Wastes and Environmental Damaging Compounds in Landfills. Prohibit the disposal of radioactive waste, hazardous waste and ozone depleting compounds in County landfills.
City of Watsonville Vista 2030 General Plan

Applicable objectives, goals and policies from the City of Watsonville General Plan are presented below.

Implementation 12.1.13 Development Fees. The City shall maintain a schedule of development impact fees that is commensurate with the increased need for public services and facilities generated by new development.

Implementation 12.2.13 Pajaro Valley Water Management Agency (PVWMA). The City shall participate in the subsequent updates of the Basin Management Plan (BMP) most recently updated in February 2002.

3.6.2 **Significance Criteria**

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects
- Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects
- Have insufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed
- Result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project’s projected demand in addition to the provider’s existing commitments
- Be served by a landfill with insufficient permitted capacity to accommodate the project’s solid waste disposal needs
- Fail to comply with federal, state, and local statutes and regulations related to solid waste

In addition, Appendix F of the CEQA Guidelines requires that an EIR evaluate the potentially significant energy implications of a project and identify energy conservation measures as mitigation where necessary. For the purposes of this CEQA analysis, a project would have a significant effect on energy consumption if it results in the wasteful, inefficient, and unnecessary consumption of energy during project construction, operation, maintenance, and/or demolition activities.

3.6.3 **Impacts and Mitigation Measures by Component**

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to each specific component are identified for each potential impact. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are also identified.

The implementation of the BMP Update would have direct long-term effects on energy use. The proposed Harkins Slough Recharge Facilities Upgrades, Watsonville Slough with Recharge Basins, and College Lake with Inland Pipeline to Coastal Distribution System components would require disposal of the filter waste backwash from the filtration facilities to the WWTP. Adequate capacity is available at the WWTP to treat this incremental
increase in wastewater and no impact to wastewater services or capacity would occur from the component. No other BMP Update components require wastewater treatment.

The analysis below focuses on the proposed increase in demands on energy consumption associated with implementation of the BMP Update. In addition, the following analysis identifies the temporary construction-phase effects of the BMP Update components on solid waste disposal and existing (underground) utilities. Construction activities could result in damage to, or interference with, existing water, sanitary sewer, storm drain, natural gas, electric, and/or communication lines.

As discussed in Section 2, Project Description, several of the BMP Update components would require surface water diversion rights permits for recharge to groundwater and, in some cases, direct addition to the Coastal Distribution System for agricultural irrigation. Because it is a regulatory process, the application for and acquisition of water rights permits would not result in a direct physical change to the environment. However, physical effects on the environment related to use of new surface water that would occur with acquisition of water right permits are addressed in Sections 3.4, Biological Resources, Section 3.9, Hydrogeology and Groundwater Quality, and Section 3.10, Hydrology and Surface Water Quality, of this EIR.

### 3.6.3.1 Disruptions to Utility Service

*Impact ES-1 Construction of the BMP Update components could result in temporary, planned or accidental disruption to utility services provided by underground lines. This potentially significant impact can be reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.*

**Mitigation Measure(s):**

*Mitigation Measure ES-1:* A study to identify utilities along proposed alignments will be conducted by PVWMA during pre-design phases of projects. The following mitigation measures are required for segments identified in final design as having potential conflicts with significant utilities:

a. Utility excavation and encroachment permits would be required from the appropriate agencies, including the Public Works Departments of Santa Cruz County, City of Watsonville, Caltrans, and Union Pacific Railroad. These permits include measures to minimize utility disruption. PVWMA and its contractors shall comply with permit conditions. Permit requirements shall be included in construction contract specifications.

b. Utility locations would be verified through field survey (potholing) and use of an underground locating service.

c. A detailed engineering and construction plan shall be prepared as part of the design plans and specifications. This plan shall include procedures for the excavation, support, and fill of areas around utility cables and pipes. All affected utility services would be notified of PVWMA’s construction plans and schedule. Arrangements would be made with these entities regarding protection, relocation, or temporary disconnection of services.
d. In areas where the pipeline would parallel wastewater mains, engineering and construction plans shall include trench wall support measures to guard against trench wall failure, and possible resulting loss of structural support for the wastewater main.

e. Residents and businesses in the project area shall be notified in writing by the contractor of planned utility service disruption two to four days in advance, in conformance with state and county standards.

Increased Recycled Water Storage at Treatment Plant

Although not anticipated, construction activities for the Increased Recycled Water Storage at Treatment Plant component, including excavation for the storage tanks on the WWTP site and the new pipeline to CDS, could encounter or disrupt existing underground utilities. Any service disruptions would be temporary. The potentially significant impact associated with potential damage to or interference with utilities would be reduced to a less-than-significant level with the implementation of Mitigation Measure ES-1.

Harkins Slough Recharge Facilities Upgrades

Construction activities for the Harkins Slough Recharge Facilities Upgrades component are not expected to affect utilities, with the exception of installation of the new filter waste backwash pipeline along San Andreas Road. Excavation for the pipeline could encounter or disrupt existing underground utilities. Any service disruptions would be temporary. The potentially significant impact associated with potential damage to or interference with utilities would be reduced to a less-than-significant level with the implementation of Mitigation Measure ES-1.

Watsonville Slough with Recharge Basins

Construction activities for the Harkins Slough Recharge Facilities Upgrades component are not expected to affect utilities, with the possible exception of installation of new pipeline to the North Dunes Recharge Basin. Excavation for the pipeline could encounter or disrupt existing underground utilities. Any service disruptions would be temporary. The potentially significant impact associated with potential damage to or interference with utilities would be reduced to a less-than-significant level with the implementation of Mitigation Measure ES-1.

College Lake with Inland Pipeline to Coastal Distribution System (CDS)

Construction activities for the College Lake with Inland Pipeline to Coastal Distribution System component are not expected to affect utilities, with the exception of installation of new pipelines, particularly the inland pipeline to CDS. This pipeline extends for 5.8 miles primarily within existing roadway right-of-way. Within urban areas of the alignment, excavation for the pipeline is likely to encounter or disrupt existing underground utilities. Any service disruptions would be temporary. The potentially significant impact associated with potential damage to or interference with utilities would be reduced to a less-than-significant level with the implementation of Mitigation Measure ES-1.

Murphy Crossing with Recharge Basins

Construction activities for the Murphy Crossing with Recharge Basins component are not expected to affect utilities, with the exception of installation of new pipeline from the infiltration gallery to recharge basins.
3.6 Energy, Utilities, and Services

Excavation for the pipeline could encounter or disrupt existing underground utilities. Any service disruptions would be temporary. The potentially significant impact associated with potential damage to or interference with utilities would be reduced to a less-than-significant level with the implementation of Mitigation Measure ES-1.

3.6.3.2 Increases in Energy Consumption

Construction and implementation of BMP Update components would result in increased temporary and ongoing energy demand. However, based on the limited size and energy demand required for each component and the adequacy of electricity delivery systems, this represents a less-than-significant impact and no mitigation is required.

Increased Recycled Water Storage at Treatment Plant

The construction of the BMP Update components would result in indirect energy consumption from construction traffic and the use of construction materials. The primary energy demand during construction would occur from use of gasoline and diesel-powered mobile construction equipment and vehicles to transport workers and materials to and from the construction site. Electricity would also be used for construction lighting, field services, and electrically driven construction devices such as air compressors, pumps and other equipment. The project would result in very little indirect energy consumption as a result of post-construction traffic (i.e., operational traffic). Although the project would result in increased indirect energy consumption, the amount of transportation fuel and potential electricity use required for project operation is not considered an inefficient or wasteful use of energy.

Implementation of the BMP Update components would result in direct energy consumption associated with operations from an incremental increase in the demand for electrical energy. While the proposed project would somewhat increase electricity demands compared to existing conditions, the increased demands do not represent a substantial increase in energy consumption necessitating the construction of new or expanded facilities, nor would the additional energy consumption result in the wasteful inefficient, and unnecessary consumption of energy. This is a less-than-significant impact.

Estimated operational power demand for the Increased Recycled Water Storage at Treatment Plant component is estimated at 350,000 kWh per year. As described above, this represents a less-than-significant increase in energy consumption.

Harkins Slough Recharge Facilities Upgrades

See discussion above for the Increased Recycled Water Storage at Treatment Plant component. Estimated operational power demand for the Harkins Slough Recharge Facilities Upgrades component is approximately 267,000 kWh per year. This represents a less-than-significant increase in energy consumption.

Watsonville Slough with Recharge Basins

See discussion above for the Increased Recycled Water Storage at Treatment Plant component. Estimated power demand for the Watsonville Slough with Recharge Basins is 333,000 kWh per year. This represents a less-than-significant increase in energy consumption.
3.6 Energy, Utilities, and Services

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

See discussion above for the Increased Recycled Water Storage at Treatment Plant component. Estimated operational power demand for the College Lake with Inland Pipeline to Coastal Distribution System component is approximately 800,000 kWh per year. This represents a less-than-significant increase in energy consumption.

**Murphy Crossing with Recharge Basins**

See discussion above for the Increased Recycled Water Storage at Treatment Plant component. Estimated operational power demand for the component is approximately 80,000 kWh per year. This represents a less-than-significant increase in energy consumption.

3.6.3.3 **Solid Waste Disposal Impacts**

*Impact ES-2: Construction of the BMP Update components could potentially impact solid waste landfill capacity, since the County’s Buena Vista Landfill is approaching capacity. Although the BMP Update improvements are expected to generate a relatively small amount of construction waste to be disposed of at the landfill, this is considered a significant impact due to limited landfill capacity. Mitigation is identified below to reduce the impact to a less-than-significant level.*

**Mitigation Measure(s):**

*Mitigation Measure ES-2: PVWMA shall include in its construction specifications a requirement for the contractor to provide plans for recovering, reusing, and recycling construction, demolition, and excavation wastes and providing for composting of plant material, where feasible.*

**Increased Recycled Water Storage at Treatment Plant**

Construction of the Increased Recycled Water Storage at Treatment Plant component would require approximately 12,000 cubic yards (CY) of excavation. It is assumed that some portion of the excavation will consist of construction and demolition waste requiring disposal at a landfill. Clean materials could be deposited at various locations available to PVWMA; materials may be reused onsite, used for fill at another location, or sold. If determined to be hazardous (e.g., pesticide residuals, heavy metals), the material may require disposal at an approved facility. (Refer to Section 3.8 Hazards and Hazardous Materials for more information on potential hazardous soil conditions).

If construction and demolition waste is disposed at the Buena Vista Landfill rather than reused, recycled, or deposited at an alternative facility, it could increase the disposal rate and possibly exceed the landfill’s permitted daily tonnage, depending on the amount and timing of the delivery to the landfill. Given the limited capacity at the landfill, this represents a significant impact. Implementation of Mitigation ES-2 would reduce this impact to a less-than-significant level.
3.6 Energy, Utilities, and Services

Harkins Slough Recharge Facilities Upgrades

Construction of the Harkins Slough Recharge Facilities Upgrades component would require approximately 3,100 CY of excavation for the filter backwash pipeline. Excavation would also be required for a new recharge basin, which may be located at two possible locations: about 60,000 CY of excavation would be required for the Southeast Recharge Basin and 20,000 CY for the Monitoring Well #7 Recharge Basin (both requiring 85% off-haul).

It is assumed that some portion of the excavation will consist of construction and demolition waste requiring disposal at a landfill. Clean materials could be deposited at various locations available to PVWMA; materials may be reused onsite, used for fill at another location, or sold. If determined to contain hazardous materials (e.g., pesticide residuals, heavy metals), the material may require disposal at an approved facility.

If construction and demolition waste is disposed at the Buena Vista Landfill rather than reused, recycled, or deposited at an alternative facility, it could increase the disposal rate and possibly exceed the landfill’s permitted daily tonnage, depending on the amount and timing of the delivery to the landfill. Given the limited capacity at the landfill, this represents a significant impact. Implementation of Mitigation ES-2 would reduce this impact to a less-than-significant level.

Watsonville Slough with Recharge Basins

Construction of the Watsonville Slough with Recharge Basins component would require 5,250 CY of excavation for the pipeline, 400 CY for the diversion pumps, and 100,000 CY of excavation for the North Dunes Recharge Basin. As described above, excavation for alternative basin locations would be 60,000 CY of for the Southeast Recharge Basin and 20,000 CY for the Monitoring Well #7 Recharge Basin (both requiring 85% off-haul).

If construction and demolition waste is disposed at the Buena Vista Landfill rather than reused, recycled, or deposited at an alternative facility, it could increase the disposal rate and possibly exceed the landfill’s permitted daily tonnage, depending on the amount and timing of the delivery to the landfill. Given the limited capacity at the landfill, this represents a significant impact. Implementation of Mitigation ES-2 would reduce this impact to a less-than-significant level.

College Lake with Inland Pipeline to Coastal Distribution System (CDS)

Construction of the College Lake with Inland Pipeline to Coastal Distribution System component would require approximately 44,000 CY of excavation. This includes 42,000 CY for the pipeline and 2,000 CY for the filtration facility. It is assumed that some portion of the excavation will consist of construction and demolition waste requiring disposal at a landfill. Clean materials could be deposited at various locations available to PVWMA; materials may be reused onsite, used for fill at another location, or sold. If determined to contain hazardous materials (e.g., pesticide residuals, heavy metals), the material may require disposal at an approved facility.

If construction and demolition waste is disposed at the Buena Vista Landfill rather than reused, recycled, or deposited at an alternative facility, it could increase the disposal rate and possibly exceed the landfill’s permitted daily tonnage, depending on the amount and timing of the delivery to the landfill. Given the limited capacity at the landfill, this represents a significant impact. Implementation of Mitigation ES-2 would reduce this impact to a less-than-significant level.
Murphy Crossing with Recharge Basins

Construction of the College Lake with Inland Pipeline to Coastal Distribution System component would require approximately 60,500 CY of excavation. This includes 5,500 CY for the pipeline, 20,000 for the infiltration gallery, and 35,000 CY for the recharge basin. It is assumed that some portion of the excavation will consist of construction and demolition waste requiring disposal at a landfill. Clean materials could be deposited at various locations available to PVWMA; materials may be reused onsite, used for fill at another location, or sold. If determined to contain hazardous materials (e.g., pesticide residuals, heavy metals), the material may require disposal at an approved facility.

If construction and demolition waste is disposed at the Buena Vista Landfill rather than reused, recycled, or deposited at an alternative facility, it could increase the disposal rate and possibly exceed the landfill’s permitted daily tonnage, depending on the amount and timing of the delivery to the landfill. Given the limited capacity at the landfill, this represents a significant impact. Implementation of Mitigation ES-2 would reduce this impact to a less-than-significant level.

3.6.4 IMPACTS AND MITIGATION MEASURES OVERALL COMBINED BMP UPDATE

As identified in this section, implementation of the overall combined BMP Update would have potential significant impacts associated with utilities disruptions and solid waste disposal. All potential impacts would either be less than significant or reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.
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3.7  GEOLOGY AND SOILS

3.7.1  ENVIRONMENTAL SETTING

3.7.1.1  Regional Setting

This section describes the geology, soils, and seismic conditions in the Pajaro Valley region, based on a review of reports and geologic maps including:

- The Final Program EIR for the Pajaro Valley Water Management Agency’s (PVWMA) Basin Management Plan (1993);
- The Final EIR for the PVWMA Local Water Supply and Distribution Project (1999);
- Reports published by the U.S. Geological Survey (USGS) and the California Division of Mines and Geology (CDMG);
- Santa Cruz County General Plan (1994); and
- U.S. Department of Agriculture Soil Surveys for Santa Cruz and Monterey counties.

Geology

The project is located within the Pajaro Valley, a wide plain between the Coast Ranges and Monterey Bay. Northwest-trending mountains and valleys that are often defined by active faults characterize the Coast Ranges. The southern Santa Cruz Mountains, from the vicinity of Highway 101, westward through the Chittenden Pass, consist of Middle and/or Lower Pliocene (5 million years ago) marine sedimentary rocks and Early Miocene (23.5 million years old) marine deposits (Figures 3.7-1 and 3.7-2). A small amount of Mesozoic granite from the Salinian block occurs south of Highway 129 (at the Granite Rock quarry) in the San Andreas rift zone. The Pajaro Valley is underlain by Quaternary alluvium from Aromas to Monterey Bay. The Pajaro Valley separates the southern Santa Cruz Mountains to the north from the Gabilan Range to the south. The Gabilan Range is underlain partly by Pleistocene nonmarine sedimentary rocks.

Seismicity

The region is characterized by high seismic activity. The San Andreas Fault System, forming the boundary between the North American and Pacific crustal plates, is expressed as a series of northwest-trending faults. These faults include the San Andreas, San Gregorio, Monterey Bay, Hayward, Calaveras, Sargent, Vergales, and Zayante faults (Figure 3.7-3). Many individual faults of the San Andreas Fault System have produced strong earthquakes in the past and will continue to do so in the future. The 1989 Loma Prieta earthquake, which was centered in the Santa Cruz Mountains to the northeast of the Pajaro Valley, resulted in deaths, injuries, and widespread damage in the BMP Update area.
Table 3.7-1 lists the location of regionally significant active faults that could affect project facilities, and the location of the faults relative to these facilities. The following text provides a summary of primary faults most likely to adversely affect the project area.

Table 3.7-1 Active Faults in the Project Vicinity

<table>
<thead>
<tr>
<th>Fault</th>
<th>Approx Distance Nearest Component</th>
<th>Last Movement</th>
<th>Fault Classification¹</th>
<th>Historical Seismicity²</th>
<th>Max Credible Earthquake (MCE)³</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Gregorio</td>
<td>16.8 miles</td>
<td>Holocene</td>
<td>Active</td>
<td>Micro Seismicity</td>
<td>7.7</td>
</tr>
<tr>
<td>Monterey Bay</td>
<td>12 miles</td>
<td>Holocene</td>
<td>Active</td>
<td>Micro Seismicity</td>
<td>N/A</td>
</tr>
<tr>
<td>Calaveras (southern)</td>
<td>16.8 miles</td>
<td>Historic (creep, 1861 rupture) Holocene</td>
<td>Active</td>
<td>M5.6 – M6.4 (1861) M4 – M4.5 (swarms 1970,1990)</td>
<td>7.5</td>
</tr>
<tr>
<td>Sargent</td>
<td>8.4 miles</td>
<td>Historic (creep from 1989 quake)</td>
<td>Active</td>
<td>Micro Seismicity</td>
<td>N/A</td>
</tr>
<tr>
<td>Zayante-Vergales</td>
<td>1 mile</td>
<td>Holocene</td>
<td>Segments identified as both active and potentially active</td>
<td>Data Limited</td>
<td>6.8</td>
</tr>
</tbody>
</table>

N/A = not available

¹ Jennings, 1994, and Hart, 1997; An “Active fault” is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (approximately the last +10,000 years).

² Richter magnitude (M) and year for recent and/or large events.

³ The maximum credible earthquake (MCE) is the strongest earthquake that is likely to be generated along a fault zone, based on the geologic character of the fault and earthquake history. MCE value cited from Mualchin and Jones, 1992.


San Andreas Fault

The San Andreas Fault is a major northwest-trending, right-lateral, strike-slip fault. The fault extends for about 600 miles from the Gulf of California in the south to Cape Mendocino in the north. The San Andreas is not represented by a single trace, but by a system of active faults that diverge from the main fault south of San Jose. Regional faults that are subparallel to the San Andreas Fault, such as the Hayward, Calaveras, and San Gregorio, are within the broader San Andreas Fault System.

The San Andreas Fault has produced numerous large historic earthquakes including the 1906 San Francisco earthquake. That event had an estimated Richter magnitude of 8.3, and was associated with up to 21 feet of displacement and widespread ground failure (PVWMA/ESA, 2001). Numerous moderate-sized earthquakes (Richter magnitude 5.2) occurred in Watsonville in 1954 and again in 1964 and 1969, causing irrigation and water
mains to rupture and plaster and stucco to crack (PVWMA, 1993). The Richter magnitude 7.1 Loma Prieta earthquake of October 1989 caused strong groundshaking and ground failure across a wide region. Major damage occurred in downtown and residential Watsonville, Santa Cruz, Castroville, Gilroy, and Hollister. The Loma Prieta earthquake produced a peak ground acceleration of 0.39g (gravitational acceleration), which was accompanied by groundshaking established at Modified Mercalli intensity VIII in the project area.

The San Andreas Fault has repeatedly provided evidence of large surface fault rupture events and is designated as an earthquake fault zone under the Alquist-Priolo Act of 1972 (see description of this legislation on page 3.7-9). The Peninsula segment of the San Andreas Fault is estimated to have a 15 percent probability of producing a Richter magnitude 6.7 earthquake in the period between 2000 and 2030 (PVWMA/ESA, 2001). Because a significant amount of stress was released during the 1989 Loma Prieta earthquake, the Santa Cruz Mountains segment is assigned a 10 percent probability of producing a similar magnitude earthquake in the same 30-year period.

**San Gregorio Fault**

The San Gregorio Fault Zone is made up of several shorter faults and extends roughly parallel to the coast of California, about 270 miles from the vicinity of Bolinas Bay south to Monterey Bay. The Palo Colorado Fault as mapped by Jennings (1994) extends from the center of Monterey Bay 24 miles to Big Sur, and may be a segment of the San Gregorio Fault Zone. The San Gregorio continues south through Big Sur and eventually connects with the Hosgri Fault Zone in the south-central portion of the state. Except for two small segments that pass through land, the San Gregorio Fault Zone remains offshore from San Francisco to Santa Cruz, and is about 18 miles offshore in the vicinity of La Selva Beach (PVWMA/ESA, 2001).

**Calaveras Fault**

The Calaveras Fault, a major right-lateral, strike-slip fault, extends for about 100 miles from Dublin to Hollister, where it merges with the San Andreas Fault. The Calaveras Fault is most active on the southern segment. The Morgan Hill earthquake of April 1984 (Richter magnitude 6.2) originated on the Calaveras Fault. Creep has been documented along the fault in the vicinity of Hollister. The Calaveras Fault is designated as an earthquake fault zone under the Alquist-Priolo Act (PVWMA/ESA, 2001).

**Sargent Fault**

The Sargent Fault branches off from the San Andreas Fault and extends for about 34 miles from the Lexington Reservoir in the north to just north of Hollister in the south. The Sargent Fault is a reverse fault that dips steeply to the west and is seismically active. The fault is considered capable of surface rupture and is designated as an Alquist-Priolo earthquake fault zone (PVWMA/ESA, 2001).

**Zayante-Vergeles Fault**

The Zayante-Vergeles Faults are subparallel and about five miles west of the San Andreas Fault. The Zayante Fault is considered to be a potentially active fault (Jennings, 1994). Some portions of the Zayante Fault may be active and some scientists believe its southern section may be indirectly connected to the San Andreas Fault Zone. The connection between these faults in the subsurface beneath the Pajaro River floodplain is inferred in the absence of specific evidence. The Vergeles Fault displaces granitic basement rock against Pleistocene-age
Aromas sand, but has not been found to display Holocene movement. Former investigations on the Vergeles Fault have resulted in the State Mines and Geology Board designating portions of the fault as a fault rupture hazard zone (USGS Watsonville East and Watsonville West 7.5-minute Topographic Map). However, other portions of the Vergeles are classified as potentially active and are not designated under the Alquist-Priolo Act (PVWMA/ESA, 2001).

**Soils**

Soils form in response to the characteristics of underlying rock formations, slope, drainage, and climate. Soils within the BMP Update area vary from rich agricultural soils in the low-lying, gentle slopes of the southern Santa Clara Valley and Pajaro Valley to thin, eroded soils in the steep slopes of the Santa Cruz Mountains. Some soils contain clay minerals that have expansive properties. These soils expand when wet and shrink when dried.

Soils may also have low pH or high sulfate concentration or other chemical characteristics that can create a corrosive environment to uncoated steel or concrete. Soils within the BMP Update area could be moderately to highly corrosive.

The southern Santa Clara Valley is underlain by alluvium, from which good agricultural soils have formed. The southern portion of the valley is currently in agricultural use, supporting a variety of crops and orchards. Soils in the Santa Cruz Mountains are variable. Upland soils are thin and generally do not support agriculture, except for rangeland. Locally flat, alluvial areas within the mountains are cultivated. Soils that have formed within the alluvium of the Pajaro Valley are rich, highly productive agricultural soils that support a variety of vegetable crops as well as berries, flowers, and orchards.

The U.S. Department of Agriculture maintains information about soils in their Soil Survey Geographic (SSUGRO) database. The SSUGRO database includes 120 named soils in the PVWMA service area. The saturated hydraulic conductivities of the named soils range from 0.0003 to 200 feet per day. The soils Available Water Capacity, similar to the specific yield of geologic sediments, range from 1% to 30% (Figure 3.7-4).

### 3.7.1.2 Local Setting

**Topography and Geography**

The Pajaro Valley plain is a low-lying topographic area that ranges in elevation from sea level to about 200 feet mean sea level (MSL) along the perimeter, at the foot of the Coast Ranges. Flat to gently sloping landforms characterize most of the topography, with some moderate to steep slopes along the edges of wide valleys cut into old marine terraces (e.g., Harkins Slough and Corralitos Creek) and in the coastal dune areas. Moderate slopes are also present in the Cayetano Range, a dissected low range of hills at the southern edge of the valley.

**Geologic Units**

The geologic units mapped in the BMP Update area consist of marine sedimentary bedrock and unconsolidated deposits of alluvial, aeolian, and marine origin. Important differentiations exist among areas underlain by bedrock and areas underlain by various types of sediments. The properties of bedrock and sediments that need to be considered during the planning, design, and construction phases of the project facilities are strength, compressibility, and liquefaction potential (bedrock is not subject to liquefaction). These properties (discussed in the next section) vary for different geologic units and affect their seismic responses and construction uses.
Young Sediment

The beach dunes, basin deposits, and floodplain deposits are the youngest geologic units in the BMP Update area, being less than about 10,000 years old (the Holocene epoch of the Quaternary geologic period). The dune and beach deposits generally are fine to medium sand with local concentrations of pebbles and cobbles in the beach sands, ranging in thickness from 5 to 80 feet. The basin and floodplain deposits consist of clay, silty clay, and fine sand ranging in thickness from less than 5 to more than 100 feet. The dune sands consist of unconsolidated, well-sorted, fine- to medium-grained quartz sand. The high porosity and permeability of the dune sands allow for potential rapid recharge of coastal sections of the Aromas Aquifer. Locally, however, the dune sands may be separated from the Aromas Aquifer by low permeability clays that restrict recharge. Where the dune sands readily recharge the Aromas Aquifer, a groundwater mound likely formed historically that acted as a natural barrier against seawater intrusion.

Older Alluvial Sediments

The majority of the BMP Update area is underlain by sedimentary deposits of late Tertiary to Pleistocene age, with some deposits of marine or mixed origin near the coast. These deposits include the Quaternary-aged terrace deposits and the older terrace deposits of Watsonville. The terrace deposits consist of unconsolidated basal gravel, sand, silt, and clay. These terrace deposits represent material eroded from the older rocks and redeposited by ancient streams and/or wind, or reworked by ocean wave action and longshore drift. The thicknesses of individual types of deposits vary from less than 10 feet to more than 200 feet. These deposits are collectively referred to as the alluvial formation in the PVWMA Basin Plan and are a water-bearing strata underlain by and in good hydrologic connection with the Aromas Red Sands Formation, discussed below.

The alluvial deposits are a highly variable mixture of unconsolidated sand, gravel, and clay that are present in the Pajaro River floodplain and in adjacent smaller river valleys. In the floodplain, a 50-foot-thick basal gravel grades upward into a confining blue clay marker bed. The blue clay is discontinuous for four miles west of the Pajaro Gap before becoming an apparently nearly continuous unit that thickens as it extends to the coast. The basal gravel is hydrologically connected with the Aromas Red Sands and is a source of water for shallow wells within the Pajaro River floodplain (PVWMA/ESA, 2001).

Aromas Red Sands Formation

The Aromas Red Sands Formation has a thickness that ranges from 100 feet in the foothills to over 800 feet in the center of the basin. The Aromas Red Sands are also of Pleistocene age, but are older than the overlying alluvial formation. The Aromas Red Sands consist of older fluvial and younger aeolian sand deposits with discontinuous lenses of clay, silt, and gravel. The sands are moderately well-sorted and commonly have a red-brown color. The Aromas Formation is considered to be the primary water-bearing unit of the Pajaro Basin.

Throughout the Aromas Red Sands, thick expanses of sand are separated by discontinuous confining layers of clay that separate the formation into the Lower Aromas (primarily fluvial deposits) and the Upper Aromas (primarily aeolian deposits). The confining layer consists of interbedded clay and silty clay in the fluvial part of the Aromas Red Sands. The clay layers tend to be thicker in the west and thin toward the east. Previous investigations suggest the source of the Aromas Red Sands as the granitic rock formations of either the Coast Ranges or the Sierra Nevada Range.
Purisima Formation

The Purisima Formation underlies the Aromas Red Sands and consists of interbedded sands, silts, clays, and shales of marine origin of Pliocene age (about 2 to 6 million years old). The formation outcrops around the periphery of the basin in the north and the east. Beneath the central Pajaro Valley the Purisima is 1,000 to 2,000 feet thick and grows thinner as it extends to the southeast. East of Corralitos, the Purisima is approximately 4,000 feet thick in the down-dropped block between the Zayante-Vergales Fault and the San Andreas Fault. The San Andreas Fault separates the Purisima from older rocks to the east.

Previous investigations divide the Purisima into three units. The upper unit is very fine to fine sand with silt and clay interbeds. The middle unit is a fine to medium sand with clay and silt interbeds and some gravel. The lower unit is a sand with clay and shale interbeds. The middle and lower units tend to have a bluish appearance in freshly exposed sediments. Approximately 600 feet below the top of the lower unit is a 150-foot thick shale marker bed that is continuous throughout the Pajaro Valley.

Geologic Hazards

Landslides, earthslips, mudflows, and soil creep are all expressions related to the instabilities created by steep slopes, shallow soil development, the presence of an excessive amount of water, or the lack of shear strength in the soil or at the soil/rock interface. Earthquake activity induces some landsliding in soils, but most slippage results from the weight of rain-saturated soil and/or rock exceeding the shear strength of the underlying material. Erosion of supporting material at the toe of a slope further contributes to instability. Static slope instability is the major cause of landslides throughout coastal California. Although existing soil materials may form the basis of an unstable condition, natural processes and human activities can initiate landslides in otherwise stable areas.

Settlement is a function of the compressibility of loose deposits (such as some unconsolidated sands or uncompacted fill) and the weight of overlying fill or structures. For example, the loose and semifluid nature of slough deposits render them subject to compression when loads are placed on them. The load (such as fill or other support structures) will settle, sometimes differentially, during a period of several years before a state of equilibrium is reached. The amount of settlement will vary, depending on the thickness of the deposit, the weight of the load, and rate of loading.

Seismicity and Hazards

Active traces of the San Andreas and Vergales Faults have been mapped crossing the BMP Update area. A discussion of these faults is presented in Section 3.7.1.1, Regional Setting. Seismic hazards from local and regional faults are discussed below.

Groundshaking

Earthquakes in the Monterey Bay area could produce strong groundshaking in the Pajaro Valley. Groundshaking intensity is partly related to the size of an earthquake, the distance to the project facility, and the response of the geologic materials that underlie the site. As a rule, the greater the earthquake magnitude and the closer the fault rupture to the site, the greater the intensity of groundshaking. Violent groundshaking is generally expected at and near the epicenter of a large earthquake. Throughout the Pajaro Valley, intensity of groundshaking reached a Modified Mercalli scale VIII in the 1989 Loma Prieta earthquake and likely reached a similar level in a large earthquake affecting the area in October 1865.
Aftershocks also produced damage following the earthquakes. An intensity of VIII, with average peak ground accelerations of 0.25g to 0.30g (peak ground surface acceleration), is expected throughout the northern part of the Pajaro Valley; an intensity of IX or higher, and with average peak ground acceleration at 0.50 to 0.55g, is expected in the southern and coastal parts of the valley. Geologic materials respond differently to earthquake waves. Deep unconsolidated materials amplify earthquake waves. Even when an earthquake epicenter is distant from a site, it can induce strong groundshaking and wave amplification, with severe hazards to people and property. This probably accounted for the severity of damage in Watsonville in the 1989 earthquake as well as associated ground failures, primarily from liquefaction. Besides general intensity of earthquakes, peak ground acceleration is an important consideration in the response of structures to earthquake movements. Considering all potential earthquake sources in the region, the maximum credible ground acceleration in the entire valley is estimated at 0.5g (gravitational acceleration), which is as high a level of acceleration as may be expected in any part of California. Because the depths of overlying soils are variable, ground accelerations at the surface are varied. As noted, deep soils may amplify ground movements in some areas.

Secondary Earthquake Hazards

Liquefaction is a phenomenon whereby unconsolidated and/or near saturated soils lose cohesion and are converted to a fluid state as a result of severe vibratory motion. The relatively rapid loss of soil during strong earthquake shaking results in the temporary fluid-like behavior of the soil, and occasionally ground failure. Soils that are most susceptible to liquefaction are clean, loose, uniformly graded, saturated, fine-grained sand, usually at depths of less than 50 feet below ground surface. In general, upland areas have a low liquefaction potential, except where significant alluvium occurs in creek bottoms or swales. Liquefaction was recorded in areas scattered throughout the Pajaro Valley in the 1989 Loma Prieta earthquake. It is expected that areas bordering the entire Pajaro River are subject to ground failures in large earthquakes. Four kinds of ground failure commonly result from liquefaction: lateral spread, flow failure, ground oscillation, and loss of bearing strength. A lateral spread is a horizontal displacement of surficial blocks of sediments resulting from liquefaction in a subsurface layer. Lateral spread occurs on slopes ranging between 0.3 and 3 percent and commonly displaces the surface by several meters to tens of meters. Lateral spreads of only a few feet damaged every major pipeline that broke during the 1906 San Francisco earthquake.

Flow failures occur on slopes greater than three degrees and are primarily liquefied soil or blocks of intact material riding on a liquefied subsurface zone. Ground oscillation occurs on gentle slopes when liquefaction occurs at depth and no lateral displacement takes place. Soil units that are not liquefied may pull apart from each other and oscillate on the liquefied zone. Ground fissures can accompany ground oscillation and sand boils. The loss of bearing pressure can occur beneath a structure when the underlying soil loses strength and liquefies. When this occurs, the structure can settle, tip, or even become buoyant and “float” upwards.

Coastal areas of the Pajaro Valley also are subject to tsunamis (often incorrectly referred to as tidal waves). A tsunami may be generated by nearby earthquakes, or earthquakes occurring hundreds of miles from the affected coastline. A 1946 earthquake in the Alaskan Trench of the north Pacific Ocean produced two 12-foot tsunamis in Monterey Bay. A probable wave run-up for the area between Sunset State Beach and Moss Landing has been estimated between 6.7 feet for the 100-year tsunami and 13.2 feet for the 500-year tsunami.
3.7 Geology and Soils

Soils

A variety of soil types are present within the BMP Update area. These soil associations are Elder-Conejo, Clear Lake, Watsonville-Elkhorn Pinto, Diablo-Cropley, and Baywood-Pfeiffer and are briefly described below based on information in the Soil Survey of Santa Cruz County (1980).

Soils on alluvial plains and fans and in basin-like areas were developed on unconsolidated deposits derived mainly from sedimentary rocks. Their topography ranges from nearly level to strongly sloping. They are very deep and are well to poorly drained. They occur along the Pajaro River, in the valley of Corralitos Creek, and in Harkins and Elkhorn sloughs, at elevations ranging from about +5 feet MSL to about +300 feet MSL. The following soil associations are in this group.

- The Elder-Conejo soils are generally confined to the valley of the Pajaro River east of Watsonville, and to the valley of Corralitos Creek. These soils are well drained, very deep sandy loams, loams, and clay loams, with nearly level to strongly sloping topography.

- Soils of the Clear Lake Association occur along the Pajaro River downstream from Watsonville. These soils are poorly drained, consisting of very deep clays in basin-like areas on nearly level topography. Soils on marine terraces, old alluvial fans, and hills generally were developed on marine deposits, old alluvium, or weathered shale. These deep to very deep soils range from nearly level to moderately steep topography, and from well drained to somewhat poorly drained. They occur in an arc from west of Aptos, through Corralitos, south through the lakes, to the Tarpy Road area, and on terraces adjacent to Harkins and Elkhorn sloughs, at elevations ranging from about +20 to about +600 feet MSL.

- Soils of the Watsonville-Elkhorn-Pinto Association are well drained to somewhat poorly drained, very deep loams and sandy loams on marine terraces and old alluvial fans, with nearly level to moderately steep topography. These soils occur mainly along the terraces, in the lower foothills of the Santa Cruz Mountains, and on dissected terraces closer to the coast.

- The Diablo-Cropley soils occur west and south of Watsonville. They are well drained, deep, and very deep clays on alluvial fans or hills, with gently sloping to hilly topography.

- Soils on sand dunes, hills, and mountains were formed in aeolian deposits or in residuum derived from sandstone, marine deposits, or granitic rock. These deep or very deep soils range from gently sloping to very steep topography and are well drained or somewhat excessively drained. They occur in the hills west of Corralitos Creek and east of Elkhorn Slough, at elevations ranging from about +100 to about +700 feet MSL.

- The Baywood-Pfeiffer soils occur south of Aptos to Sunset Beach State Park, and east to Freedom Boulevard. These soils are well drained to somewhat excessively drained, very deep and deep loamy sands and gravelly sandy loams on sand dunes, with gently sloping to steep topography.
### 3.7.1.3 Regulatory Setting

**Santa Cruz County General Plan/Local Coastal Plan**

The Public Safety and Noise section of the General Plan and Local Coastal Program for the County of Santa Cruz (1994) includes numerous policies relating to the construction of residential, commercial, and critical structures within geologic hazard zones. The following policies pertain to the placement of public facilities within Santa Cruz County:

Policy 6.1.3: Engineering Geology Report for Public Facilities in Fault Zones. Require a full engineering geology report by a certified engineering geologist whenever a significant potential hazard is identified by a Geologic Hazards Assessment or Preliminary Geologic Report, and prior to the approval of any new public facility or critical structures within the designated fault zone.

Policy 6.1.8: Design Standards for New Public Facilities. Require all new public facilities and critical structures to be designed to withstand the expected groundshaking (specified in design standards) during an earthquake on the San Andreas Fault.

Policy 6.3.5: Installation of Erosion Control Measures. Require the installation of erosion control measures consistent with the Erosion Control Ordinance, by October 15, or the advent of significant rain, or project completion, whichever occurs first. Prior to October 15, require adequate erosion control to be provided to prevent erosion from early storms. For development activities require protection of exposed soil from erosion between October 15 and April 15 and require vegetation and stabilization of disturbed areas prior to completion of the project. For agricultural activities, require that adequate measures be taken to prevent excessive sediment from leaving the property.

**City of Watsonville Vista 2030 General Plan**

No applicable policies.

**Alquist Priolo Earthquake Fault Zoning Act**

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act), signed into law December 1972, requires the delineation of zones along active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near active fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces. Although surface fault rupture is not necessarily restricted to areas within an Alquist-Priolo Fault Hazard Zone, cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement.

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1 Because no physical components of the proposed BMP Update except the Murphy Crossing infiltration gallery are located in Monterey County, geology/soils policies from Monterey County planning documents are not provided herein.
Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong groundshaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. The California Geological Survey (CGS) has completed seismic hazard mapping for portions of California most susceptible to liquefaction, groundshaking and landslide, including portions of the San Francisco Bay Area. The CGS has not completed mapping for the Watsonville West and Watsonville East 7.5-minute quadrangles, which include the BMP Update area.

California Building Code

The California Building Code is another name for the body of regulations known as the California Code of Regulations (CCR), Title 24, Part 2, which is a portion of the California Building Standards Code (CBSC, 2010). The CBSC applies to new construction. CCR Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in CCR Title 24 or they are not enforceable. Published by the International Conference of Building Officials, the Uniform Building Code (UBC) is a widely adopted model building code in the United States. The CBSC incorporates by reference the UBC with necessary California amendments. About one-third of the text within the California Building Code has been tailored for California earthquake conditions.

3.7.1.4 Setting by Component

Increased Recycled Water Storage at Treatment Plant

The area encompassing the treatment plant and the proposed Increased Recycled Water Storage at Treatment Plant component is entirely low-lying flat to gently sloping topography. The area is located within the floodplain of the Pajaro River. To the north and south, the land slopes gently toward the river. The levees along the river provide the local topographic relief in the area. The area has deep alluvial soils comprised of younger (Holocene) flood plain deposits consisting of unconsolidated, relatively fine-grained, heterogeneous deposits of sand and silt and commonly including relatively thin, discontinuous layers of clay. Earthquake groundshaking is the primary seismic hazard affecting the component area. The entire area is expected to experience groundshaking intensity IX in a major earthquake and associated peak ground accelerations of 0.50g to 0.55g. Liquefaction is a hazard with a ‘very high’ potential immediately at the river channel and ‘moderate’ in the adjoining area. The liquefaction hazard is rated ‘moderate’ at the treatment plant and along the San Andreas lateral, and ‘moderate’ to ‘high’ along the alignment of the proposed recycled water pipeline. No part of the area with proposed component facilities lies within a tsunami hazard area.

Soils

Two soil types are classified in the area of the treatment plant and west Highway 1, Fluvaquentic Haploxerolls-Aquic Xerofluvents complex on 0 to 15 percent slopes with slow to medium runoff. San Emigdio Variant sandy loam on 0 to 2 percent slopes is found along much of the proposed recycled water pipeline and is a deep, well
drained soil (Soil Conservation Service, 1980). No part of the component area is within a designated zone of mineral, aggregate, oil and gas or geothermal resources.

**Harkins Slough Recharge Facilities Upgrades**

The proposed Harkins Slough upgraded facilities are located on two types of topography. Harkins Slough, Watsonville Slough and the lower Pajaro River floodplain are flat to gently sloping areas with very low relief. These areas are bordered by terraces with moderate to steep slopes and over which are located the coastal dune areas. The coastal dune areas are located in the uplands north of the Pajaro floodplain. Slope and relief are gentle to moderate, characteristically described as rolling hills.

The proposed facilities are located in an area comprised of two general types of geologic materials that coincide with the above topographic divisions: alluvium (river-laid deposits) in the low lands and dune sand (wind-laid deposits) in the uplands. All surficial soils in the area are of Quaternary age. Harkins and Watsonville Sloughs and most of the Bolsa del Pajaro (lower river plain) are comprised of Holocene basin deposits of alluvial, unconsolidated plastic clay and silty clay containing much organic material and locally interbedded with thin layers of silt and silty sand. The deposits are derived from varied origins including flood basin, lake, estuary, lagoon, tidal flats and marshland. In general, they tend to be thick deposits, in areas reaching a depth of 90 meters (295 feet) Some areas along Beach Road are comprised at the surface of younger flood-plain deposits, that is, a river-laid veneer (less than 18 feet deep) of fine-grained, heterogeneous, deposit of sand and silt interbedded with clay.

The areas immediately bordering the slough and alluvial plain are comprised of younger terrace deposits of Pleistocene age. The terrace deposits consist of semiconsolidated, moderately to poorly sorted clay, silty clay, silt, and some sand. Most of these deposits were laid in old sloughs and are characterized by expansive soils and poor drainage. These soils have a low susceptibility to liquefaction.

The recharge area is comprised of wind-laid (aeolian) deposits divided into two groups: 1) Sunset Beach aeolian deposits comprised of weakly consolidated, well-sorted, fine- to medium-grained sand, ranging in depth from 2 to 25 m, and having generally high porosity and permeability and low to moderate liquefaction potential (higher hazard where the water table is closer to the surface); and 2) Manresa Beach aeolian deposits, located north of the Sunset Beach deposits, are somewhat older Pleistocene deposits also of dune origin. They are weakly to moderately consolidated, moderately well-sorted silt and sand deposits with generally moderate permeability and porosity, except in the soil zone where they are rated low for both characteristics. The upper horizons are moderately indurated because of clay and iron oxide cementation. These soils are subject to extensive erosion.

Earthquake groundshaking is the primary seismic hazard affecting all areas of the Harkins-Watsonville Sloughs and Coastal Distribution facilities. The entire area is expected to experience groundshaking intensity IX in a major earthquake and associated peak ground acceleration of 0.50g to 0.55g. Liquefaction is a hazard with a “moderate” potential to affect almost all of the area in the low-lying slough and floodplains, and rated as generally “low to “moderate” in upland. An exception is the area in the immediate vicinity of the Pajaro River, where the liquefaction hazard is rated “very high”. The existing pumping facility at Harkins Slough and the site of the proposed sedimentation basin are located in an area rated having “moderate” liquefaction hazard. While a tsunami would affect the nearby coastal beaches and bluffs, no part of the component area lies within a tsunami hazard area.
Soils

The soils in Harkins Slough and Watsonville Slough are Clear Lake clay, moderately wet. The site of the existing pump station and the proposed filtration facilities are located on this soil type. The soil has slow permeability and a high water table. The soils are extensively farmed.

The edges of the uplands with the Pleistocene terrace deposits are comprised of Baywood loamy sand on 30 to 50 percent slopes. High erosion hazard is characteristic and because of the steep slopes, the soil is generally left for open space and is not cultivated. The uplands of the coastal dunes area is comprised primarily of four soil types. Baywood loamy sand on 2 to 15 percent slopes, Baywood loamy sand on 15 to 30 percent slopes, Elder sandy loam on 2 to 9 percent slopes and Elder sandy loam on 9 to 15 percent slopes. No part of the component area is within a designated zone of mineral, aggregate, oil and gas or geothermal resources.

Watsonville Slough with Recharge Basins

See discussion above for Harkins Slough Recharge Facilities Upgrades. The Environmental Setting for geology and soils for the Watsonville Slough with Recharge Basins component is the same as the Harkins Slough Recharge Facilities Upgrades as the two components are located adjacent to each other.

College Lake with Inland Pipeline to the Coastal Distribution System (CDS)

College Lake, Kelly Lake and Lake Tynan are located in alluvial areas bordered by gentle to moderate slopes along the upper-lying northern edge of the Pajaro Valley plain. Kelly Lake and the nearby Drew Lake are in wholly enclosed topographic depressions. The lakes are located in areas comprised of Quaternary alluvium. The lake bottoms are classified as Quaternary Basin deposits, consisting of unconsolidated plastic clay and silty clay with high organic content. Locally, thin-bedded silt and sandy silt deposits are contained within the clays. The soils have high susceptibility to liquefaction in an earthquake.

The adjacent uplands are comprised of Quaternary nonmarine terrace deposits classified as Watsonville terrace deposits and subdivided into fluvial and alluvial fan facies. These terrace deposits are semiconsolidated, moderately to poorly sorted silts, sand, silty clay, and gravel. They have low susceptibility to liquefaction. There are no mapped areas of soil instability, such as landslides, in the College Lake area. Areas with moderate and steep slopes long the edge of College Lake may have some instability hazard and would be subject to erosion.

Corralitos and Salsipuedes Creeks similarly flow across gentle to flat slopes comprised of Quaternary alluvium. The area immediately south of College Lake is alluvium classified as Older Flood Plain Deposits consisting of unconsolidated, relatively fine-grained, heterogeneous deposits made of sand and silt and commonly including lenses of clay. The deposits generally have “moderate” susceptibility to liquefaction. The area surrounding Corralitos Creek and Salsipuedes Creek is alluvium classified as Younger Flood Plain Deposits consisting of unconsolidated, relatively fine-grained heterogeneous deposits of sand and silt commonly including discontinuous thin layers of clay. These geologic materials have a very high susceptibility to liquefaction.

Earthquake groundshaking is the primary seismic hazard affecting all areas of College Lake with existing and proposed facilities. The entire area is expected to experience groundshaking intensity VIII in a major earthquake and associated peak ground accelerations of 0.25g - 0.30g. Liquefaction is a hazard with a “high” potential to affect all of College Lake and almost all the area along the alignment of the CDS connection pipeline. The area
immediately along Salsipuedes Creek is rated “very high” liquefaction potential. The proposed pumping facilities site at College Lake is located in an area rated having “moderate” liquefaction hazard.

No part of the College Lake area is in a tsunami hazard area. In an earthquake, small seiche waves could form in College Lake as well as Kelly Lake. A seiche is a wave-like phenomenon in a water body that is formed by earth movements, such as earthquake groundshaking or landsliding that is similar to the sloshing of water in a bathtub. Given the size and depth of the temporary water body in College Lake, the hazard is likely to be relatively minor.

**Soils**

The soils in College Lake are mostly the Conejo loam on 0 to 2 percent slopes (SCS, 1980). The soils are flooded during winter by the formation of College Lake, and drained by a reclamation district in the springtime for cultivation. The capability for cultivation is high and this is highly productive soil with a capability subclass I irrigated and capability unit IIIc-1 non-irrigated; the Storie index is 95 (SCS, 1980). Erosion hazard is slight. The clay content creates a moderate hazard of shrink swell and low strength that make the soil unsuitable for construction materials, embankments and levees and problematic for some types of construction. A western arm of the lake is comprised of Clear Lake clay, 0 to 2 percent slopes.

The perimeter areas of College Lake are comprised of a variety of soil types including the Danville loam, Diablo clay, Elder sandy loam, Tierra-Watsonville complex, and Watsonville loam. The area near College Lake, including the site of the water diversion and treatment facilities is comprised of Baywood Variant loamy sand, 0 to two percent slopes. The southern portion of the College Lake pipeline alignment is located in Baywood loamy sand. A small area of the alignment passes through Cropley silty clay. No part of the College Lake area is within a designated zone of mineral, aggregate, oil and gas or geothermal resources.

**Murphy Crossing with Recharge Basins**

The area encompassing the proposed Murphy Crossing with Recharge Basins facilities is entirely low-lying flat to gently sloping topography. The area is the floodplain of the Pajaro River. The land to the north and the south of the river slopes gently toward the river. The levees along the river provide the major local relief in the area.

The component area has deep alluvial soils that are divided into several sub-types. The area immediately adjacent to the Pajaro River is comprised of younger (Holocene) flood plain deposits consisting of unconsolidated, relatively fine-grained, heterogeneous deposits of sand and silt and commonly including relatively thin, discontinuous layers of clay. Gravel is locally abundant. The geologic materials have moderate porosity and permeability and the depth to the water table is generally less than 6.5 feet (ft). The geologic materials have “very high” liquefaction hazard.

Upslope and farther back from the river channel are widespread older (but also Holocene) floodplain deposits consisting of unconsolidated, relatively fine-grained, heterogeneous deposits of sand and silt and commonly including relatively thin layers of clay. This is a deep deposit (328 feet) and gravel is abundant at depth, creating a locally significant aquifer. The depth to the water table is variable but generally 9.8 to 32.75 feet deep. The geologic materials have a “moderate” liquefaction hazard.

Lacking relief, there are no significant soil instability hazards. Earthquake groundshaking is the primary seismic hazard affecting all areas of the Murphy Crossing area. The entire area is expected to experience groundshaking intensity IX in a major earthquake and associated peak ground accelerations of 0.50g to 0.55g. Liquefaction is a
hazard rated as “moderate” to “high” at the site of the recharge basin. No part of the area with proposed component facilities lies within a tsunami hazard area.

Soils

The soils of the Murphy Crossing with Recharge Basins component area are generally highly productive soils and almost entirely under cultivation. The site of the infiltration gallery is an area with Mocho silt loam and San Emidigio Variant sandy loam soil (SCS, 1980) (Table 6.2.1). The proposed recharge basins have soils classified as Baywood loamy sand, which forms a stringer through the approximate center of that site and is surrounded by Conejo loam on 2 to 9 percent slopes and Conejo clay loam on 0 to 2 percent slopes. The proposed pipeline from the extraction wells to the recharge basin crosses the five soils noted above. The pipeline alignment connecting the infiltration gallery to the recharge basins crosses Mocho silt loam, Conejo loam on 0 to 2 percent slopes, and Baywood loamy sand. No part of the component area is within a designated zone of mineral, aggregate, oil and gas or geothermal resources.

3.7.2 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Expose people or structures to potential substantial adverse effects including the risk of loss, injury, or death resulting from the rupture of a known earthquake fault, seismic ground shaking, landslides, or seismic-related ground-failure, including liquefaction, which cannot be mitigated through the use of standard engineering design techniques;
- Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide or slope failure/instability;
- Result in substantial soil erosion or the loss of topsoil and subsequent sedimentation into local drainage facilities and water bodies; or
- Be located on an expansive soil, as defined by the Uniform Building Code (1997) or subject to other soil constraints that might result in deformation of foundations or damage to structures, creating substantial risks to life or property.

3.7.3 Impacts and Mitigation Measures by Component

Introduction

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to each specific component are identified for each potential impact. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are identified.

3.7.3.1 Exposure to Seismic Hazards

Impact GS-1: Seismic groundshaking and its secondary effects, including localized liquefaction and related ground failure from a major earthquake in
Santa Cruz County or Monterey Bay region could cause structural damage to associated facilities of each of the BMP Update components. With mitigation identified in this EIR, the impacts would be limited to less-than-significant levels.

Mitigation Measure(s):

**Mitigation Measure GS-1**: Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of groundshaking and liquefaction. Construction shall be in accordance with applicable City and County ordinances and policies regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted.

**Increased Recycled Water Storage at Treatment Plant**

Groundshaking is an unavoidable hazard for facilities in the San Francisco Bay and Monterey Bay regions. Groundshaking at the treatment plant could cause structural damage to the facility structures or unsecured objects. The proposed Increased Recycled Water Storage at Treatment Plant component includes a new storage tank or tanks and underground pipeline. The tank will be designed in accordance with seismic design recommendations provided in a geotechnical report and in accordance with provisions of the California Building Code. Structural damage to the actual pipe and pipe joints is expected to be less extensive than damage to aboveground structures, but will be designed with appropriate shut-off valves or other features to minimize leaks and effects of ruptured pipelines. With implementation of Mitigation Measure GS-1, potential damage to facilities due to seismic shaking and liquefaction would be reduced to a less-than-significant level.

**Harkins Slough Recharge Facilities Upgrades**

The potential exists for large magnitude earthquakes to result in high intensity groundshaking and secondary earthquake effects, notably liquefaction. Intense groundshaking and high gravitational accelerations would affect the entire component area of the sloughs and uplands. Groundshaking and liquefaction could cause loosening of pipeline joints resulting in leaks and possibly also breaking of a pipeline. Facility pumps could be rendered inoperable, and recharge basins could be damaged leading to rupture or failure and water loss of water is in the basin at the time of an earthquake. The most severe impacts would result from liquefaction of the soil, which could induce both vertical and lateral displacement of the soil that would bend, weaken, and break pipelines. Broken pipelines could result in soil wash-out and sinkholes. Groundshaking hazards are unavoidable but through adequate mitigation, as identified above as Mitigation Measure GS-1, the risk of loss or injury due to an earthquake can be reduced to a less-than-significant level.

**Watsonville Slough with Recharge Basins**

Please see discussion above for the Harkins Slough Recharge Facilities Upgrades component; potential impacts and Mitigation Measure GS-1 would equally apply for the Watsonville Slough with Recharge Basins component, as the two components are located in the same area.
College Lake with Inland Pipeline to Coastal Distribution System (CDS)

Please see discussion above for the Harkins Slough Recharge Facilities Upgrades component; potential impacts and mitigation measure would equally apply for the College Lake with Inland Pipeline to Coastal Distribution System component.

Additionally, College Lake itself has a high liquefaction hazard. The hazard could result in substantial damage to proposed component facilities. In a worst case scenario, this could result in rapid draining of some lake waters, with resultant flood hazards and erosion of downstream areas. The likelihood of massive sudden failure and resultant flood is low. Considering that the lake is a shallow water body and emptied for much of the year, the overall hazard of this type of failure is low. To the extent that increasing the storage capacity of the lake would result in a greater volume of water in the lake, it could contribute to increasing the hazard. With implementation of Mitigation Measure GS-1, the impact would be reduced to a less-than-significant level.

Murphy Crossing with Recharge Basins

Please see discussion above for the Harkins Slough Recharge Facilities Upgrades component; potential impacts and mitigation measures would equally apply for the Murphy Crossing with Recharge Basins component. Seismic hazards are unavoidable but through adequate mitigation, as identified above as Mitigation Measure GS-1, the risk of injury and loss of life due to an earthquake can be reduced to a less-than-significant level. The purpose of the mitigation is to reduce the potential for injury and the length of service interruptions during and after a seismic event.

3.7.3.2 Erosion/Loss of Soil Resources/Sediment Discharges in Water Courses

Impact GS-2: Construction of BMP Update components would result in erosion and discharge of sediment in water bodies. With mitigation identified in this EIR, the impact would be reduced to a less-than-significant level.

Mitigation Measure(s):

Mitigation Measure GS-2: Construction of future BMP Update project facilities shall include preparation and implementation of erosion control plans to minimize erosion and inadvertent transport of sediments into water bodies during installation of facilities. Measures shall include, but not be limited to: limiting the area of ground disturbance and vegetation removal at any one time during construction; conducting work prior to the rainy season if possible and protecting disturbed areas during the rainy season; installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses; immediately revegetating disturbed areas; and other Best Management Practices (BMPs) during construction to protect water quality. All grading and construction shall conform to requirements of the Santa Cruz County Grading Ordinance. To the extent possible, grading activities in non-cropped areas shall be limited to the period between April 15 and October 31.

Increased Recycled Water Storage at Treatment Plant

Proposed increases to recycled water storage at the treatment plant would be located in flat areas with soils having low erosion hazard. However, the operation of construction equipment and vehicles, trench excavation, and soil
stockpiling would expose loose soils to erosion if construction occurs in the rainy season or with high winds. Soils exposed by construction operations have a tendency to be dislodged and transported by rain, surface watering, or temporary construction discharges. Soil erosion and loss of topsoil during a large construction project that extends over several months can be significant and result in project delays due to required soil restabilization, regrading, and soil removal from drainage structures. Construction activities would involve grading which would cover an approximate 21,000 square foot area with an estimated total of 12,000 cubic yards (CY) of soil disturbance. With implementation of standard erosion control measures and practices as set forth in Mitigation Measure GS-2 potential impacts would be less than significant.

**Harkins Slough Recharge Facilities Upgrades**

The existing Harkins Slough filtration facilities are located in a flat area with soils having low erosion hazard. Potentially moderate to high erosion hazards are located along existing pipeline alignments in the area of the recharge basin where sandy soils are subject to rapid erosion. The nearby areas are extensively cultivated and normal farming practices already produce substantial areas of exposed soils each year. Construction activities associated with most of the proposed upgrades would be minimal, except for construction of a new recharge basin that would require grading and excavation, which could result in potential erosion and inadvertent transport of sediments into adjacent sloughs. Construction activities for upgrades to the slough facilities would involve grading of an estimated total of 3,100 CY. If additional recharge basins are required, up to an additional 60,000 CY of grading may be required. Implementation of Mitigation Measure GS-2 would reduce the impact to a less-than-significant level.

**Watsonville Slough with Recharge Basins**

Diversion and filtration activities associated with the Watsonville Slough with Recharge Basins component would result in the operation of construction equipment and vehicles, trench excavation, and soil stockpiling, which would cause erosion if construction occurs in the rainy season. While the proposed filtration facilities would be located at the existing Harkins Slough facilities, located in a flat area with low erosion hazard, potentially moderate to high erosion hazards are located at the area proposed for the diversion site and along existing pipeline alignments where sandy soils are subject to rapid erosion.

Implementation of this component could result in erosion impacts for either the North Dunes Recharge Basin or the Southeast Recharge Basin option. Development of the North Dunes Recharge Basin would require a 25-acre percolation area and the Southeast Recharge Basin would require a 14-acre percolation area. Total grading amounts for diversion facility and related pipeline installation is estimated to be 3,100 CY. Grading for the additional recharge basins is estimated to be 60,000 CY. Mitigation Measure GS-2 would apply, ensuring potential impacts remain at less-than-significant levels.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

Most of the proposed College Lake with Inland Pipeline to Coastal Distribution System facilities would be located on flat areas with soils having low erosion hazard. Grading associated with the construction of the component's pipeline is estimated to be 5,250 CY. Total grading for the component's filtration facility is estimated to be 2,000 CY. Mitigation Measure GS-2 would apply, ensuring potential impacts remain at less-than-significant levels.
Additionally, as a result of increasing storage capacity in College Lake, a wider perimeter area would be denuded and subject to erosion. Wave action could further erode these soils, which in some areas have moderate erodibility hazard. Most of the inundation area would occur in areas of flat slope and/or areas having soils with low erosion hazard. A small area of the expanded shoreline would have moderate erosion hazard, generally in places of steeper slope. Because these constitute a small area of the shoreline, the soil loss in these areas is not expected to result in significant erosion gullies, and soil deposition would occur in the lake bottom, where they would be tilled. There is a remote possibility that soil loss in such areas could initiate rifling and gully formation on the adjacent slope. This is considered to be a less-than-significant potential impact, and would be further reviewed at the time project-specific plans and designs are prepared for this BMP Update component.

**Murphy Crossing with Recharge Basins**

The proposed facilities associated with the Murphy Crossing with Recharge Basins component would be located in the low floodplain of the Pajaro River on flat areas that have a lower erosion hazard. The Murphy Crossing with Recharge Basins Project would divert water from the Pajaro River between December and May, and this project component includes the construction of an infiltration, pump station, monitoring wells, recharge basins, and a connector pipeline from pump station to recharge basins. Due to proximity to the Pajaro River, construction and excavation could result in erosion. Grading for construction of the component's pipeline is estimated to be 5,500 CY. Total grading for the component's recharge basin is estimated to be 30,000 CY. Mitigation Measure GS-2 would reduce the impact to a less-than-significant level.

### 3.7.3.3 Damages from Soil Properties

**Impact GS-3:** Proposed pipeline, diversion facilities and water filtration systems associated with BMP Update components could incur damage as a result of underlying soils properties (subsidence, high shrink-swell potential, and corrosivity). With mitigation identified in this EIR, the impacts would be limited to less-than-significant levels.

**Mitigation Measure(s):**

*Mitigation Measure GS-3:* All diversion and pipeline facilities shall be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the potential detrimental effects of expansive soils, corrosivity, and/or other identified soils constraints. A licensed geotechnical engineer shall prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site-specific, adverse soil and bedrock conditions that could hinder development. Project engineers shall implement the recommendations. Geotechnical design and design criteria will comply with applicable codes and requirements of the California Building Code with California additions (CCR Title 24), applicable City and County construction and grading ordinances.

**Increased Recycled Water Storage at Treatment Plant**

The soil types at the treatment plant and along the proposed pipeline route associated with increasing recycled water storage at the treatment plant vary relative to the location. Each soil type in the component area possesses
characteristics that could limit development of structures or other facilities. These limitations include the shrink-
swell capability (expansive behavior) and corrosivity of the soil. One or more of these soil properties could
impact portions of the proposed component.

Soils with a high potential for shrink-swell are found in various locations throughout the proposed component
area. Shrink-swell behavior in soils could adversely impact subsurface pipelines buried up to five feet below the
surface and foundations of above-ground facilities. Unless properly mitigated, shrink-swell soils could exert
additional pressures on below-grade facilities, producing shrinkage cracks that allow water infiltration and
compromise the integrity of backfill material. Depending on the depth of buried pipeline, soil in expansion or
contraction could lead to undue lateral pipeline stress and stress of structural joints. Lateral stresses could, over
time, lead to pipeline rupture or leaks in the coupling joints. Shrinkage cracks could form in native soils adjacent
to the pipeline trench or in backfill material if expansive soils are used. If shrinkage cracks extend to sufficient
depths, groundwater can infiltrate into the trench, causing piping (progressive erosion of soil particles along flow
paths) or settlement failure of the backfill materials. Settlement failure can also occur if expansive soils are used
in backfill and undergo continued expansion and contraction. Over time these soils could settle, resulting in
misalignment or damage to buried facilities.

The effects of shrink-swell soils could damage foundations of aboveground structures, such as the planned water
storage tank. The expansion and contraction could exert enough pressure on the structures to result in cracking,
settlement, and uplift.

The conductivity of soils may be high enough in the component area to corrode underground metal pipes and
electrical conduits. Over time, pipe corrosion could lead to pipeline failure, resulting in localized surface flooding
of water or localized settlement of surface soils in the location of the failure. Failed subsurface electrical conduits
could result in electrical short-circuiting. This would reduce power temporarily to the facility and possibly result
in temporary shutdown of operations.

Implementation of Mitigation Measure GS-3 would reduce potential impacts to less-than-significant levels.

**Harkins Slough Recharge Facilities Upgrades**

The Baywood soils in the project area are subject to low to moderate shrink-swell potential that could result in
damages to pipelines and facilities as described above. Implementation of Mitigation Measure GS-3 would reduce
potential impacts of the Harkins Slough Recharge Facilities Upgrades component to less-than-significant levels.

**Watsonville Slough with Recharge Basins**

Please see discussion, above, for the Harkins Slough Recharge Facilities Upgrades component, as the two
components are located in the same area and would result in the same impacts, which could be mitigated with
implementation of Mitigation Measure GS-3.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

The Clear Lake soils on the Pajaro floodplain are considered to be somewhat weak (compressible) and subject to
hazards of settlement. Settlement of these soils may weaken joints in the pipelines, displace them, and eventually
bend or break the pipelines. The soils in the vicinity of this project component are subject to moderate shrink-
swell potential that could result in damages to pipelines and facilities as described above. Implementation of
Mitigation Measure GS-3 would reduce impacts at College Lake with Inland Pipeline to Coastal Distribution System component to a less-than-significant level.

**Murphy Crossing with Recharge Basins**

The soils in the vicinity of this project component are subject to low shrink-swell potential. Implementation of Mitigation Measure GS-3 would ensure that impacts remain at a less-than-significant level.

**3.7.4 Overall Combined BMP Update**

As identified in this section, implementation of the overall combined BMP Update would potentially result in significant geologic and soil impacts. However, all potential impacts would either be less than significant or reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.
Surface Level Geologic Units

Title: Surface Level Geologic Units
Date: August 2013
Project: 2012-48

Explanation:
- Cities & Towns
- Pajaro River
- San Andreas Fault Trace
- Zayante-Vergeles Fault Trace
- PVWMA Boundary

Geologic Units:
- Dune
- Alluvium
- Terrace / Eolian Deposits
- Aromas Red Sands Fm
- Pre-Pliocene Sed
- Purisma Fm

Figure 3.7-1
Geologic Cross-Sections

EXPLANATION

Geologic unit (basal clay units not shown)—
- Alluvium (Layer 1 and 2)
- Upper Aromas (Layer 3 and 4)
- Lower Aromas (Layer 5)
- Purisima (Layer 6)
- Basement

Layer structure
- Model Base
- Land surface
- Bathymetry
- Alluvium (Layer 1)
- Alluvial Confining Unit (Layer 2)
- Upper Aromas (Layer 3)
- Aromas Confining Unit (Layer 4)
- Lower Aromas (Layer 5)
- Purisima (Layer 6)
- San Andreas Fault
- Extent of active model
- Zayante-Vergeles Fault Zone
- Extent of active model
- Coastline
- Extent of active model

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June 2013
2012-48

Figure 3.7-2
Active Faults

June 2013

2012-48

P:\DDA Current Projects\2012-48 PVWMA BMP CEQA\Public Review Draft EIR\Working Draft EIR\Figures\3-0 Project Description Figures\Active Faults
3.8 HAZARDS AND HAZARDOUS MATERIALS

3.8.1 ENVIRONMENTAL SETTING

3.8.1.1 Regional Setting

The Pajaro Valley is comprised of an urban center, surrounded by agricultural lands. Industrial uses within Watsonville are generally concentrated in the areas along Highway 129 between Highway 1 and Main Street.

Database Search

In order to determine the potential for hazardous materials contamination in the BMP Update area, the California Department of Toxic Substances Control’s EnviroStor database was consulted. EnviroStor's database identifies contaminated sites within California, as well as facilities that process or transfer toxic waste, based on geographic area. The database includes federally designated sites, state response sites, military sites, school sites and voluntary cleanup sites. Each identified entry in the database contains a report showing the site’s current address, past contaminating uses, history of the site, current and historical toxic substances present, land use restrictions, and cleanup status.

The results of the EnviroStor search show several cleanup sites within the greater Watsonville area, as presented in Figure 3.8-1. EnviroStor also identified multiple leaking underground storage tank (LUST) cleanup sites in the Watsonville area, including several locations along Highway 129.

Airport Hazards

The Watsonville Municipal Airport is the only municipal airport in Santa Cruz County. It is considered a reliever airport for general aviation from the San Francisco Bay Area. In 2000, approximately 330 aircraft were based at the airport. The number of aircraft based out of Watsonville is expected to be about 381 by 2020, with about 395 daily aircraft operations. Safety issues associated with the airport operations include noise, ground safety, and flight hazards. To address these issues, the City is implementing the Watsonville Municipal Airport Master Plan (City of Watsonville, 2008), which addresses airport safety and noise abatement.

3.8.1.2 Regulatory Setting

Hazardous materials include substances that are corrosive, poisonous, radioactive, flammable or explosive. In 1993, Senate Bill 1082 gave the California Environmental Protection Agency (CalEPA) the authority and responsibility to establish a unified hazardous waste and hazardous materials management and regulatory program (Unified Program). The purpose of the Unified Program is to consolidate and coordinate six different hazardous materials and hazardous waste programs, and to ensure that they are consistently implemented throughout the state. The Unified Program is overseen by CalEPA with support from the Department of Toxic Substances Control, the State Water Resources Control Board, the Office of Emergency Services, and the State Fire Marshal.

State law requires county and local agencies to implement the Unified Program. The county and local agencies in charge of implementing the program are the Certified Unified Program Agency (CUPA). The County of Santa Cruz Environmental Health Services Department is the designated CUPA. Environmental Health Services is
responsible for enforcing the local ordinance (Chapter 7.100) and state laws pertaining to use and storage of hazardous materials. In addition to the CUPA, other local agencies help to implement the Unified Program. These agencies are called Participatory Agencies (PA). The Watsonville Fire Department is the PA for the City of Watsonville. The Department provides hazardous materials code enforcement, public education, and emergency response services. It also oversees enforcement of hazardous waste regulations, underground tank requirements, risk management requirements, and cleanup of hazardous materials spills that occur within the City. In addition, the Department manages the City’s hazardous materials management plans. The City coordinates with Santa Cruz County to manage hazardous materials through a county-wide Hazardous Materials Area Plan.

Applicable objectives, goals and policies from the Santa Cruz County General Plan/Local Coastal Program and the City of Watsonville General Plan are presented below.

**County of Santa Cruz General Plan/Local Coastal Program**

No applicable policies.

**City of Watsonville Vista 2030 General Plan**

Policy 13.1.1 Environmental and Public Safety. The City shall plan for and maintain development standards that minimize risks to human lives and property resulting from environmental and man-caused hazards. The City shall protect neighboring residential development from the immediate threats of potentially hazardous industrial or agricultural materials and airport hazards through careful land use planning.

Policy 13.5.1 Hazardous Materials Control. The City shall strictly enforce ordinances and regulations for the use, storage, transport and disposal of hazardous materials.

### 3.8.1.3 Setting by Component

**Increased Recycled Water Storage at Treatment Plant**

The Increased Recycled Water Storage at Treatment Plant component is located at the existing Recycled Water Facility. Hazardous materials are used and stored on the site (e.g., chlorine, polymer). No contamination has been reported on the property.

The results of the EnviroStor search are presented in Figure 3.8-1. None of the cleanup sites are located within ¼ mile of this component. In addition, the EnviroStor search did not identify any LUST cleanup sites in the vicinity of this component.

**Harkins Slough Recharge Facilities Upgrades**

The Harkins Slough Recharge Facilities Upgrades component is located primarily on agricultural land located between Highway 1 and Monterey Bay. Surrounding lands are also used for agricultural production. Structures located in the site area include the existing diversion facility and the existing filtration facility near the confluence of Watsonville and Harkins Sloughs. No contamination has been reported on the property.

The results of the EnviroStor search are presented in Figure 3.8-1. One of the cleanup sites lies within ¼ mile of this component, northeast of the proposed recharge basin locations. This active cleanup site is currently used by the Monterey Bay Academy but was formerly part of a military installation. Potential contaminants of concern on
the site include explosives and munitions debris in onsite soils. These contaminants would not affect the proposed recharge basin site, which is well outside of the former military installation boundaries. The EnviroStor search did not identify any LUST cleanup sites in the vicinity of the Harkins Slough Recharge Facilities Upgrades component.

**Watsonville Slough with Recharge Basins**

See discussion above for the Harkins Slough Recharge Facilities Upgrades component.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

College Lake is a seasonal lake located in a natural depression that, when dry, produces vegetable and flower crops during the summer and fall months. Agricultural uses surround the site. No contamination has been reported on the property. The proposed pipeline to the CDS is located primarily within existing roadway right-of-way that is lined with both agricultural and urban uses. A portion of the pipeline is located in the existing industrial area along Highway 129 between Highway 1 and Main Street.

The results of the EnviroStor search are presented in Figure 3.8-1. No cleanup sites are located within ¼ mile of the College Lake improvements. However, one cleanup site is located along the pipeline alignment on Highway 129 between Locust and Walker Streets. This site has land use restrictions based on soil contamination from arsenic and lead due to previous manufacturing of lead arsenate insecticide spray on the property. In addition, multiple LUST cleanup sites were identified along the proposed pipeline along Highway 129.

**Murphy Crossing with Recharge Basins**

The Murphy Crossing facilities including recharge basins are located primarily in agricultural areas. No contamination has been reported on the property.

The results of the EnviroStor search are presented in Figure 3.8-1. None of the cleanup sites are located within ¼ mile of this component. In addition, the EnviroStor search did not identify any LUST cleanup sites in the vicinity.

### 3.8.2 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment
3.8 Hazards and Hazardous Materials

- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in a safety hazard for people residing or working in the project area
- For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the project area
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan

3.8.3 IMPACTS AND MITIGATION MEASURES BY COMPONENT

Potential impacts associated with the BMP Update components are identified below. Mitigation measures that would apply to each specific component are identified for each potential impact. If specific mitigation measures apply to individual components, in addition to the previously identified measures, these specific mitigation measures are identified.

None of the BMP Update components are located in the vicinity of Watsonville Airport, nor would they introduce uses that would result in a safety hazard to airport operations. In addition, the BMP Update components would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan (refer to Section 3.12 Transportation of this EIR for additional discussion).

3.8.3.1 Impacts Associated with Hazardous Materials Use

*Development of BMP Update components could involve the use of limited amounts of hazardous substances. The transportation, storage, and use of hazardous materials would be regulated by applicable local, state, and federal laws to avoid significant hazards. This is a less-than-significant impact.*

**Increased Recycled Water Storage at Treatment Plant**

The Increased Recycled Water Storage at Treatment Plant component would not require use of additional hazardous substances on the site. This is a less-than-significant impact.

**Harkins Slough Recharge Facilities Upgrades**

The Harkins Slough Recharge Facilities Upgrades component would involve the use of limited amounts of hazardous substances; specifically, the use and storage of coagulants (polyaluminum chloride, alum, or similar polymer). The transportation, storage, and use of hazardous materials at the site would be regulated by applicable local, state, and federal laws to avoid significant hazards. This is a less-than-significant impact.

**Watsonville Slough with Recharge Basins**

The Watsonville Slough with Recharge Basins component would involve the use of limited amounts of hazardous substances; specifically, the use and storage of coagulants (polyaluminum chloride, alum, or similar polymer). The transportation, storage, and use of hazardous materials at the site would be regulated by applicable local, state, and federal laws to avoid significant hazards. This is a less-than-significant impact.
College Lake with Inland Pipeline to Coastal Distribution System (CDS)

The College Lake with Inland Pipeline to Coastal Distribution System component would involve the use of limited amounts of hazardous substances; specifically, the use and storage of coagulants (polyaluminum chloride, alum, or similar polymer). The transportation, storage, and use of hazardous materials at the site would be regulated by applicable local, state, and federal laws to avoid significant hazards. This is a less-than-significant impact.

3.8.3.2 Impacts Associated with Hazardous Materials Contamination

Impact HM-1: Construction of the BMP Update components could potentially release hazardous materials from the disturbance/removal of soils used for agricultural purposes that may contain pesticide residuals. In addition, Construction of the BMP Update components (i.e., excavation for pipelines) could potentially release hazardous materials in areas of potential soil contamination such as those identified by DTSC. This is a potentially significant impact that would be reduced to a less-than-significant level with mitigation identified below.

Mitigation Measure(s)

Mitigation Measure HM-1: Prior to initiation of earthwork activities, PVWMA shall perform soil testing on agricultural sites proposed for development and analytically test for pesticide residuals and pesticide-related metals arsenic, lead, and mercury. If contamination is identified in the soil samples above applicable levels, PVWMA shall prepare a Site Management Plan (SMP) to establish protocols/guidelines for the contractor including: identification of appropriate health and safety measures while working in contaminated areas; soil reuse; handling, and disposal of any contaminated soils; and agency notification requirements. The SMP may be subject to the review and approval of the appropriate regulatory agency.

Increased Recycled Water Storage at Treatment Plant

The Increased Recycled Water Storage at Treatment Plant component is located on the existing Recycled Water Facility, which was historically used for agricultural purposes prior to development. Agricultural land may contain soils that have been contaminated with pesticide residuals and pesticide-related metals arsenic, lead, and mercury. Disturbance of soils during construction could result in the release of these substances, which represents a potentially significant impact. Mitigation Measure HM-1 would apply, ensuring potential impacts remain at less-than-significant levels.

Harkins Slough Recharge Facilities Upgrades

The recharge basins for the Harkins Slough Recharge Facilities Upgrades component are located on agricultural lands. Agricultural land may contain soils that have been contaminated with pesticide residuals and pesticide-related metals arsenic, lead, and mercury. Disturbance and excavation of soils during construction could result in the release of these substances, which represents a potentially significant impact. Mitigation Measure HM-1 would apply, ensuring potential impacts remain at less-than-significant levels.
Watsonville Slough with Recharge Basins

The recharge basins for the Watsonville Slough with Recharge Basins component are located on agricultural lands. Agricultural land may contain soils that have been contaminated with pesticide residuals and pesticide-related metals arsenic, lead, and mercury. Disturbance and excavation of soils during construction could result in the release of these substances, which represents a potentially significant impact. Mitigation Measure HM-1 would apply, ensuring potential impacts remain at less-than-significant levels.

College Lake with Inland Pipeline to Coastal Distribution System (CDS)

The College Lake with Inland Pipeline to Coastal Distribution System component is located on agricultural land. Agricultural land may contain soils that have been contaminated with pesticide residuals and pesticide-related metals arsenic, lead, and mercury. Disturbance and excavation of soils during construction could result in the release of these substances, which represents a potentially significant impact. Mitigation Measure HM-1 would apply, ensuring potential hazardous materials impacts remain at less-than-significant levels.

The EnviroStor search identified one cleanup site and multiple LUST sites along the pipeline alignment on Highway 129. Disturbance and excavation of soils for pipeline installation could result in the release of hazardous substances associated with previous contamination along Highway 129 where several industrial uses are located. This represents a potentially significant impact. Mitigation Measure HM-2 would apply to the College Lake pipeline component to ensure that potential impacts remain at less-than-significant levels.

Mitigation Measure(s):

*Mitigation Measure HM-2*: During the design phase of the proposed pipeline alignment from College Lake to CDS, PVWMA shall perform a Phase I Environmental Site Assessment for the alignment to determine the potential for encountering hazardous materials contamination in soils to be excavated and identify appropriate recommendations. Appropriate health and safety measures shall be identified as needed for worker safety, soil handling, and disposal of contaminated soils.

Murphy Crossing with Recharge Basins

The Murphy Crossing with Recharge Basins component is located in an agricultural area. Agricultural land may contain soils that have been contaminated with pesticide residuals and pesticide-related metals arsenic, lead, and mercury. Disturbance and excavation of soils during construction could result in the release of these substances, which represents a potentially significant impact. Mitigation Measure HM-1 would apply, ensuring potential hazardous materials impacts remain at less-than-significant levels.

3.8.4 IMPACTS AND MITIGATION MEASURES OVERALL COMBINED BMP UPDATE

As identified in this section, implementation of the overall combined BMP Update would have potential significant impacts based on impacts related to disturbance of soils that may be contaminated with hazardous materials. However, as previously identified, potential impacts would be reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.
3.9 SURFACE WATER, GROUNDWATER, AND WATER QUALITY

3.9.1 ENVIRONMENTAL SETTING

3.9.1.1 Regional Environmental Setting

Physiography

The Pajaro Valley is part of the Central Coast Hydrologic Region (Central Coast Regional Water Quality Control Board (CCRWQCB, 2011; DWR, 2003) that extends from southern San Mateo to southern Santa Barbara Counties. Mountainous terrain and rolling hills generally characterize Central Coast basins, which are broadly associated with the San Andreas Rift Zone and related faults. The Pajaro Valley is the downstream-most portion of the Pajaro River watershed, a 1,300-square-mile drainage unit constituting most of San Benito County, and large portions of Santa Clara, Santa Cruz, and parts of Monterey County. Separated by the Santa Cruz Mountains, the Gabilan Range, and the San Andreas fault from the upper 90 percent of its watershed, the water resources of the Pajaro Valley have traditionally been managed separately, and often with more connection to the Soquel-Aptos area, the Prunedale segment of the Elkhorn Slough and the Salinas Valley systems to the west and south. During the past decade since the 2002 revised Basin Management Plan and EIR, the importance of the linkages between the Pajaro Valley and the watershed upstream has become clearer. The volume of water and pollutant loads entering the Pajaro Valley at Chittenden, the roles of floodwaters and sediment which originate upstream, and the steelhead and other species that use the river and its tributaries are all significant influences for management of the waters in the Pajaro Valley.

While its San Benito River tributary drains the larger and drier southeastern arm of the watershed, most of the flow originates from the Pajaro River – with headwaters in the Diablo Range – and Llagas and Uvas Creeks, tributaries which source in the southern Santa Cruz Mountains. Dams were constructed on all four of these headwaters during the mid-twentieth century: Pacheco (North Fork Pajaro River in 1940), Chesbro (Llagas Creek in 1956), Uvas (Uvas Creek, 1958) and Hernandez Reservoirs (San Benito River, 1962) are all operated to store winter runoff for local recharge upstream of the Pajaro Valley. The dams have reduced both runoff and sediment supply to the lower portion of the watershed, and have contributed to a vibrant agricultural and (increasingly) urban economy upstream near Gilroy, Hollister and San Juan Bautista, yet they have not served to appreciably reduce flooding in either the upper basins or the Pajaro Valley. Since the late 1980s, Delta waters imported through the San Felipe Project from San Luis Reservoir have augmented local supplies and increased water use upstream. These changes are all elements of the Integrated Regional Water Management Plan (IRWMP) currently being updated for the Pajaro watershed\(^1\). The revised basin-wide planning now reflected in the BMP Update may gradually assume an increasing role in assessing watershed-wide environmental effects and alternatives. Hence, conditions upstream from Chittenden are occasionally discussed in this document.

The Pajaro Valley is bounded by the Santa Cruz Mountains to the north and east, the Los Carneros Hills to the south, and Monterey Bay (the Pacific Ocean) to the west. The San Andreas and the Zayante-Vergeles northwest-

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1 The most recent update of the IRWMP was in 2006.
trending fault zones cross the eastern side of the basin. Marine sediments and overlying alluvium and dune deposits form the groundwater basin west of the San Andreas fault, while functionally impermeable, granitic bedrock juxtaposed against the marine sediments generally lie east of the San Andreas fault. Slopes of the Santa Cruz Mountains northeast of the San Andreas fault rise to a ridgeline defining the basin and the Santa Cruz/Santa Clara County line. The Pajaro Valley Groundwater Basin (sub-basin 3-2) is an area defined by the California Department of Water Resources (2003). Covering approximately 120 square miles, its boundaries are similar to the PVWMA boundary but identify a hydrogeologic unit generally enveloped by the contact between the Purisima and Aromas formations, extending further to the northeast and southwest than the PVWMA boundary, and stopping west of the San Andreas fault. The Pajaro Valley Groundwater Basin has relatively little meaning for surface-water processes or near-surface groundwater.

Climate

The Pajaro Valley is in a Mediterranean climate typical of central coastal California. This climate zone is characterized by cool, wet winters and warm, dry summers. Over 90 percent of the yearly precipitation falls from November through April, and coastal fog is common in the summer and fall months. The mean annual temperature is 57°F; the mean monthly maximum temperature is 74°F in September; and the mean monthly minimum temperature is 39°F in January (Table 3.9-1).

| Table 3.9-1 Monthly climatic 30-year normals, 1981-2010, Watsonville, California |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                               | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   | Annual |
| Mean Max. Temperature (F)    | 60.9  | 62.7  | 64.4  | 67.6  | 69.2  | 71.3  | 71.6  | 72.3  | 73.6  | 72.2  | 66.5  | 60.8  | 67.8   |
| Mean Temperature (F)         | 50.1  | 52.4  | 54.1  | 56.5  | 59.0  | 61.5  | 62.6  | 63.2  | 63.0  | 60.3  | 54.7  | 50.1  | 57.3   |
| Mean Min. Temperature (F)    | 39.4  | 42.1  | 43.9  | 45.5  | 48.9  | 51.7  | 53.7  | 54.1  | 52.5  | 48.4  | 43.0  | 39.4  | 46.9   |
| Mean Precipitation (in.)     | 4.46  | 4.68  | 3.63  | 1.69  | 0.60  | 0.11  | 0.01  | 0.02  | 0.21  | 1.10  | 2.74  | 4.25  | 23.5   |
| Heating Degree Days (F)      | 460   | 353   | 337   | 260   | 194   | 122   | 92    | 75    | 89    | 164   | 310   | 462   | 2918  |
| Cooling Degree Days (F)      | 0     | 0     | 1     | 7     | 10    | 17    | 19    | 19    | 30    | 18    | 2     | 0     | 123   |

The long-term mean annual rainfall at Watsonville is 22.2 inches, averaged for the period of record from water years 1880 to 2012 (Figure 3.9-1), while the 30-year normal (1981-2010) is 23.5 inches (Table 3.9-1). Precipitation and runoff are higher in the northern tributary watersheds draining from Mt. Madonna and the Santa Cruz Mountains in general, principally those of Corralitos, Browns Valley, Casserly, Coward Creeks and Banks Canyon, and generally lower in the southern portion of the valley and within some of the upper tributary watersheds east of the Santa Cruz Mountains crest (Llagas, Uvas, and upper Pajaro River, although not in that of the San Benito River) (Figure 3.9-2). Mean annual precipitation within the Pajaro Valley ranges from 16 inches.

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2 Aromas formation (Pleistocene) and the Purisima formation (Pliocene)
3 Observed water levels on each side of the San Andreas Rift Zone indicate groundwater separation found at the Wilson Quarry in Aromas (see Hecht and others, 2010).
4 Until 1974, the county line corresponded with the watershed divide or ridgeline. A 1974 adjustment moved the County line to include all of Mt. Madonna County Park in Santa Clara County, and most of the Pescadero Creek watershed in Santa Cruz County (to facilitate development of the once-proposed Pescadero Dam). This adjustment tends to make it more useful to consider Chittenden as a key location on the Pajaro River related to water-resource of the Pajaro Valley.
near Zmudowski Beach and lower Elkhorn Slough to more than 40 inches near the crest of the Santa Cruz Mountains.

From year to year, annual rainfall in this region has varied from 44 percent of mean (1977) to more than 210 percent of mean (1998). Multi-year droughts, recently occurring during 2007 to 2009, 1987 to 1992, and the extreme years of 1976 and 1977, are punctuated by sub-decadal wet periods peaking in 1941, 1983 and 1998 (Figure 3.9-1). These sequences of wet and dry years shape both the availability and quality of surface and groundwater in the region.

Mean monthly reference evapotranspiration$^5$ (ET$\_o$) in Pajaro Valley ranges between 5.2 inches (in June) to 1.6 inches (in December), with an annual mean of 42.3 inches (Table 3.9-2). Slightly lower ET$\_o$ is found towards the coast, and higher ET$\_o$ is inland (Figure 3.9-3), reflecting the frequent presence of fog as well as the moderating effects of Monterey Bay on air temperature.

### Table 3.9-2 Reference evapotranspiration of Pajaro Valley East Area, Watsonville, California

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Data source: CIMIS station 129, Pajaro; located at the west end of San Juan Rd.
Lat. 36°54’12”N, Long. 121°44’31”W, Elev. 65 ft., WGS84

$^5$ Reference evapotranspiration (ET$\_o$) is a standard method and commonly published form of evapotranspiration that represents water use by well-irrigated mowed turf grass, and is used to calculate the potential evapotranspiration (PET) by applying a plant-specific coefficient (Kc). Data are readily available from the California Irrigation Management Information System (CIMIS) website.
Denise Duffy & Associates, Inc.

3.9-4

Pajaro Valley Water Management Agency
BMP Update Draft EIR

3.9 Surface Water, Groundwater, and Water Quality


### Table 3.9-3: Mean, peak, and minimum discharge in the Pajaro River at Chittenden, California, water years 1940-2012 (cont.)

|------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|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|--|
Hydrology

The Pajaro River is the primary stream in Pajaro Valley, flowing into the basin at the Pescadero Creek confluence just east of Chittenden. Draining 1,186 square miles, the U.S. Geological Survey (USGS) has gaged the Pajaro River at Chittenden since October 1939 (Figure 3.9-4). Mean annual discharge at the gaging station is 163 cubic feet per second (cfs) or 118,000 acre-feet (Table 3.9-3), or about 0.14 cfs per square mile. On average, February has the highest flows of the wet season (587 cfs), while dry-season baseflows during July, August, and September are below 10 cfs. Year to year, streamflow in the Pajaro River shows a much greater variability than rainfall (Figure 3.9-5), ranging from a maximum annual mean discharge of 905 cfs during water year 1983 to a minimum of 1.06 cfs during 1977. Similarly, the peak streamflow (Figure 3.9-6) for each year of record varied from a maximum of 25,100 cfs in water year 1998 to 16 cfs in 1977. The volumetric flowrate capacity (i.e., the amount of flow accommodated within the banks of the Pajaro River) at this location is roughly 4,000 cfs.

The Pajaro River flows west across the San Andreas Rift Zone, then through the East Area (Figure 3.9-7) of the basin to its confluence of Salsipuedes Creek at the City of Watsonville. The distinguishing feature of the East Area is that its groundwater is recharged primarily from the Pajaro River. Related to this recharge, wells in this area produce mixed-ion or sodium-carbonate water, with virtually every well in the East Area having a boron concentration exceeding 0.2 mg/L. This local boron concentration is a water-quality fingerprint of recharge Pajaro River waters (HEA, 1978) (Figure 3.9-8).

In the North Area of the basin, tributaries are formed on the southern slopes of the Santa Cruz Mountains, where rainfall is greatest. Of these creeks, Corralitos Creek and its tributary Browns Valley Creek, are the largest. Green Valley, Banks and Hughes creeks join to form Casserly Creek and flow into College Lake. Water levels in College Lake are managed – inundated during the wet season and pumped dry by the College Lake Reclamation District (Reclamation District #2049) to be farmed during the dry season. The outflow from College Lake is considered the headwaters of Salsipuedes Creek, which is joined by Corralitos Creek in its first half mile, and then flows a relatively short distance to the Pajaro River. Turning southwestward at the confluence of Salsipuedes Creek, the Pajaro River flows to Monterey Bay.

In addition to College Lake, others in the ‘chain of lakes’ located north and east of the City of Watsonville include Kelly and Tynan lakes (private, year-round impoundments used for recreation), Pinto Lake (used as a City of Watsonville park and Santa Cruz County Park), and Drew Lake (the smallest lake with a widely fluctuating seasonal water level). These lakes receive runoff from small, local watersheds and from seasonal, shallow groundwater.

The North Area receives most of the rainfall and recharge in the basin, and produces the water of lowest salinity basin-wide. Recharge to groundwater is primarily from infiltration of rainfall, as well as streamflow. Groundwater is generally calcium carbonate water, suggesting recharge with little or no influence from flow along faults, seawater or formation (connate) water.

The South Area of the Pajaro Valley groundwater basin includes the Watsonville, Galligahan, Harkins, Hanson, Struve, and McCluskey slough system north of the Pajaro River, as well as Carneros Creek and Elkhorn Slough system south of the Pajaro River. Recharge in this area occurs primarily by direct rainfall in the areas of sandy

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6 The Pajaro Valley groundwater basin is subdivided into an East Area, North Area, and South Area, based on work originally done by USGS staff (c.f., Muir, 1972)
soils, and to a lesser extent irrigation return flows. Recharge generally has not offset local groundwater production since the 1940s. Water quality in this area is predominantly influenced by a combination of underflow from the North and East areas, saltier water drawn upward from deep aquifers and coastal inflow or seawater intrusion. The minimal lagoon at the mouth of the river, and the larger lagoon in the lowermost reaches of Watsonville Slough empty multiple times each year as surface water flow from the sloughs and the river flow breaches the beach berm. Over the past decade, the incidence of wave surge over the beach berm has increased bringing salty Monterey Bay water into the lagoon more often. During 2012-13, the berm was overtopped perhaps a half dozen times, sending pulses of saltier water up Watsonville Slough, sometimes beyond the Harkins Slough confluence. Currently, aquatic vegetation encroaching the channel south of the railroad tracks constrains the flow of water to and from the slough system.

**Basin Stratigraphy and Groundwater Occurrence**

The hydrogeology of Pajaro Valley has been described in numerous reports including those by Green (1970), Muir (1972, 1974), Dupré, (1975), Dupré and Tinsley, (1980), Hecht and others (1984), and Johnson and others (1988), among others.

Pajaro Valley area is underlain by a basement of Cretaceous granitic rocks associated with the Salinian Terrane, a continental fragment plutonic block faulted against Franciscan sedimentary basement rocks at the San Andreas Rift. Overlying these generally non-water bearing rocks are a series of westward-dipping, sediments of late Tertiary and Quaternary age, all of which are water bearing. These sediments include the poorly consolidated Mio-Pliocene Purisima Formation, the Pleistocene Aromas Red Sands, and Holocene terrace deposits, unconsolidated alluvium, dune deposits, and younger marine sediments. The five major water bearing units are summarized in Table 3.9-4. Formation permeability and well yield generally decrease with depth.
### Table 3.9-4 Pajaro Valley Groundwater Basin Hydrogeology

<table>
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<th>Formation</th>
<th>General Character</th>
<th>Water-Bearing Properties</th>
<th>Water Quality Characteristics</th>
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<tr>
<td>Dune Deposits</td>
<td>Unconsolidated, well-sorted, fine-to-medium-grained quartzose sand. In part, actively drifting.</td>
<td>Largely unsaturated, but, where saturated, yields water to wells in small quantities, unconfined.</td>
<td>Important areas for recharge. Excellent quality where developed, locally degraded with nitrates or intruding salt.</td>
</tr>
<tr>
<td>Alluvium</td>
<td>Unconsolidated gravel, sand, silt, and clay. Underlies the alluvial plain and extends into adjoining stream canyons.</td>
<td>Permeable; yields moderate quantities of water to wells.</td>
<td>East of Watsonville, TDS 550 to 1350 mg/L, elsewhere 150 to 750 mg/L, except where intruded by marine waters. Limited concentrations of nitrate, sulfate, boron in some wells east of Watsonville.</td>
</tr>
<tr>
<td>Aromas Red Sands</td>
<td>Semi-consolidated, quartzose, brown to red sand, with some clay layers. Deposited by wind and by meandering and braided streams.</td>
<td>Permeable; yields moderate quantities of water to wells. Main producing aquifer.</td>
<td>Usually excellent quality with TDS 150 to 450 mg/L, generally increasing with depth. Usually low in sulfate, boron, iron and manganese. Locally contaminated. Naturally occurring trace elements in sub-to marginally-toxic concentrations reported in isolated wells.</td>
</tr>
<tr>
<td>Purisima Formation</td>
<td>Poorly indurated sand, silt, clay, and shale; some gravel. Extensive shale beds in lower part of formation. Mostly marine in origin, three subunits locally: upper member is a poorly indurated fine sand with silt and clay layers, some gravel; middle member is a poorly indurated medium to fine sand with silt and clay layers, some gravel; lower member is a poorly indurated sand with shale layers.</td>
<td>Moderately permeable. Lies at considerable depth beneath much of the valley area, although is exposed at the surface in the foothills. Waterbearing properties in the Pajaro Valley are not well known, but upper and middle units probably will yield moderate quantities of water. The Purisima Formation is an important aquifer north of the Pajaro Valley.</td>
<td>Usually good quality with TDS 150 to 800 mg/L. Greater relative concentrations of sulfate than in Aromas groundwater. Low boron.</td>
</tr>
</tbody>
</table>


The Purisima Formation underlies the valley at depths ranging from at or near land surface along the northern and eastern boundaries, to as much as 800 or 900 feet near the mouth of the Pajaro River (Johnson et al. 1988). The Purisima Formation consists of layered sandy silts and silts deposited in near shore and far shore marine deposits. It is generally screened only by the deepest wells in the Pajaro Valley and provides limited amounts of water.

The Aromas Red Sands are between 100 and 900 feet thick in Pajaro Valley. The sands consist of both older fluvial deposits and younger eolian deposits. The Aromas Red Sands are described as well sorted brown to red sands with interbeds of clay and poorly sorted gravels (Hanson et al., 2008; Hanson et al., 2010). The Aromas Red Sands provide a significant amount of the groundwater pumped by wells in Pajaro Valley and form the unit considered to be the primary water-bearing aquifer.

Terrace deposits, unconsolidated alluvium, dune deposits, and younger marine sediments blanket the Aromas Red Sands to depths of 245 feet in much of the Pajaro Valley. The alluvium is described as a highly variable mixture of unconsolidated gravel, silt, and sand with lenses of clay and silty clay. Terrace deposits consist of moderately to poorly sorted silt, sand, silty clay, and gravel; while dune deposits consist of fine-to medium-grained quartz...
3.9 Surface Water, Groundwater, and Water Quality

sand (Johnson et al., 1988). Relatively little water is pumped from these units, though they are often important recharge areas.

The Aromas Red Sands and Purisima Formations are locally overlain by layers of blue clay which act as a confining (or semi-confining) layer, inhibiting the free vertical movement of the groundwater throughout much of the basin (Figure 3.9-9). The thickness of the clay layer is illustrated in Figure 3.9-10 (per Hanson and others, 2013 pending).

Developable groundwater occurs within sands and gravels in the partially- to non-consolidated sediments throughout the valley. The alluvium, terrace and dune deposits, and the upper portion of the Aromas sands comprise the main groundwater body of the Pajaro Valley. Perched groundwater is found in areas above the blue clay deposits of the alluvial unit and is significant as an actual and potential source of degraded water quality to the heavily used basal aquifer due to agricultural and urban development (Figure 3.9-11). The deepest wells in the valley draw groundwater from the lower Aromas Formation and the upper Purisima Formation.

Groundwater Recharge and Flow

Water entering the ground and percolating through soils and surface sediments to recharge groundwater has three primary sources in the Pajaro Valley: (1) infiltration from rainfall; (2) percolation through stream beds; and (3) percolation from irrigated soils. Groundwater recharge areas and related channel lengths have been identified in the Pajaro Valley based on analysis of precipitation, soil and subsurface permeability, and geologic data (Figure 3.9-7). These primary recharge areas are generally underlain by sandy or very sandy soils (Santa Cruz Resource Conservation District, 2005) developed from underlying sediments having high permeability. Most groundwater in the Pajaro Valley floor area, however, occurs under confined conditions, where clays are thickest in the middle of the valley (Figures 3.9-9 and 3.9-10), roughly trending parallel to the Pajaro River and thinning inland toward Watsonville and the mountains. Groundwater from the primary recharge areas flows toward the center of the valley to the deeper confined aquifers. Conversely, rainfall and irrigation on the terrace and alluvial deposits in the center of the valley generally perches water on confining clays, limiting recharge to the underlying confined aquifer. Agricultural lands on the valley floor which are not underlain by perched groundwater, however, constitute another source of recharge in addition to the primary recharge areas, owing largely to the level grade of the cultivated fields.

Groundwater recharge was estimated at 40,550 acre-feet according to HEA (1978) and at 30,770 acre-feet according to the USGS in their work on the Pajaro Valley Hydrologic Model (personal communication). Rainfall is the major source of groundwater recharge in the Pajaro Valley, principally through the sandy and very sandy soils of the primary recharge areas. The main area of groundwater recharge by rainfall infiltration in the Pajaro Valley area is north, east and west of Corralitos. This area is underlain by the Purisima Formation and the Aromas Red Sands. There is also a secondary area that is favorable for rainfall infiltration between the Pajaro River and Corralitos. This area is underlain by the Purisima Formation, Aromas Red Sands and terrace deposits.

Percolation through all stream beds in the valley provides an average annual recharge estimated between 10,400 acre-feet (HEA, 1978) and 14,470 acre-feet (USGS, personal communication), which is a significant portion of total recharge to the Pajaro Valley aquifers. According to Muir (1972), the best area for surface infiltration and artificial recharge is in the bed of the Pajaro River from Pajaro Gap to Murphy Crossing. The streambed and soil is predominantly sand in this area, and there is no confining clay layer. Water recharged would be expected to flow into the alluvium, terrace deposits, Aromas Red Sands and the Purisima Formation. Other favorable areas include the streambeds and adjacent soils in and along Corralitos and Casserly Creeks, and in Green, Pleasant and
3.9 Surface Water, Groundwater, and Water Quality

Larkin Valleys. About 60 percent of channel-percolation recharge is through beds of these creeks draining the Santa Cruz Mountains north and east of Watsonville, and about 40 percent from the Pajaro River (Hecht and others, 2010). These areas correspond with the primary recharge areas noted in Figure 3.9-7.

Recharge to groundwaters below the primary confining clay layers generally takes place where clay layers are not laterally continuous, occur as lenticular deposits, or are not present, such as in the upstream portions of the East Area. More than 85% of the East Area recharge originates from the Pajaro River (Hecht and others, 2010). The plume of recharged waters moves westward from the East Area, contributing to supply in much of the Monterey County portion of the basin.

Groundwater recharge is depicted in gaging records for the Pajaro River (Figure 3.9-12). The Pajaro River is a losing reach from Chittenden to Murphy Crossing (and somewhat further downstream) and channel loss is greatest in the lower portion of the reach where clay and silt-rich lithologies become less common and coarser sediments are exposed along the streambed (Hatch and others, 2010; Ruehl and others, 2006). Receding flows following seasonal storms are significantly lower and can recede to zero flow at Murphy Crossing, while flows persist at the Chittenden gage. The magnitude of channel loss from the 7.1-mile reach between the two gages, was 3.5 cfs to 10 cfs at flows less than 70 cfs, and the estimated annual recharge to groundwater may average 4,000 acre-feet or more to the Pajaro Valley aquifers (HEA, 1978). Consistent with measured higher percolation rates in the lower half of the reach (as high as 4.6 feet per day), there were significant changes in stream channel morphology observed, where thick accumulations of fine-grained sediment were deposited as channel discharge receded into the dry season. These recent studies by UC Santa Cruz show that greater aquifer recharge may be possible by diverting high flows to local recharge basins, or if flow were maintained through the losing reach of the Pajaro River, preventing the formation of an unsaturated zone below the streambed (Ruehl and others, 2006).

The effect of recharge to groundwater in the vicinity of Murphy Crossing and the recharge basins proposed in the BMP Update is shown in PVWMA groundwater monitoring data collected at two actively pumped agricultural wells (Figure 3.9-13). The first well is 540 feet deep and screened in Aromas sandstone, while the second is 165 feet deep and draws groundwater from alluvial sands. Water levels in both wells seasonally fluctuate from a high level during the wet season to a low level from dry-season drawdown. The figure highlights two periods: (a) a wet period from 1995 through 1998 that followed the critically dry year of 1994, and (b) the recent multi-year drought from 2007 through 2009 that followed two sequential wet years. During the wet period progressively higher water levels were recorded, and during the drought the trend showed lower water levels. These data suggest that recharge to groundwater reaches deep into the aquifer in the Murphy Crossing area.

Figure 3.9-14 shows current groundwater elevations interpreted from measurements during the late dry season from 1947 to 2011. The lines in red represent groundwater levels that are below sea level, and the lighter blue lines are above sea level. Based on recent (2011) data, a significant trough of elevations below sea level exists throughout the valley floor, with several defined depressions from well pumping. During the 1987 through 1992 extended drought, below sea level conditions and pumping depressions were spatially more expansive. Of noteworthy importance is the groundwater ridge formed by high rates of recharge through dune sands in the San Andreas Road area, which is a major source of water to the upper zones in the complex multi-aquifer system at the mouth of the Pajaro River and to the pumping depressions. Recharge to groundwater in the East Area from the Pajaro River and corresponding flow to pumping depressions, and recharge from higher rainfall in the North Area is also evident in Figure 3.9-14.
Groundwater Extraction, Overdraft, Seawater Intrusion and Subsidence

Currently, nearly all of the reported water use in the Pajaro Valley is pumped groundwater. Figure 3.9-15 shows all the metered wells in the Pajaro Valley. Between 2000 and 2011, groundwater pumping in the Pajaro Valley ranged between approximately 45,000 and 62,000 acre-feet per year. The 5-year average for groundwater pumping from 2007 to 2011 is approximately 53,760 acre-feet. The five-year average from 2007 to 2011 for total water use, including delivered water and City of Watsonville surface water use, is approximately 55,595 acre-feet. (BMP Update Figure 2-20 and Table 2-7)

The historical increase in agricultural acreage, a switch to more water-intensive crops, and urban population growth has driven a rise in demand for water, trending to a greater cumulative overdraft in the Pajaro Valley groundwater basin. Before extensive pumping began in the Pajaro Valley, groundwater throughout the basin flowed toward the Pajaro River bottomlands or Elkhorn Slough and toward the Monterey Bay. The last reports of artesian conditions in the confined alluvial aquifer south and west of Watsonville were during the early 20th century (Hecht and others, 1984). By the 1940’s following major development of groundwater resources, some wells would still flow artesian but only during the wet season (BMP Update). Since the 1940s, hydrogeologic studies have shown a regional decline in the water table during the dry season with partial recovery from wet-season recharge. Seawater intrusion was well established in the upper aquifers by the early 1950’s and the spatial extent of the area affected by intrusion has slowly and intermittently increased in some areas and aquifers over the decades since (Figure 3.9-14). During the last 50 years, inland water levels have fallen significantly in some locations despite slightly higher than average rain fall over the same period. By the 1970s, water levels west of Watsonville were consistently below sea level from approximately May to December, often never recovering to levels above sea level, providing the conditions necessary for seawater intrusion (BMP Update). During multi-year droughts below sea level conditions and pumping depressions expand, only to improve marginally during following wet-year sequences (Figure 3.9-14).

As discussed in the previous section, recharge to groundwater is concentrated during the wet season and highly variable, while water supply demand is concentrated during the dry season and relatively constant from year to year. This seasonal offset of supply and demand explains why groundwater storage is depleted during the dry season and the area below sea-level broadens. In addition, there has historically been more water withdrawn from the basin on an annual basis than is replaced, which has resulted in an overdraft condition. Long-term overdraft of the aquifer system has caused groundwater levels to drop below sea level throughout much of the basin, creating conditions that allow for the inland migration of the freshwater/seawater interface. Chloride concentration, specific conductance, and total dissolved solids (TDS), are useful metrics to characterize the extent seawater intrusion. Use of these indicators shows that the area south of the Pajaro River has experienced the highest extent of intrusion since 1998 and the intruded area continues to expand. Seawater intrusion is generally most extensive in the deeper confined aquifers. This issue is also discussed in Sections 2.

While land subsidence is commonly associated with groundwater overdraft, it has not been reported in the Pajaro Valley.

Flooding and Flood Protection

Current estimates show that the levees can carry approximately 19,000 cfs of water. A 100-year flood would generate approximately 44,000 cfs. Even 13-to-15-year events (storms with a 6.5 percent to 8.0 percent chance of occurring each year) can cause flooding.
Over the past several decades, flooding from the Pajaro River has led to severe damage on multiple occasions. Significant flooding occurred in December 1955, April 1958, February 1986, March 1995, January 1997, and February 1998. The two most significant floods with major damage occurred in 1955 and 1995. In March 1995, floods breached the levee south of the river, causing two deaths and over $95 million dollars of total economic loss, including $67 million in damage to agriculture and $28 million in non-agricultural damage to the community of Pajaro. As the population living and working near the river increases and the economic impact of the Pajaro floods grows, finding solutions becomes more and more pressing.

To address the Pajaro River flooding problem, the Counties of Monterey and Santa Cruz and the City of Watsonville are working with the US Army Corps of Engineers (USACE). The Pajaro River Flood Risk Reduction Project is a local and federal response to address the immediate and future flood protection needs of the region.

The Pajaro River Flood Risk Reduction Project involves rebuilding or rehabilitating the USACE flood protection levees along eleven miles of the Lower Pajaro River: from the ocean to Murphy Crossing Road and along five miles of Salsipuedes and lower Corralitos Creeks, which drain into the lower Pajaro River in the City of Watsonville. The reconstructed levees will ultimately provide the urban reaches of region with 100-year flood protection and some lower level of protection for the agricultural areas. The FEMA 100-year flood zone within the PVWMA boundary is depicted in Figure 3.9-16. Until the Flood Project is completed, the urban and agricultural areas of the Lower Pajaro River area will be under-protected from flooding (Pajaro River watershed study, phase 2, RMC, 2003). The project team is currently revising project alternatives and completion of the draft EIR is expected in 2014.

Once the project is completed, the areas at risk of flooding may qualify to be mapped out of the FEMA 100-year flood plain, and may no longer be required to participate in the National Flood Insurance Program (NFIP), a goal considered highly important to future economic growth in the Pajaro Valley. The project was federally authorized by the Flood Control Act of 1966 and the Water Resources Development Act (WRDA) of 1990.

The expansion of College Lake was one of 16 flood control alternatives identified for further evaluation for flood protection on the Pajaro River (Pajaro River watershed study, phase 2, RMC, 2003) by the Pajaro River Watershed Flood Prevention Authority (FPA). The following two flood control projects comprise the College Lake expansion alternative:

- The first project would increase the storage capacity of College Lake. To increase the capacity of College Lake, two dams would be constructed, both at an elevation of 79 feet with a spillway at 69 feet.
- The second project would divert floodwaters from Corralitos Creek to the lake from upstream of its confluence with Salsipuedes Creek, reducing inflow to the Pajaro River. During a 100-yr flood event, 420 acres of land would be inundated.

The alternative would reduce the flood flow on the Pajaro River downstream of the Salsipuedes Creek confluence by less than 2,500 cfs. This is equivalent to about 10% flood protection benefit. The implementation of this alternative is limited by land uses in the vicinity of College Lake and was not identified as the recommended alternative. However, the Resource Conservation District of Santa Cruz County is conducting a Watershed Study to identify alternative management approaches for College Lake that could offer multiple benefits, including water supply, flood protection and environmental habitat benefits.

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7 http://www.pajarowatershed.org/Content/10017/flood_protection.html
3.9 Surface Water, Groundwater, and Water Quality

**Sea-level Rise**

According to a recent summary of potential impacts of global climate change in California (Pacific Council on International Policy, 2010), sea level is expected to rise 16 inches above current levels by 2050. Over the longer-term, the State recently adopted a 55-inch value for sea level rise by 2100 to be used when planning construction of new or modified critical infrastructure (Resolution of the California Ocean Protection Council on Sea Level Rise, adopted on March 11, 2011). Figure 3.9-16 identifies the locations of potential effects to coastal flooding from a 55-inch sea level rise. Higher sea levels are expected to increase beach erosion, expose larger areas to coastal flooding, increase the frequency of bar overtopping (leading to increased salinity in coastal lagoons and sloughs) and worsen near-coastal damage from major storms. In addition, sea water intrusion may be exacerbated by the higher sea levels associated with climate change.

**Water Quality**

*Water Quality Regulation:* The proposed components of the BMP Update need to be considered within the existing conditions and water-quality guidelines and objectives for the Pajaro Valley basin (summarized in Sec. 3.9-2). The Regional Board (CCRWQCB) has promulgated the following water-quality guidelines and objectives for the Pajaro Valley:

- For inflowing surface water, specific objectives for the Pajaro River at Chittenden include total dissolved solids (TDS), specific conductance, sodium, chloride, sulfate, and boron (*Table 3.9-5*);
- Salinity, sodium, chloride, and boron also have water-quality guidelines for irrigation water and plant toxicity (*Table 3.9-6*), as do nitrogen, bicarbonate, and pH;
- Total maximum daily loads (TMDLs) for sediment and fecal coliform in the Pajaro River; and,
- A fecal coliform TMDL for the Watsonville Sloughs.

No specific groundwater objectives are designated for the basin by the CCRWQCB. In addition, the crop pathogen *Phytophthora* spp has in the past been a local concern to the agricultural entities; however, it is now understood to be readily managed with farm practices.
### Table 3.9-5 Water quality objectives for inorganic constituents relative to average concentrations reported

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Units</th>
<th>CA Ocean Plan</th>
<th>Title 22 MCL</th>
<th>Aquatic toxicity levels</th>
<th>Irrigation Water</th>
<th>Livestock water</th>
<th>Pajaro R. at Chittenden</th>
<th>Pajaro River</th>
<th>Pajaro Valley Basin groundwater</th>
<th>Background groundwater at proposed Murphy Crossing recharge basins</th>
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<th>Well B (shallow well)</th>
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*Denise Duffy & Associates, Inc.*

Pajaro Valley Water Management Agency

BMP Update Draft EIR
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<th>Aquatic toxicity levels&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Irrigation Water&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Livestock water&lt;sup&gt;e&lt;/sup&gt;</th>
<th>Pajaro R. at Chittenden&lt;sup&gt;f&lt;/sup&gt;</th>
<th>Pajaro River&lt;sup&gt;g&lt;/sup&gt;</th>
<th>Pajaro Valley Basin groundwater&lt;sup&gt;h&lt;/sup&gt;</th>
<th>Background groundwater at proposed Murphy Crossing recharge basins&lt;sup&gt;i&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel (Ni)</td>
<td>mg/L</td>
<td>0.02&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.1</td>
<td>0.4&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.1&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.2&lt;sup&gt;1&lt;/sup&gt;</td>
<td>2&lt;sup&gt;1&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>mg/L</td>
<td>0.06&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.05</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silver (Ag)</td>
<td>mg/L</td>
<td>0.003&lt;sup&gt;1&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thallium (Tl)</td>
<td>mg/L</td>
<td>--</td>
<td>0.002</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vanadium (V)</td>
<td>mg/L</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>mg/L</td>
<td>0.08&lt;sup&gt;1&lt;/sup&gt;</td>
<td>5</td>
<td>0.2&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.004&lt;sup&gt;1&lt;/sup&gt;</td>
<td>2&lt;sup&gt;1&lt;/sup&gt;</td>
<td>10&lt;sup&gt;1&lt;/sup&gt;</td>
<td>25</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**NOTES**

- "-" indicates no standard or recommendation has been made, or that there was no analytical analysis.
- Bold italicized values indicates groundwater in the vicinity of the proposed Murphy Crossing recharge basins exceeding water quality objectives.
- MCL = Title 22 Maximum Contaminant Level as of June 12, 2003; the MCL of lead is the Regulatory Action Level.
- Aquatic toxicity from Central Coast Basin Plan, Table 3-5; Based on limiting values recommended in the National Academy of Sciences-National Academy of Engineers “Water Quality Criteria 1972.” Values are 90 percentile values except total mercury values.
- Irrigation and livestock water, recommended maximum concentrations of trace elements from the Central Coast Basin Plan.
- Mean surface water objectives, Table 3.7 of Central Coast Basin Plan.
- Average values from Chittenden, Arromas Bridge Crossing and Murphy Crossing stations along the Pajaro River; data collected from 1980 to 2007.
- Average from Pajaro Valley Water Management Agency monitoring wells, data collected from 1980 to 2008.
- Average from two Pajaro Valley Water Management Agency monitoring wells, data collected from 1990 to 2013. Well 54 is 540 ft deep and draws water below 340 ft from Arromas sandstone, while Well 350 is 165 ft deep, drawing shallow groundwater from alluvial sands.
- CA Ocean Plan, daily maximum implemented to protect marine aquatic life.
- CA Ocean Plan, 30-day average set to protect human health.
- Total coliform density will not exceed 1,000 per 100 ml when the ratio of fecal to total coliform exceeds 0.1.
- Recommendations for hard waters, >100 mg/L CaCO<sub>3</sub>.
- Recommendations for soft waters, <100 mg/L CaCO<sub>3</sub>.
- Objectives for water used continuously on all soils (Central Coast Basin Plan Table 3-4). Values will normally not adversely affect plants or soils. Refer to CCSP Table 3-3 for irrigation and plant toxicity guidelines.
- Objectives for use up to 20 years on fine textured soils of pH 6 to 8.5.
- Combination of nitrate and nitrile.
Table 3.9-6 Guidelines for Interpretation of Quality of Water for Irrigation

Source: Central Coast Regional Basin Plan (CCRWQCB, 2011)

<table>
<thead>
<tr>
<th>Problem and Related Constituent</th>
<th>No Problem</th>
<th>Water Quality Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Increasing Problems</td>
</tr>
<tr>
<td>Salinity (EC of irrigation water, mmho/cm)</td>
<td>&lt;0.75</td>
<td>0.75 - 3.0</td>
</tr>
<tr>
<td>Permeability (EC of irrigation water, mmho/cm)</td>
<td>&gt;0.5</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td>SAR, adjusted (mmho/cm)</td>
<td>&lt;6.0</td>
<td>6.0 - 9.0</td>
</tr>
<tr>
<td>Specific ion toxicity from root absorption</td>
<td>Sodium (evaluate by adjusted SAR)</td>
<td>&lt;3</td>
</tr>
<tr>
<td>Chloride (meq/l)</td>
<td>&lt;4</td>
<td>4.0 - 10</td>
</tr>
<tr>
<td>mg/l</td>
<td>&lt;142</td>
<td>142 - 355</td>
</tr>
<tr>
<td>Boron, mg/l</td>
<td>&lt;0.5</td>
<td>0.5 - 2.0</td>
</tr>
<tr>
<td>Specific ion toxicity from foliar absorption (sprinklers)</td>
<td>Sodium (meq/l)</td>
<td>&lt;3.0</td>
</tr>
<tr>
<td>mg/l</td>
<td>&lt;69</td>
<td>&gt;69</td>
</tr>
<tr>
<td>Chloride (meq/l)</td>
<td>&lt;3.0</td>
<td>&gt;3.0</td>
</tr>
<tr>
<td>mg/l</td>
<td>&lt;106</td>
<td>&gt;106</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>NH4 - N, mg/l for sensitive crops</td>
<td>&lt;5</td>
</tr>
<tr>
<td>NO3 - N, mg/l for sensitive crops</td>
<td>&lt;5</td>
<td>5 - 30</td>
</tr>
<tr>
<td>HCO3 (only with overhead sprinklers)</td>
<td>&lt;1.5</td>
<td>1.5 - 8.5</td>
</tr>
<tr>
<td>meq/l</td>
<td>&lt;90</td>
<td>90 - 520</td>
</tr>
<tr>
<td>pH</td>
<td>Normal range</td>
<td>6.5 - 8.4</td>
</tr>
</tbody>
</table>

- Interpretations are based on possible effects of constituents on crops and/or soils. Guidelines are flexible and should be modified when warranted by local experience or special conditions of crop, soil, and method of irrigation.
- Assumes water for crop plus needed water for leaching requirement (LR) will be applied. Crops vary in tolerance to salinity. Refer to tables for crop tolerance and LR. The mmho/cm x 640 = approximate total dissolved solids (TDS) in mg/l or ppm; mmho x 1,000 = micromhos.
- Adjusted SAR (sodium adsorption ratio) is calculated from a modified equation developed by U.S. Salinity Laboratory to include added effects of precipitation and dissolution of calcium in soils and related to CO2 + HCO3 concentrations.

To evaluate sodium (permeability) hazard: Adjusted SAR = Na/[1/2 (Ca + Mg)]1/2[1 + (8.4 - pHc)].

Refer to Appendix for calculation assistance.

SAR can be reduced if necessary by adding gypsum. Amount of gypsum required (GR) to reduce a hazardous SAR to any desired SAR (SAR desired) can be calculated as follows:

\[
GR = \left[ \frac{2(Na)^2}{SAR^2_{desired}} (Ca + Mg) \right]^{2/4}
\]

Note: Na and Ca + Mg should be in meq/l. GR will be in lbs. of 100 percent gypsum per acre foot of applied water.

- Most tree crops and woody ornamentals are sensitive to sodium and chloride (use values shown). Most annual crops are not sensitive (use salinity tolerance tables). For boron sensitivity, refer to boron tolerance tables.
- Leaf areas wet by sprinklers (rotating heads) may show a leaf burn due to sodium or chloride absorption under low humidity-high evaporation conditions. (Evaporation increases ion concentration in water films on leaves between rotations of sprinkler heads.)
- Excess N may affect production or quality of certain crops; e.g., sugar beets, citrus, avocados, apricots, etc. (1 mg/l NO3 - N = 2.72 lbs. N/acre foot of applied water.) HCO3 with overhead sprinkler irrigation may cause a white carbonate deposit to form on fruit and leaves.
Surface Water Quality: Data reported in the Basin Management Plan Update include maxima and minima for TDS (in important constituent for agriculture) and nitrate (for human consumption and aquatic habitat) from three PVWMA monitoring stations on the Pajaro River, four stations on Corralitos Creek, three stations in the Watsonville Slough system, and at College Lake outflow (Table 3.9-7). Elevated TDS levels are observed at the lowermost, and tidally influenced stations on the Pajaro River (PR3) and in lower Watsonville Slough. Lower TDS concentrations were observed at higher elevations in the watershed. Maximum nitrate concentrations were elevated above its maximum contaminant level (MCL) for drinking water (45 mg/L; or 10 mg/L expressed as nitrate nitrogen) at Pajaro River station PR1 and PR2. Figure 3.9-4 shows the locations of the three Pajaro River stations.

<table>
<thead>
<tr>
<th>PVWMA water quality monitoring station</th>
<th>Total Dissolved Solids</th>
<th>Estimated Maximum Specific Conductance</th>
<th>Nitrate as NO3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum (mg/L)</td>
<td>Maximum (mg/L)</td>
<td>(mmhos/cm @25°C)</td>
</tr>
<tr>
<td>Pajaro River at Aromas, PR1</td>
<td>200</td>
<td>1,400</td>
<td>2.15</td>
</tr>
<tr>
<td>Pajaro River at Murphy Crossing, PR2</td>
<td>200</td>
<td>1,400</td>
<td>2.15</td>
</tr>
<tr>
<td>Pajaro River downstream of Hwy 1, PR3</td>
<td>275</td>
<td>20,000</td>
<td>30.8</td>
</tr>
<tr>
<td>Corralitos Creek at Browns Valley Road, CO1</td>
<td>150</td>
<td>380</td>
<td>0.58</td>
</tr>
<tr>
<td>Corralitos Creek at Varni Road, CO2</td>
<td>150</td>
<td>380</td>
<td>0.58</td>
</tr>
<tr>
<td>Corralitos Creek at Scurich Road, CO3</td>
<td>150</td>
<td>755</td>
<td>1.16</td>
</tr>
<tr>
<td>Corralitos Creek at Green Valley Road, CO4</td>
<td>135</td>
<td>560</td>
<td>0.86</td>
</tr>
<tr>
<td>Watsonville Slough above Harkins Slough, WS1</td>
<td>200</td>
<td>1,650</td>
<td>2.54</td>
</tr>
<tr>
<td>Watsonville Slough at Harkins Slough, WS2</td>
<td>260</td>
<td>6,710</td>
<td>10.3</td>
</tr>
<tr>
<td>Watsonville Slough at Shell Rd., WS3</td>
<td>260</td>
<td>14,900</td>
<td>22.9</td>
</tr>
<tr>
<td>College Lake</td>
<td>100</td>
<td>650</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Notes:
1. Total dissolved solids in mg/L divided by 640 approximates specific conductance in mmhos/cm, useful to estimate crop tolerance (see accompanying figure).
2. nd = not detected

Groundwater Quality: Based on water-quality testing of well water, PVWMA has compiled and spatially interpolated the water-quality results for TDS, chloride, and nitrate. Maximum concentrations of TDS are shown in Figure3.9-17, chloride in Figure3.9-18, and nitrate in Figure3.9-19. Elevated concentrations of TDS and chloride concentrations illustrate the salinity increases from seawater intrusion and from Pajaro River recharge in the East Area. The following subsections describe these processes. Nitrate concentrations are locally elevated in East Area groundwater as well as the sandy areas of the San Andreas Terrace, the Springfield Terrace, and the upper Carneros area. The description of nitrate sources is also discussed in a following subsection.

Salinity Increases from Seawater Intrusion: The Alluvium, Aromas Red Sands, and Purisima Formations are hydrogeologically connected to the ocean through a number of outcrops in Monterey Bay. Longstanding and continued overdraft of the groundwater has allowed seawater to intrude via these outcrops into the freshwater aquifer system. The extent of landward seawater intrusion has increased over time along the coastal region of the basin (Figure 2-2 of Section 2). The total intruded area has increased almost sevenfold since 1951, with the area south of the Pajaro River exhibiting the highest extent of intrusion. A number of coastal wells showing substantial increases in chloride concentrations over the last couple of decades are indicative of seawater intrusion. Rising chloride concentrations corroborate the fact that the volume of freshwater displaced in the intruded area is continuing to increase. Chloride levels are generally highest in the deeper confined aquifers consisting of Aromas Red Sands and the Purisima Formation. The concentration of chloride has been measured...
at values ranging from less than 5.0 mg/L to approaching the full strength seawater (approximately 19,000 mg/L) in some monitoring wells.

**East Area Salinity Increases:** In recent decades, TDS concentrations have increased in the East Area groundwater ([Figure 3.9-20](#)), largely due to increasing salinity in the Pajaro River, resulting from upstream sources. The Pajaro River is the source of most of the recharge to groundwater in the East Area. As discussed above, groundwater recharge from the Pajaro River is highest in the lower half of the reach between Chittenden and Murphy Crossing ([Hatch and others, 2010; Ruehl and others, 2006](#)), as the river flows into the Pajaro Valley groundwater basin. As in most streams, TDS in the Pajaro River is inversely correlated to the rate of streamflow, with lowest levels during storm flows and highest levels when flows are low ([Figure 3.9-21](#)). This trend has magnified since 1952 and at the two stations downstream of Chittenden, such that flows of less than 15 to 20 cfs usually have concentrations of TDS exceeding 1000 mg/L, the CCRWQCB water-quality objective for the Pajaro River at Chittenden, and a level at which a number of crops begin to experience diminishing yields and increased vulnerability to crop diseases ([Figure 3.9-22](#)). The Chittenden data show that from 1952 to 1972 (the yellow triangular symbols and brown dashed regression line on [Figure 3.9-21](#)), only flows less than about 3.0 cfs (which occurs a much lower percentage of the time) normally exceeded the 1000 mg/L threshold, whereas by 1973-1992 (the green triangular symbols and green dashed line) flows of up to 7.0 cfs usually exceeded the threshold. Similarly, the Aromas Bridge and Murphy Crossing data from 2003-13 show flows of up to about 16 cfs usually exceeded the threshold.\(^8\) The progressive increase in flows carrying more than 1,000 mg/L TDS means that the Pajaro River is recharging, on average, slightly saltier water – but saltier enough to increase the groundwater salinity and threaten to reduce the agricultural potential of the East Area.

Causes of the increasing surface-water salinity may include one or more of the following conditions: increases in population, changes to land use, agricultural return flows, and, potentially, increasing salinity of formation waters between Chittenden and Pajaro Gap induced by the Loma Prieta earthquake (1989). With the exception of the last source, it is likely that the contributing causes will continue, if not expand. Without intervention, it is reasonable to expect further deterioration in the salinity of low flows entering the Pajaro Valley from these upstream sources, and -- indirectly -- in the salinity of many wells in the East Area.

Crop yields are dependent on the salinity of irrigation water and of soil, as well as the tolerance of the crop ([Figure 3.9-22](#)) to salts. In general, crops grown in the Pajaro Valley are ‘moderately tolerant’ to salt ([Table 3.9-8](#)) and, as indicated in [Figure 3.9-22](#), should not be affected by existing TDS levels in the Pajaro River and East Area groundwater. However, with potentially higher TDS levels, crop selection may become limited to maintain a high yield, particularly with ‘moderately sensitive’ crops.

---

\(^8\) For various reasons, the Pajaro River also becomes slightly saltier as it flows from Chittenden to Murphy Crossing. The downstream increases in salinity mean that [Figure 3.9-21](#) may somewhat overstate the changes over time.
Nutrients and Nitrate: As with TDS, similar increases in nitrate concentrations in the Pajaro River have been observed (Figure 3.9-23). Nitrate decreases through the reach from Chittenden to Murphy Crossing due to one or more internal sinks, not dilution by groundwater, by hill-slope runoff, or by other water inputs (Ruehl and others,
The increase shown in Figure 3.9-23 is likely owing to agricultural runoff and treated wastewater\(^9\) entering the Pajaro River since the USGS 1952 to 1992 data set (Applied Science and Engineering, 1999).

Nutrients are common groundwater constituents in many agricultural areas, and in excess pose a public risk. Nutrient sources include agriculture, livestock, septic tanks, and urban runoff. Nitrate is a commonly used indicator of nutrients. Nitrites can occur in groundwater through the conversion of naturally occurring or introduced organic nitrogen or ammonia. Most fertilizers contain high concentrations of nitrogen, and as a result soils in agricultural areas such as the Pajaro Valley are prone to having elevated concentrations of nitrate. Nitrites are highly soluble and can leach into groundwater or can travel with surface water runoff. Elevated nitrite concentrations are commonly found in shallow wells. Typically, deeper wells in the Pajaro Valley (those that are screened at least 125 feet below the water table or that pump water from beneath a confining layer), including municipal wells, contain nitrate concentrations that do not exceed the drinking water standard. Nitrate concentrations are locally elevated in East Area groundwater (Figure 3.9-19), as well as the sandy areas of the San Andreas Terrace, the Springfield Terrace, and the upper Carneros area (HEA, 1978). With regard to the Murphy Crossing area, background nitrate concentrations of receiving groundwater in the vicinity of proposed recharge basins are significantly higher than in the Pajaro River (Figure 3.9-24), suggesting a local source other than the river, and indicating that recharge of Pajaro River water when flows exceed 45 to 90 cfs can improve the local groundwater nitrate concentrations.

Closely related to TDS, concentrations of sulfate, chloride and sodium also show a slight increase since the 1952 to 1992 USGS data set (Figures 3.9-25, -26, and -27), and are conserved during flow along the reach from Chittenden to Murphy Crossing (Ruehl and others, 2007). Springs along the San Andreas fault zone may contribute to the noted increase in concentration.

The Pajaro River also introduces moderate concentrations of naturally-occurring boron into Pajaro Valley waters. Other than sea water, the Pajaro River is the only significant natural source of boron in basin groundwaters. Local boron concentration is a water-quality fingerprint of recharge Pajaro River waters (HEA, 1978) (Figure 3.9-8). Boron toxicity to less boron-tolerant crops in many agricultural areas elsewhere in California is traceable to use of irrigation waters with boron content in excess of 0.75 mg/L. Boron concentrations less than 0.5 mg/L are generally satisfactory for all crops.\(^10\) Boron originates from geological sources, generally in the San Benito watershed. Concentrations in the Pajaro River are highest when flows are low and at times have exceeded 1 mg/L (Figure 3.9-28).

\(^9\) Wastewater from the City of Gilroy domestic plant (which also serves Morgan Hill) is a known upstream source of nitrate loadings.

\(^10\) Boron is not thought to adversely affect animals, including humans, at concentrations many times greater than those reported anywhere in the Pajaro Valley; see EPA, 2002, Toxicological review of boron and compounds (CAS No. 7440-42-8), 98 p.
3.9 Surface Water, Groundwater, and Water Quality

3.9.1.2 Setting by Component

PVWMA has implemented several projects to replace groundwater water supplies for agricultural pumpers in coastal Santa Cruz and northern Monterey Counties:

- The Coastal Distribution System (CDS) is used to deliver the supplemental water supplies (Figure 3.9-15). The water supplied through the CDS is referred to as delivered water. One component of delivered water is tertiary-treated, disinfected non-potable water. Recycled water is blended to meet water-quality objectives set by the PVWMA Board-appointed Water Quality and Project Operations Committee as described immediately below.

- The Recycled Water Treatment Facility (RWF) commenced operation in 2009 and can produce up to 4,000 acre-feet per year of tertiary-treated, disinfected, Title 22 compliant recycled water for distribution to coastal farms through the CDS during the irrigation season. Recycled water currently constitutes the majority of the delivered water (72 percent during calendar year 2011) and is blended with water from the following sources: (a) the City of Watsonville potable system (about 90 percent of the City’s water supply is groundwater); (b) recovered Harkins Slough water (described below); and (c) groundwater from water wells operated by PVWMA for the purpose of blending.

- The Harkins Slough Managed Aquifer Recharge and Recovery (MAR) Facilities seasonally store wet weather surface-water flows from Harkins Slough in shallow sandy aquifers of the San Andreas Terrace, located near the coast. The stored water is recovered by a series of extraction wells and delivered to coastal farms through the CDS.

Delivered water quality currently depends on the blended amounts of recycled water, City of Watsonville potable water, PVWMA blend water wells, and Harkins Slough Recharge Facility recovery well water. PVWMA observes the water-quality guidelines for irrigation supplies in the Central Coast Regional Basin Plan (discussed in Section 3.9.1 above; see Table 3.9-6), and tests the delivered water quality for total dissolved solids (TDS), chloride, sodium, nitrate, and sodium absorption ratio (SAR), among other analytes. Recycled water generally has the highest concentrations of dissolved solids, and is blended to a lower chloride and sodium level to provide an SAR value of less than four. On average, water from the Harkins Slough facility recovery wells has lower concentrations of salts and nutrients than recycled water, but at times this source has had marginally higher concentrations of sodium, chloride, and/or nitrate than recycled water. During water years 2011 and 2012, TDS of delivered water ranged from 400 mg/L to 830 mg/L (Figure 2-28 of the BMP Update), chloride from 50 to 180 mg/L (BMP Figure 2-29), sodium from 50 to 160 mg/L (BMP Figure 2-30), nitrate from near zero to 65 mg/L as NO₃ (BMP Figure 2-31), SAR from 1.5 to 4.3 mg/L (BMP Figure 2-32), and boron from 0.08 to 0.28 mg/L.

The following subsections describe the hydrologic setting at each of the proposed BMP Update Components:

- Increased Recycled Water Storage at Treatment Plant;
- Harkins Slough Recharge Facilities Upgrades;
- Watsonville Slough with Recharge Basins;
- College Lake with Inland Pipeline to CDS; and
- Murphy Crossing with Recharge Basins.
**Increased Recycled Water Storage at Treatment Plant**

Increased Recycled Water Storage at Treatment Plant would include two 1-MG storage tanks, additional pumps at the RWF, and 500 feet of parallel pipe to the CDS intended to increase water deliveries by 750 AFY. The recycled water facility is located at the wastewater treatment plant, on the north bank of the Pajaro River, approximately 3,000 feet west of Highway 1, at 500 Clearwater Lane in the City of Watsonville. In addition to the treatment units, the facility includes a 500,000 gallon clearwell storage tank, distribution pumps, approximately 500 feet of buried 24-inch diameter pipe connecting the facility to the CDS pipe along Clearwater Lane, and asphalt and dirt surfaces. Storm runoff from the site accumulates in on-site shallows and roadside ditches. Runoff drains north to the Beach Road ditch and with higher intensity and prolonged storms eventually may flow to the Pajaro River.

The shallow geologic deposits around the wastewater treatment plant comprise younger (Holocene) flood plain deposits consisting of unconsolidated, relatively fine-grained, heterogeneous sand and silt; and commonly including relatively thin, discontinuous layers of clay (Dupré and Tinsley, 1980). Gravel is locally abundant. The geologic materials have moderate porosity and permeability and the depth to the water table is generally less than six feet.

The recycled water facility has not produced to its potential capacity of 4,000 acre-feet per year because (a) the demand for recycled water is greater than the availability during daylight hours, and (b) there is insufficient demand during nighttime and in the ‘shoulder’ periods before and after the peak irrigation season. Currently, after the existing 500,000 gallon storage tank is topped off, recycled water is not produced at night unless there is a demand (water order) by a grower or group of growers. Absent immediate demand, treated effluent is sent through the City of Watsonville’s ocean outfall after secondary treatment.

**Flood Hazard**

The existing recycled water facility and proposed upgrades are located within the Federal Emergency Management Agency (FEMA) 100-year flood hazard zone for the Pajaro River. However, the site has been improved with a ring levee to protect it from the 100-year flood.

**Harkins Slough Recharge Facilities Upgrades**

Harkins Slough Recharge Facilities Upgrades would include additional recharge basins and extraction wells, upgrades to the pump station and existing filtration plant, a new pipeline to sanitary sewer. The upgrade is intended to increase water deliveries to the CDS by 1,000 AFY.

Watsonville Slough and Harkins Slough are located west of Highway 1 in unincorporated Santa Cruz County. Harkins Slough is a partially channelized, ephemeral waterway that originates in an area of small residential properties north of Watsonville and flows through agricultural land to its confluence with Watsonville Slough, east of San Andreas Road. Watsonville Slough, which is also channelized, extends from a developed area within the City of Watsonville west across Highway 1 through agricultural land to Shell Road. At this point, the slough turns southward parallel to the coastline and extends through Pajaro Dunes, a gated residential community, and eventually empties into the Pajaro River Lagoon and finally Monterey Bay. In the area near the confluence of Watsonville and Harkins Sloughs, the land use is primarily agricultural. Vegetables and strawberries are the main crops.
Local Hydrogeology

The shallow geologic deposits beneath Harkins Slough and Watsonville Slough comprise two general types of geologic materials: alluvium (river-laid deposits) in the lowlands and dune sand (wind-laid deposits) in the uplands. Surficial soils in the area are of Quaternary age. The dune sands are generally unsaturated, but are highly permeable and transmit groundwater readily. The alluvium is somewhat permeable and yields moderate quantities of water to wells (Table 3.9-4).

Thick lacustrine and marine fine-grained layers occur at the base of the shallow deposits (Dupré, 1975). These fine grained layers range in thickness from 5.0 ft to as much as 185 ft in the Corralitos and Harkins Sough subareas, and represent a potentially significant barrier to the vertical flow of groundwater in the coastal subareas of the Pajaro Valley.

Local Hydrology

The watershed of Watsonville and Harkins Sloughs is mostly west of the City of Watsonville and Highway 1. Harkins Slough, Hanson Slough and the west and east branches of Struve Slough are tributaries of Watsonville Slough, which collectively drain an 11,867 acre watershed (at Shell Rd.). The confluence of Harkins Slough and Watsonville Slough is near San Andreas Road. From this point, Watsonville Slough flows west for about 1.5 miles, and then turns south for about 0.6 miles, where it empties into the Pajaro River Lagoon. The two sloughs, and their tributaries, share many common attributes, including most of those which affect water supply or are influenced by the attributes. For example, two important studies by California State University Monterey Bay that provided the basis for sediment and pathogen TMDLs have referenced both sloughs collectively within a single descriptor, specifically, “Watsonville Sloughs”. This section of the EIR also describes the environment of both sloughs together generally. For the few attributes where they differ substantively, the discussion has been separated.

Conditions in the two channels have been considered in a series of investigations since the last BMP EIR was prepared in 2002 (Swanson H&G, 2002, 2003; Hager and others, 2004; Hager and Watson, 2005; SFEI, 2008; Lear and Woyshner, 2009, and more recently by the Resource Conservation District of Santa Cruz County (RCD-SC), among regular PVWMA reports and others). These investigations have confirmed and extended prior studies (HEA, 1978; Hecht and others, 1984, and Questa, 1995) which have measured low seasonal runoff, elevated salinities downstream from Highway 1, high nutrient and pathogen counts, and high water temperatures. The Watsonville Sloughs, which provides critical habitat for several listed aquatic and estuarine species, is listed in accordance with Sec. 303(d) of the Clean Water Act as impaired water bodies for sediment, nutrients, and pathogens.

The valley floor along both streams is rich in peat and organic clays; peat was actually mined from Harkins Slough early in the 20th century (HEA, 1978), at about the same time that both sloughs were completely ditched (Hager and Watson, 2005). Agriculture had been established along both streams, and riparian vegetation had been almost completely eliminated by 1930. Both the City of Watsonville and County of Santa Cruz established major landfills on either side of Harkins Slough during the 1940s, which continue in operation today. Watsonville Slough received direct industrial discharges until the late 1970s (UCSC students, 1973), most notably from a slaughterhouse. In recent years, residential expansion, urbanization, and perhaps the increased use of plastic mulch has increased runoff to both sloughs.
Harkins Slough is an earthen drainage channel, which carries irrigation and precipitation runoff from primarily agricultural lands in the vicinity of the City of Watsonville towards the Pacific Ocean. Harkins Slough discharges to Watsonville Slough under high flow events but is hydrologically controlled and impeded during much of the year by a concrete block weir structure. While this leaky weir structure somewhat limits tidal backflows from the mouth of Watsonville Slough and limits flooding upstream, it does not completely stop freshwater flows from moving downhill, along and out of Harkins Slough. Originally, the main purpose of the weir was to prevent flows from going to Harkins Slough. However, during current periods of low flow (most of the year) most of the flow from Watsonville Slough flows through the weir and upstream into Harkins Slough. In addition, at moderate to high flows stormwater passes to Harkins Slough across the Knox Property. In the past, the Santa Cruz County Public Works Department operated the Harkins Slough pump station at this location to manage flooding of agricultural fields by pumping water from Harkins Slough over the concrete weir to Watsonville Slough.\(^{11}\)

Since 2002, freshwater winter flows for groundwater recharge and irrigation use have been diverted from the slough. The PVWMA pumps water from Harkins Slough to a sand filter facility adjacent to the pump station before it is delivered via pipeline to a recharge basin approximately one (1) mile away. The water is allowed to percolate and is then withdrawn through wells to meet irrigation demand. This short term subsurface storage allows PVWMA to use surface water supplies while helping to reduce seawater intrusion within the basin. Water is typically diverted from December to May, beginning after the winter rains have sufficiently reduced the salinity of the surface water to appropriate levels. A water rights permit from SWRCB allows for up to 2,000 acre feet per year (AFY) to be withdrawn from Harkins Slough or Watsonville Slough.

Since construction of the diversion and percolation project was completed in 2002, the average annual diversion has been limited to less than 1,000 AFY. The limited diversion is due in large part to the degraded condition of Harkins Slough at the pump intake location, and in part to availability of supply of water of adequate quality in the slough. Diversions have also been limited by infiltration rates at the recharge basin (rates slow significantly as diversions progress). The slough has in the past been covered by Pennywort ([*Hydrocotyle* sp.]), an invasive aquatic plant that lives on the surface of the water (Figure 3.9-29). The introduction of the Pennywort has limited the ability to pump at full capacity due to concerns of entraining plant material in the pumps and/or clogging the pump screens. Additionally, accumulated sediments have built up at the pump station such that one pump is inoperable and the second pump operates at a limited capacity. PVWMA needs to pump at full capacity to protect water rights and show that the full 2,000 AFY is being put to beneficial use, although it should be noted that a very high percentage of the total long-term runoff from the sand-hills watersheds of Monterey Bay occurs in the wettest 10 percent of all years (HEA, 1978), the type of year which has not occurred since 1995 and 1998. Initial remedial actions such as removal of invasive species at pump intakes have been taken by PVWMA in 2012.

The RCD-SC and the California Coastal Conservancy have formed a project team (led by Balance Hydrologics) to develop a hydrologic/hydraulic model of the slough system capable of simulating flows on an event basis, seasonally, and over long-term decadal time frames (Ballman and others, 2013). The study includes collection of a defined set of water-level and water-quality data during the winters of water years 2012 and 2013.

\(^{11}\) The pump station is owned by the Santa Cruz Storm Maintenance District (L. Gutierrez, personal communication, September 9, 2013).
3.9 Surface Water, Groundwater, and Water Quality

Flood Hazards

The existing Harkins Slough Diversion facility and proposed upgrades are located within a FEMA 100-year flood hazard zone as shown on Figure 3.9-16. The recharge basin sites are outside the FEMA 100-year flood hazard zone.

Water Rights

PVWMA currently holds an amended water rights permit (no. 21039) for diversion from Harkins Slough at two 40-acre locations, which includes Watsonville Slough. The water appropriated is limited to the quantity which can be beneficially used and shall not exceed 2,000 acre-feet per year to be collected to underground storage at a maximum rate of 30 cubic feet per second from November 1 of each year to May 31 of the succeeding year. Construction work and complete application of the water to the authorized use shall be prosecuted with reasonable diligence and completed by December 31, 2021. The water right includes (a) compliance with provisions derived from an agreement between PVWMA and the Department of Fish and Game dated January 18, 2000 and filed with the State Water Board, and (b) compliance with the provisions of the agreement between PVWMA and the California Coastal Commission dated November 3, 1999 and filed with the State Water Board.

Watsonville Slough with Recharge Basins

Watsonville Slough with Recharge Basins (intake structure and pumping station, additional filters at existing Harkins Slough filter plant, additional storage in recharge basins, and pipelines and is intended to increase water deliveries to the CDS by 1,200 AFY.

Local Hydrogeology

The hydrogeologic setting of Watsonville Slough is discussed in the previous Harkins Slough Recharge Facilities Upgrades section.

Local Hydrology

Most existing conditions affecting water supply for Watsonville Slough are described in the Harkins Slough section immediately above. Watsonville Slough differs only in a few attributes. First, it is a channel paralleling the Pajaro River on the northern side of its valley and it is more hydrologically linked to the Pajaro River than Harkins Slough at flood flows. In this regard, unlike the organic-rich soils at the surface in Harkins Slough, the organic soils along Watsonville Slough are covered by two to eight feet of heavy clay, deposited primarily by floodwaters originating from the river. The clays are likely quite young, and may partially result from deposition over the past 200 to 300 years as the nearly 1,200 square miles of the Pajaro watershed have been subject to increased erosion and sediment delivery. Watsonville Slough in reaches upstream of Harkins Slough has been excavated through the clays into the underlying peats and organic soils. Lear and Woyshner (2009) note that when water levels fall below the clays and the peats are exposed to air, they may oxidize and are subject to gradual subsidence, in a smaller-scale analog to the peaty islands of the Sacramento-San Joaquin Delta, which are currently subsiding. Conversely, this system forms a small confined aquifer when Watsonville Slough is full, such that groundwater levels along the slough are kept high for some distance from the slough, creating conditions which limit both agricultural yields and urban uses.
Secondly, Watsonville Slough receives urban drainage from nearly all of the City of Watsonville. Runoff from the urban areas creates rapid fluctuations in water levels and higher flows earlier in the wet-season, and carries urban contaminants into the slough system. Masses of aquatic vegetation above its confluence with Harkins Slough and sediment dams constrain flow and tidal circulation, particularly through the channelized reach south of the railroad tracks.

Finally, from its confluence with Harkins Slough near San Andreas Road, Watsonville Slough flows southwest for about 1.5 miles, and then turns south for about 1.2 miles, where it empties into the Pajaro River Lagoon. Watsonville Slough is occasionally subject to high storm-wave events that carry seawater up the slough to a point north of its confluence with Harkins Slough (and up Harkins Slough) and therefore, the water exhibits elevated salinity especially in deeper stratified pools in Harkins Slough. Santa Cruz County has operated a barrier and pump system at Shell Road for at least 80 years; however, over the past decade, the incidence of overtopping has noticeably increased. Elevated chloride concentrations as a result of the 2012 brackish water flood prevented operation of the diversion in 2012 and reduced the period of diversion in 2013. This could become a greater problem in the future due to a rising sea level and the types of storms are expected to occur more frequently with climate change. The Watsonville Slough hydrology study, being led by the RCD-SC, is modeling this issue (Ballman and others, 2013). The National Resource Conservation Service (NRCS) is planning a wetland restoration construction project located upstream of the existing Harkins Slough diversion that could improve the water quality at the diversion point by: (1) bringing higher quality water from the Watsonville Slough to Harkins Slough, (2) reducing turbidity by settling and filtering solids in the wetland, and (3) by improving water quality through natural vegetation filtration (anticipated to reduce nutrient concentrations) as the water flows through the constructed wetland. The project may conceivably improve flow through the slough and water quality at the diversion.

Both Watsonville and Harkins Sloughs are prone to being obstructed where small tributaries or agricultural drainageways deliver sand into the channels. The slough system has been described as a series of sausage links separate by constrictions of sand. At low water, each link may have its own water level, chemistry, and biotic environment. Watsonville Slough between San Andreas and Shell Roads is perhaps most affected by these breaks in continuity.

Flood Hazards

The proposed Watsonville Slough Recharge Facilities Upgrades component is located within a FEMA 100-year flood hazard zone as shown on Figure 3.9-16. It is likely that the facility will not be operated for some weeks or months following major floods, due simply to flotsam and other physical hazards as well as the need to test waters for contamination. PVWMA, though, typically does not operate the diversion following normal size storms if the turbidity exceeds 50 Nephelometric Turbidity Units (NTUs). The recharge basin sites are outside the FEMA 100-year flood hazard zone.

Water Rights

PVWMA would need to obtain a new water rights permit from the SWRCB in order to achieve an average yield of 1,200 AFY from this component, in addition to the planned yield of 1,200 AFY from the Harkins Slough Recharge Facilities Upgrades component.
College Lake with Inland Pipeline to CDS

The outflow (headgate) of College Lake is located north of the intersection of Holohan Road and Highway 152, near the St. Francis Cemetery, approximately one mile north of the Watsonville city limits. The College Lake with Inland Pipeline to CDS component proposes to raise headgate elevation and increase lake capacity of the lake, and install a pump station, treatment plant, and approximately 6-mile water main to increase water deliveries to the CDS by 2,400 AFY.

Local Hydrogeology

College Lake is a seasonal water body in a natural depression bordered by gentle to moderate slopes along the upper-lying northern edge of the Pajaro Valley plain. The shallow geologic deposits beneath the lake consist of Quaternary alluvium. The alluvium is somewhat permeable and yields moderate quantities of water to wells (Table 3.9-4). The lake bottom is classified as Quaternary Basin deposits, consisting of unconsolidated plastic clay and silty clay with high organic content. Locally, thin-bedded silt and sandy silt deposits are contained within the clays. The adjacent uplands comprise Quaternary non-marine terrace deposits classified as Watsonville terrace deposits and subdivided into fluvial and alluvial fan facies.

Local Hydrology

College Lake is an ephemeral, shallow water body in a natural depression formed on the piedmont of the Casserly-Green Valley Creek system. The lake is fed by ephemeral and perennial streams, generally from the north, collecting runoff from a drainage area of about 11,000 acres. Most of these streams begin as high-gradient mountain channels in forested terrain, which then transition to more gentle gradients with meandering patterns west of the San Andreas fault zone. Most runoff to College Lake is derived from the Casserly-Green Valley Creek system, of which Banks Canyon (upper Casserly Creek), Gaffey Creek, and Hughes Creek are tributaries. Lesser amounts of runoff come from the unnamed tributary to the east, and other smaller tributary drainages, including areas near Pinto Lake and its overflow. Pinto Lake itself drains to a channel that feeds into the outlet channel of College Lake, which eventually flows into Salsipuedes Creek. Salsipuedes Creek flows out from College Lake to the south. About a half mile downstream from College Lake, Corralitos Creek joins Salsipuedes Creek, which subsequently flows into the Pajaro River and then to Monterey Bay (Pacific Ocean). Both sides of Salsipuedes Creek and the Pajaro River are bounded by flood protection levees downstream of College Lake.

Sediment contributions to College Lake are principally from the Casserly-Green Valley Creek system, although significant erosion has been observed in the unnamed east tributary, and deltaic deposits have been reported at the mouth of Casserly Creek (Fall Creek Engineering, 2002). Deposition of this type merits evaluation to help understand project sediment transport and sedimentation rates, and the potential for impeding fish passage or compromised roads and culverts around the lake.

Casserly Creek, Banks Canyon, and Gaffey Creek have been cited as supporting the south-central California coast steelhead (Onchorhynchus mykiss), while recent studies suggest that College Lake itself is utilized as both a migratory corridor and perhaps seasonally as rearing habitat (Smith, 2008). Corralitos Creek also drains important steelhead spawning and rearing habitat in the upper Corralitos and Browns Valley creeks and tributaries. Spring outmigration of smolt from the Corralitos Creek watershed is constrained by low spring stream flows in many years. At the USGS gage on Corralitos Creek at Green Valley Road (Figure 3.9-4), a somewhat difficult smolt passage is 1.0 to 1.5 cfs (Smith, 2008). Spring outmigration through the Salsipuedes/Corralitos
Creek system can potentially be affected by the magnitude, timing, and reliability of outflows from College Lake. Based on an assessment of critical riffles, the proposed College Lake with Inland Pipeline to CDS estimates a minimum bypass flow of 2.0 cfs from College Lake and 7.5 cfs in Salsipuedes Creek downstream of its confluence with Corralitos Creek during the normal period for smolt outmigration, March 15 to May 31 (Carollo, 2013; ESA, 2001; ESA, 1999). Before the project is implemented, these flow thresholds should be confirmed for current conditions given potential changes to the stream bed and channel.

Outflows from College Lake naturally flow downstream through Salsipuedes Creek during the wet season. During certain water level and flow conditions, however, Corralitos Creek flows back into Salsipuedes Creek and toward College Lake. A headgate (low dam) is used to limit backflows when stream levels are less than an elevation of 60.2 feet (NGVD29). The lake floods during the wet season and drains during the dry season, initially by evapotranspiration and gravity but then also through pumping by the College Lake Reclamation District (Reclamation District #2049) once the lake falls to near the headgate elevation. The lake has been drained annually since the early 1900s to create farmland on the lake bottom. Reclamation District #2049 was formed in 1934.

Though long-term data are sparse, recent water-level monitoring by PVWMA are available upstream and downstream of the headgate (Figure 3.9-30). Under existing conditions, pumping usually commences between mid-March and May 1st, depending on the amount of late-season rainfall, and is completed by November 1st (Allen Harryman, College Lake Reclamation District, personal communication, 2013). During a drought year in 2007 (Figure 3.9-30), water levels illustrate reduced outflow (or possibly no outflow) at the existing headgate elevation of 60.2 feet.

Streamflow gaging data and pumping data at College Lake are currently not available, though the RCD-SC is currently conducting a limited study of College Lake water flows, usage, and resource management; this study should provide specific information on the operations of the lake and outflow data after completion of this EIR. Based on rainfall-runoff relations of regionally gaged streams (Figure 3.10-9 of Hecht and others, 1984), the unit runoff from Casserly Creek was estimated at approximately 340 acre-feet per square mile for the mean basin precipitation of 31 inches per year. For the 11,000-acre watershed of College Lake (17.2 square miles), the estimated mean annual inflow to the lake is estimated at 5,800 acre-feet. An alternate computation based on mean annual runoff (5-inch contour on Rantz’s 1974 runoff map for the Bay Area), mean annual inflow of 4,600 acre-feet of inflow was estimated (CH2MHill, 1994).

At the existing headgate elevation of 60.2 feet, the inundation area of College Lake is 234 acres (Figure 3.9-31). The elevation of the lake bed slopes upward from approximately 55 feet above mean sea level, and the storage capacity of the lake is roughly 1,400 acre-feet (CH2MHill, 1994). The USACE stage-capacity curve estimates the storage capacity of College Lake at 1,100 acre-feet for the existing headgate elevation (USACE, 2007). Based on HEC-RAS modeling, the existing 100-year peak storage capacity is 4,960 acre-feet at a headgate elevation of 69.6 feet (NGVD29) (USACE, 2007).

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12 The inundation area was revised for this EIR, based on LIDAR data from Santa Cruz County, spot corrected with survey data collected by Santa Cruz County Resource Conservation District’s consultant (cbec eco-engineering), aerial photo interpretation, and field inferences. Ground surface elevations based on LIDAR can have substantial error where vegetation is dense (such as on fallow fields and riparian woodland) and require calibration with on-site data. During the dry season of 2012, cbec surveyed the drainage and creek channels within the footprint of College Lake, with cross sections spaced at ~300 ft intervals. Balance Hydrologics used these data, aerial photos, and field observations from Gary Kittleson, KEC, to check LIDAR-based elevations around the perimeter of College Lake to more precisely estimate the inundation area.
The connection between the existing College Lake impoundment and groundwater beneath the lake is uncertain. Although soils on the lake bottom are heavy clays, water levels beneath the lake have changed little over the past 35 years\textsuperscript{13}, suggesting that recharge might be regularly occurring near the upstream portion or through the sides of the lake. Estimated mean annual evapotranspiration (ET) from the existing 234-acre lake is estimated to be up to 825 acre-feet (when full), based on a mean annual reference evaporation\textsuperscript{14} of 42.3 inches (Table 3.9-2). However, due to the lake draining operations in spring, the actual annual ET would be expected to be less.

**Flood Hazards**

The existing Federal Emergency Management Agency's (FEMA) 100-year flood zone around College Lake is identified in Figure 3.9-31. The proposed filtration and pumping facilities which would likely be located near the College Lake outlet channel, on the elevated area on the south bank, and would occupy approximately one acre possibly in the area within the 100-year flood zone. An additional evaluation will be conducted to identify its final location.

College Lake water surface elevations and flood flows for existing conditions were calculated using detention structure design and dam safety requirements (USACE, 2007). The 100-year 48-hour rainfall event is currently estimated at 13.1 inches. Unsteady flow conditions were used to model lake levels using the USACE’s HEC-RAS water-level simulation for the 100-year storm event. The peak water surface elevation in College Lake was 69.6 feet (NGVD29) with a peak flow of 5,300 cfs. Detention structure design information was also provided in the report (USACE, 2007).

**Surface Water Quality**

The PVWMA has regularly collected water-quality samples since water year 2003 (and more sparsely back to the mid-1990s) from two stations on College Lake (Figure 3.9-31): (1) at the headgate outflow to Salsipuedes Creek; and (2) at the inflow station from Casserly Creek at Paulsen Road. The samples were analyzed for general mineral and irrigation suitability. As in the Pajaro River (Figure 3.9-21), the concentration of total dissolved solids (TDS) generally varies seasonally from higher concentrations during the dry season to lower concentrations during the wet season. A wider range of concentrations was found at the outflow station, relative to the inflow from Casserly Creek (Figure 3.9-32). Average TDS at the outflow station was 408 mg/L, and at the inflow station it was 426 mg/L, both significantly lower than sampled in the Pajaro River upstream of Salsipuedes Creek at Murphy Crossing and at Aromas. They were also significantly lower than the Central Coast Regional Basin Plan objective of 1,000 mg/L for the Pajaro River at Chittenden. These data indicate that TDS levels in College Lake are suitable for irrigation per the Central Coast Regional Basin Plan guidelines (Table 3.9-6).

Similar trends are also seen in the boron, sulfate, and nitrate concentrations (Figures 3.9-33, -34, and -35). Boron concentrations, though, have decreased since water year 2008, to non-detected levels at the inflow station and less than 0.2 mg/L at the outflow\textsuperscript{15}. Boron concentrations less than 0.5 mg/L are generally satisfactory for all crops (Table 3.9-6). Nitrate concentrations at the inflow station were relatively high prior to water year 2005, but

\textsuperscript{13} Compare 1976 groundwater levels in figures 3-8 and 3-9 of H. Esmaili & Associates, 1978, with more recent data. While 1976 was a dry year, the preceding three years were normal or wet years, enabling reasonable comparison with the 2010 data.

\textsuperscript{14} Reference evapotranspiration (ETo) is the evapotranspiration of a well-watered 4- to 6-inch tall cool-season grass.

\textsuperscript{15} One possible explanation for the change to lower boron levels since water year 2008 might be a change in sampling or analytical procedure.
have since decreased to less than 4.0 mg/L (as N) during recent years (perhaps due to a implementation of farm best management practices locally upstream, although the actual cause is unknown). As with TDS, concentrations are higher during the dry season and lower during the wet season, with a wider seasonal fluctuation at the outflow station. Nitrate concentrations are also reported to be higher during “first flush” at the beginning of the rainy season. On average, current nitrate concentrations are well below the concentration in the Pajaro River upstream of Salsipuedes Creek and the drinking water maximum contaminant level (MCL) of 10 mg/L (as N).

**Water Rights**

PVWMA submitted a water rights application to the SWRCB in 1995 for diversion and storage at College Lake. Review of the application is presently suspended. The water-rights application would need to be re-initiated and a water right permitted to allow this project to be implemented.

**Murphy Crossing with Recharge Basins**

The Murphy Crossing with Recharge Basins component proposes to recharge Pajaro Valley East Area groundwater by diverting a portion of the high flows from the Pajaro River to recharge basins located on permeable soils and sediments. Up to 5.0 cfs of water would be diverted from the Pajaro River between December and May and when flows are greater than 45 to 90 cfs. These minimum flow thresholds were selected to minimize impact on steelhead smolt passage. Water would be diverted from the Pajaro River through an infiltration gallery installed adjacent to and/or beneath the riverbed just upstream of Murphy Crossing. An infiltration gallery is a common method to divert water from a stream and has the preferred benefit of utilizing the bed and bank alluvial material as a sand/gravel filter. The average annual volume of water proposed to be diverted from the Pajaro River and recharged to groundwater is estimated at 500 acre-feet (Carollo, 2013).

**Local Hydrogeology**

The area encompassing Murphy Crossing is a low-lying floodplain of the Pajaro River. The land to the north and south of the river slopes gently toward the river, and the area has deep alluvial soils. The area immediately adjacent to the Pajaro River comprises younger (Holocene) flood plain deposits consisting of unconsolidated, relatively fine-grained, heterogeneous deposits of sand and silt; and commonly including relatively thin, discontinuous layers of clay (Dupré and Tinsley, 1980). Gravel is locally abundant, resulting in potentially promising areas for artificial recharge. Underlying geologic materials have moderate porosity and permeability. Adjacent to the Pajaro River, the depth to the water table is generally less than six feet. Lying upslope and farther back from the river channel are widespread older (but also Holocene) floodplain deposits consisting of unconsolidated, relatively fine-grained, heterogeneous deposits of sand and silt and commonly including relatively thin layers of clay (Dupré and Tinsley, 1980). These floodplain deposits are up to 300 feet deep. Gravel is abundant at depth, creating a locally significant aquifer. The depth to the water table is variable but

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16 A 1997 report by Habitat Restoration Group (Appendix C in the 2002 BMP EIR) identified a minimum flow rate of 45 cfs for steelhead passage. CH2M-Hill (1999) reported that at minimum flow values of 90 cfs, there would be approximately 52 days during an average year during which 7,000 gpm (or about 15 cfs) could be extracted from the Pajaro River. This extraction volume far exceeds the current proposed extraction volumes in the BMP Update. If diversions were limited to flows exceeding 45 to 90 cfs, the quality of water diverted from the Pajaro River would generally fall within RWQCB Basin Plan objectives for the Pajaro River, and would also contribute to a slight improvement in East Area groundwater quality.
generally around 10 to 30 feet below ground surface. Further from the river and in the vicinity of the proposed recharge basins (at a ground elevation of ~70 ft), depth to water is about 60 feet below ground surface and deeper during the 1987-92 drought (Figure 3.9-12). Muir (1972) states that the reach of the Pajaro River between Chittenden Gap and Murphy Crossing is favorable for groundwater recharge, and more recently corroborated with field studies (Hatch and others, 2010; Ruehl and others, 2006). As a result, groundwater quality in that area represents the quality of the water in the river, which varies from quite good during high flows, to salt and nutrient rich during lower flows.

Local Hydrology

The proposed location for the groundwater recharge basins is an unfilled section of an abandoned segment of the Pajaro River stream channel (oxbow) just north of the Murphy Road/Highway 129 intersection. Currently partially farmed, the site covers approximately 20 acres and functions largely as a natural drainage collection area for the farm fields and foothill watersheds to the east of the site. This site is in the vicinity of the managed aquifer recharge (MAR) project at Bokariza-Drobac Ranch, about one mile to the west, and was tested to have suitable infiltration rates (Figure 3.9-36; Fisher and others, 2011).

The recharge basins would have a total area of approximately nine acres and would be divided into four separate basins, separated by earthen berms, with tested percolation rates ranging from 1.7 feet per day for three of the basins and 0.6 feet for the fourth (CH2M Hill, 2000). Given these measurements, it could take as long as 39 days to infiltrate 500 acre-feet of water, but it would be dependent on the design of the recharge basin and the water may infiltrate at a higher rate. The project as proposed includes 7,000 feet of buried pipeline (24-inch diameter) to convey water from the infiltration gallery at the Pajaro River to the recharge basins. The pipeline would be constructed adjacent to Murphy Crossing Road and would cross Riverside Road / Highway 129. The pipeline would not cross any watercourses.

A substantial amount of hydrologic information pertaining to the Pajaro River and groundwater recharge in the East Area is presented in the regional environmental setting section (above). In summary, the reach of the Pajaro River near Murphy Crossing has some of the highest channel percolation rates in the Pajaro Valley basin (Hatch and others, 2010; Ruehl and others, 2006; HEA, 1978). Likewise, in the area proposed for the groundwater recharge basins clay layers that may impede recharge are either not laterally continuous, occur as lenticular deposits, or are not present. Peak flows at Murphy Crossing resemble flows at the USGS gaging station at Chittenden 7.1 miles upstream, but receding flows following seasonal storms are significantly lower and can recede to zero flow at Murphy Crossing (Figure 3.9-12). The duration of flows exceeding 45 to 90 cfs vary substantially with water year type and diversions may be limited during critically dry years and multiyear droughts when additional recharge from the proposed BMP Update component is most needed. Nevertheless, the USGS high-flow record at Chittenden should be suitable for project design analyses. Remaining questions regarding long-term water-quality trends (discussed above) should be narrowed.

Flood Hazards

The proposed infiltration gallery, pump station/sump, and a portion of the pipeline to the recharge basin are within the Federal Emergency Management Agency's (FEMA) 100-year flood hazard zone for the Pajaro River. The recharge basins are outside the 100-year flood hazard zone for the Pajaro River.
Water Quality

A substantial amount of water-quality information pertaining to the Pajaro River and groundwater in the East Area is presented in the regional environmental setting section (above). In summary, total dissolved solids (TDS) concentrations have increased in the East Area groundwater (Figure 3.9-20), largely owing to increasing salinity in the Pajaro River, the source of most of its recharge (Hecht and others, 2010). Flows in the Pajaro River less than 15 to 20 cfs usually have concentrations of TDS exceeding 1000 mg/L, the CCRWQCB water-quality objective for the Pajaro River at Chittenden, and a level at which a number of crops begin to experience diminishing yields and increased vulnerability to crop diseases. However, at flows proposed for diversion and groundwater recharge (> 45 to 90 cfs), TDS is less than 1,000 mg/L and significantly less than receiving groundwater in the vicinity of proposed Murphy Crossing recharge basins (Figure 3.9-21).

Concentrations of sulfate and chloride (components of TDS) have also increased in recent decades, and are below Central Coast Regional Basin Plan surface water objectives at flows proposed for diversion and groundwater recharge (Figure 3.9-25 and -26). At the proposed Pajaro River diversion flows of 45 to 90 cfs, sulfate and chloride concentrations are below concentrations in receiving groundwater, while sodium concentrations are only slightly above concentration in receiving groundwater and lower at higher flows. Background nitrate concentrations are locally elevated in East Area groundwater (Figures 3.9-19 and -24), and at flows proposed for diversion and groundwater recharge, nitrate concentrations are below the State drinking water maximum contaminant level (MCL) standard (Figures 3.9-23 and -24). Boron toxicity in many agricultural areas is traceable to use of irrigation waters with boron content in excess of 0.75 mg/L. Boron concentrations less than 0.5 mg/L is generally satisfactory for all crops. The primary source of boron in the Pajaro River is fault related and concentrations are highest when flows are low. At flows proposed for diversion and groundwater recharge, boron concentrations in the Pajaro River are generally similar to concentrations in receiving groundwater in the vicinity of the proposed Murphy Crossing recharge basins, and below surface water-quality objectives (Figure 3.9-28).

Water Rights

PVWMA submitted a water rights application to the SWRCB in 1995 for diversion and recharge at Murphy Crossing. Review of the application is presently suspended. The water-rights application would need to be re-initiated and a water right permitted to allow this project to be implemented.

3.9.2 Regulatory Setting

Federal and State Regulations

The National Flood Insurance Program (NFIP) regulations, a part of the Federal Emergency Management Agency (FEMA) regulations, updated yearly, include issues related to flood insurance and mitigation, such as community floodplain activities, land management, policy rating and the actual standard flood insurance policy. The program issues a Flood Insurance Rate Map (FIRM) for streams and community drainage channels that generally show a community's base flood elevations, flood zones, and floodplain boundaries. FIRMs display areas that fall within the 100-year flood boundary, and a compilation of the FEMA maps and Pacific Institute information on flooding with 55-inches of sea level rise is provided in Figure 3.9-16.
3.9 Surface Water, Groundwater, and Water Quality

Drinking water quality is regulated under the authority of the federal Safe Drinking Water Act (SDWA) (42 U. S. Code §300f et seq.) and the state Safe Drinking Water Act (California Health and Safety Code §116270 et seq.) and associated regulations implementing those statutes. The federal act authorizes the U. S. Environmental Protection Agency (EPA) to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards. These standards apply to approve drinking water systems, including systems that pump groundwater, but do not apply to the groundwater source. The federal law establishes National Primary Drinking Water Regulations, which are legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. Secondary Drinking Water Regulations are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water.

The Environmental Protection Agency (EPA) is primarily responsible for implementing Federal water-quality laws. EPA has delegated direct authority for implementation and oversight of Federal water quality laws within California to the State Water Resources Control Board (SWRCB) and the nine regional water-quality control boards (RWQCB). Both SWRCB and RWQCBs (collectively, the ‘Waterboards’) are responsible for implementing State water-quality laws. SWRCB also is responsible for water rights. SWRCB provides program guidance and oversight, allocates funds, and reviews RWQCB decisions. Each RWQCB is responsible for issuing individual permits, conducting inspections, and providing enforcement actions within its designated region. See the next section for a full description of the applicable Central Coast RWQCB (CCRWQCB).

Federal and state water-quality regulations apply to projects that may adversely affect the quality of surface waters or groundwater through the discharge of wastewater and/or storm water. Both the SWRCB and the RWQCBs through their designation as the lead agencies in implementing the Section 319 nonpoint source program of the federal Clean Water Act (CWA), and from the state’s primary water-pollution control legislation, the Porter-Cologne Water Quality Control Act, oversee these regulations. CWA Section 303 and the Porter-Cologne Water Quality Control Act establish beneficial uses and related water-quality objectives for all waters in the State. These objectives are implemented locally through Water Quality Control Plans, the National Pollutant Discharge Elimination System (NPDES) permits, and waste discharge requirements. Section 404 of the CWA gives the USACE authority to regulate discharges of dredged or fill material into Waters of the United States. The Rivers and Harbors Act of 1899 prohibits the unauthorized construction of structures in, under, or over navigable waters.

The Department of Water Resources (DWR) manages the water resources of California in cooperation with other agencies, to benefit the people of the State, and to protect, restore, and enhance the natural and human environment. DWR conducts programs related to flood safety, water planning, environmental concerns such as climate change, and water supply. DWR coordinates closely with the SWQRCB and the RWQCBs on water-quality issues. DWR has a role in defining groundwater basins in the State and manages a number of grant programs, such as Integrated Regional Water Management (Proposition 50) grant programs and Local Groundwater Assistance (Proposition 84) grants. Through the California Water Code, DWR has regulatory power to protect against loss of life and property from dam failure, which delegates the program to the Division of Safety of Dams. This agency may govern surface water impoundments created as part of the Murphy Crossing, College Lake, or Watsonville Slough projects.

Because hydrology is inextricably linked to ecosystem and wildlife health, the California Department of Fish and Wildlife (CDFW: formerly Fish and Game) also has regulatory oversight over projects affecting lakes, streambeds, and adjacent riparian zones.
Central Coast Regional Water Quality Control Board

At the State level, water-quality regulation in the Pajaro Valley basin falls under the jurisdiction of the CCRWQCB, Region 3. At the Federal level, the County falls under the jurisdiction of EPA Region 9. The CCRWQCB guides and regulates water quality in streams and aquifers over a 300-mile long, 40-mile wide section of the Central Coast through implementation of the following major programs.

The Central Coast Regional Basin Plan. Through planning processes required by both Federal and State law, the Central Coast Regional Basin Plan is the framework for the Regional Board’s decisions. The Central Coast Regional Basin Plan presents the beneficial uses that the CCRWQCB has specifically designated for individual aquifers, streams, marshes, rivers, lakes, ponds, estuaries, lagoons, sloughs and coastal waters, as well as the water-quality objectives and criteria that must be met to protect these uses. Twenty beneficial use categories are applied to 13 hydrologic units within the Central Coast basin. The Pajaro River Hydrologic Unit is further subdivided into 57 water bodies, each with a number of beneficial use categories selected. The beneficial uses for the water bodies relevant to the BMP Update are listed in Table 3.9-9.

<table>
<thead>
<tr>
<th>Beneficial Use</th>
<th>Code</th>
<th>Pajaro River</th>
<th>Saltpuedes Creek</th>
<th>Pajaro River Estuary</th>
<th>Watsonville Slough</th>
</tr>
</thead>
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<tr>
<td>Municipal and Domestic Supply</td>
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<td>0</td>
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</tr>
<tr>
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<tr>
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<td>--</td>
<td>--</td>
</tr>
<tr>
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<tr>
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<tr>
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</tr>
<tr>
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<tr>
<td>Preservation of Biological Habitats of Special Significance</td>
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<tr>
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<td>Freshwater Replenishment</td>
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<td>--</td>
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<tr>
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<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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</tr>
<tr>
<td>Shellfish Harvesting</td>
<td>SHELL</td>
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<td>--</td>
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</tr>
</tbody>
</table>

General basin water-quality objectives are summarized in Table 3.9-10. Objectives for inorganic constituents are summarized in Table 3.9-5, and they are compared to average concentrations for the Pajaro River and Pajaro Valley groundwater. Specific surface water-quality objectives are designated for the Pajaro River at Chittenden,
before the Pajaro River enters the Pajaro Valley Groundwater Basin, but no specific groundwater objectives are designated for the basin. Water-quality objectives from the indirectly applicable California Ocean Plan (CCRWQCB, 2006) are included in Table 3.9-5 for continuity purposes. The Ocean Plan applies in its entirety to Monterey Bay.

### Table 3.9-10 CCRWQCB General water-quality objectives

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Water Quality Objective</th>
</tr>
</thead>
</table>
| Dissolved Oxygen                   | 5.0 mg/L minimum in waters designated WARM  
7.0 mg/L minimum in waters designated COLD  
7.0 mg/L minimum in waters designated SPWN  
The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent saturation. |
| Suspended Material and Settleable Material | Waters shall not contain substances or suspended material in concentrations that result in deposition of material or cause nuisance or adversely affect beneficial uses. |
| Sediment                           | The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. |
| Turbidity                          | Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increase in turbidity attributable to controllable water quality factors shall not exceed the following limits:  
1. Where natural turbidity is between 0 and 50 Jackson Turbidity Units (JTU), increases shall not exceed 20 percent.  
2. Where natural turbidity is between 50 and 100 JTU, increases shall not exceed 10 JTU.  
3. Where natural turbidity is greater than 100 JTU, increases shall not exceed 10 percent. Allowable zones of dilution within which higher concentrations will be tolerated will be defined for each discharge in discharge permits. |
| pH                                 | For waters not mentioned by a specific beneficial use, the pH shall not be depressed below 7.0 nor raised above 8.5. |
| Oil and Grease                     | Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in visible film or coating on the surface of the water or on objects in the water, that cause nuisance or that otherwise adversely affect beneficial uses. |
| Floating Material                  | Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses. |
| Temperature                        | Temperature objectives for Enclosed Bays and Estuaries are as specified in the “Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California” including any revisions thereunto. |
| Toxic Pollutants                   | All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, toxicity bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board. Numerical objectives for arsenic, barium, boron, copper, cyanide, iron, manganese, molybdenum, selenium, silver, and zinc are provided in the Basin Plan (see accompanying table). |
| Pesticides                         | No individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life. |

*Source: California Water Quality Control Board, Region 3, Central Coast Basin Plan (2011).*

Specific to the beneficial use of agricultural supply (AGR), in addition to the objectives used for irrigation and livestock watering (noted in Table 3.9-5), the Central Coast Regional Basin Plan also includes irrigation and plant toxicity guidelines derived from University of California Agricultural Extension Service guidelines, for the interpretation of potential adverse effects (Table 3.9-6). Salt concentrations for irrigation waters (commonly measured as total dissolved solids, TDS, or specific conductance) shall be controlled through implementation of the anti-degradation policy to the effect that mineral constituents of currently or potentially usable waters shall not be increased to the extent of impairing existing beneficial uses. The Central Coast Regional Basin Plan
emphasizes that no controllable water-quality factor shall degrade the quality of any groundwater resource or adversely affect long-term soil productivity. Where wastewater effluents are returned to land for irrigation uses, regulatory controls shall be consistent with Title 22 of the California Code of Regulations and with relevant controls for local irrigation sources (p. III-4, section II.A.2.a of the Central Coast Regional Basin Plan).

The Central Coast Regional Basin Plan regulates land disposal of wastewater that may influence groundwater. These regulations are implemented through National Pollutant Discharge Elimination System (NPDES) permits, Waste Discharge Requirements (WDRs), best management practices, and enforcement actions. Other groundwater-specific regulations included in the Central Coast Regional Basin Plan include:

- Wastes discharged to groundwater shall be free of toxic substances in excess of accepted drinking water standards; taste, odor, or color producing substances; and nitrogenous compounds in quantities which could result in a groundwater nitrate concentration above 45mg/L.
- Groundwater recharge with high quality water shall be encouraged.
- In all groundwater basins known to have an adverse salt balance, total salt content of the discharge shall not exceed that which normally results from domestic use, and control of salinity shall be required by local ordinances which effectively limit municipal and industrial contributions to the sewerage system.
- Wastewaters percolated into the groundwaters shall be of such quality at the point where they enter the ground so as to assure the continued usability of all groundwaters of the basin.

Total Maximum Daily Load (TMDL). Section 303(d) of the Federal Clean Water Act requires the RWQCB to (a) identify waters that are not expected to meet water-quality standards after application of effluent limitations for point sources, (b) develop a priority ranking and establish the Total Maximum Daily Load (TMDL) of specific pollutants that may be discharged into the water, and (c) meet the water-quality standards. The RWQCB is required to submit the list of impaired water bodies to USEPA, and develop a (TMDL) load reduction plan for all listed water bodies. Approved TMDLs are implemented through National Pollutant Discharge Elimination System (NPDES) permits, non-point source control programs, and other local and State requirements.

The CCRWQCB has promulgated TMDLs for sediment and fecal coliform in the Pajaro River, and fecal coliform for Watsonville Slough. The following problem statements for each TMDL summarize the cause for action:

- Anthropogenic watershed disturbances have accelerated the natural processes of erosion and sedimentation in the Pajaro River, including Llagas Creek, Rider Creek, and San Benito River. Special studies have identified a variety of watershed conditions that have led to excessive sedimentation. Excessive sedimentation has caused an exceedance of the narrative, general water-quality objective for sediment because sediment load and rate have interfered with the beneficial uses of these water bodies including, fish and wildlife (COLD, MIGR, and SPWN).
- The beneficial use of water-contact recreation is not being protected in Pajaro River Watershed (including the following water bodies: Pajaro River, San Benito River, Llagas Creek, Tequisquita Slough, San Juan Creek, Carnadero/Uvas Creek, Bird Creek, Pescadero Creek (San Benito Co.), Tres Pinos Creek, Furlong (Jones) Creek, Santa Ana Creek, and Pacheco Creek) because fecal coliform concentrations exceed Central Coast Regional Basin Plan numeric water-quality objectives designed to protect this beneficial use.
- The beneficial uses of water contact recreation (REC-1) and non-contact water recreation (REC-2) are not supported in Watsonville Slough or its tributaries, Struve, Hanson, Harkins and Gallighan Sloughs, because fecal coliform concentrations there exceed existing Central Coast Regional Basin Plan numeric water-quality objectives protecting these beneficial uses.
CCRWQCB is charging land- and water-use entities within the basin to reduce the loadings reaching the river and slough system, and has placed (or is placing) a responsibility to change practices such that daily loadings are reduced by certain amounts. The TMDL for fecal coliform is based on a minimum of five samples for any 30-day period. The average of the samples (logarithmic mean) shall not exceed a content of 200, nor shall more than ten percent of total samples collected during any 30-day period exceed 400. Coliform content is expressed in units of MPN per 100 milliliters, which is an estimate of the Most Probable Number based on the results of a series of fermentation tubes containing varying dilutions of the sample. The TMDL for sediment uses two methods to quantify the effect of sediment in the Pajaro River: (1) suspended sediment concentration-duration values; and (2) a streambed characterization of sandy sediment in channel pools that is readily available for transport at higher flows (as described by V*, or “V-star”).

National Pollutant Discharge Elimination Systems (NPDES) Program. The NPDES program is administered by SWRCB and RWQCBs under the supervision of the US Environmental Protection Agency (EPA). NPDES discharges can be permitted with an individual permit or covered under a general permit. Individual Permits are completed to address specific design and applicable water-quality standards to an individual facility, while General Permits authorize a category of discharges within a geographic area. The majority of construction sites and industrial facilities that discharge storm water are permitted under general NPDES permits.

The NPDES permit for Granite Rock Company’s Wilson Quarry (No. CA0005274) allows for recycled water discharge from the quarry storage reservoir to the Pajaro River only after a rain event (or events) that occur at a rate and/or frequency that result in more rain than the storage capacity at the facility. The effluent limitations include an average monthly total dissolved solids (TDS) concentration of 1,000 mg/L and total suspended solids (TSS) concentration of 50 mg/L, and a maximum daily turbidity of 50 Nephelometric Turbidity Units (NTUs) and acute toxicity of one TU (toxic unit = 100/LC50). Suspended sediment concentration must not exceed 1,807 mg/L for a less than 24-hour discharge, 665 mg/L for a two day discharge, 244 for a two to 14 day discharge, 90 mg/L for a greater than 14 day discharge. The effluent also has limitations for toxic pollutants. The Pajaro River limitations are based on water-quality objectives contained in the Central Coast Regional Basin Plan. According to annual monitoring reports through 2012, the last recorded discharge from the Facility occurred in January 2002. Prior to that, periodic discharges occurred in December 2001 through January 2002.

Permits for municipal wastewater dischargers in the Pajaro River Hydrologic Unit upstream of Chittenden (upstream of the Pajaro Valley basin) include the Cities of Gilroy/Morgan Hill, San Benito County Facilities, Sunnyslope County Water District, Tres Pinos County Water District, City of Hollister, and the City of San Juan Bautista. Treated wastewater is sent to evaporation/percolation ponds for disposal to land, with some reclamation and reuse. Many of the ponds are in close proximity to the Pajaro River or tributaries. The largest discharger is the City of Gilroy/Morgan Hill treatment facility (NPDES Permit No. CA0049964). Under emergency conditions during wet weather events, tertiary-treated wastewater is permitted for discharge to the Pajaro River. The 5-year permit, dated March 18, 2010, states that during 2004 through 2008, there were no direct discharges to the Pajaro River. SCRWA monitoring reports submitted since 2008 also did not have any discharges to the Pajaro River. The permit requires installation of ultraviolet disinfection capacity to manage discharges to the Pajaro River. The City of San Juan Bautista currently discharges secondary treated wastewater to a drainage ditch (0.15 million gallons per day, or mgd) but is in development of a land-disposal system (RWQCB, 2011). Other municipal

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17 Discharges of wastewater to land are commonly called "Non-Chapter 15" or "Non-15" discharges, in reference to the group of wastes excluded from the full containment, prescriptive requirements of Chapter 15/Title 27 California Code of Regulations (CCR) that apply to hazardous, designated, and other wastes.
wastewater facilities do not permit direct discharge to the Pajaro River. The Central Coast Regional Basin Plan calls for land disposal of wastewaters in the Hollister region to be monitored carefully to assure groundwater quality is protected. The Plan also calls for source control of salt to reduce effluent salinity to levels acceptable for disposal to local groundwaters.

**Storm Water Program.** There are two major components to the storm water program: the municipal program and the industrial program. Phase I of the municipal program involves urbanized areas of 100,000 or more population and requires the Regional Board to adopt permits for their discharges. Phase II implementation extended NPDES urban runoff discharge permitting to cities with a population of 50,000 to 100,000 people\(^\text{18}\), and to construction sites which disturb between one and five acres.

In Phase I and Phase II, urbanized counties and cities that implemented a comprehensive storm water management plan (CSWP) for urban runoff management meeting RWQCB standards could apply to the Regional Board for a joint city-county NPDES Municipal Storm Water Permit. Upon acceptance, the authority to regulate storm runoff discharges from municipal storm drain systems was transferred to the permit holders, allowing them to more effectively integrate the storm water control program with other nonpoint source control programs.

The California Department of Public Health’s (CDPH) Drinking Water Program’s has issued Draft Regulations for Groundwater Replenishment with Recycled Water (CDPH, 2013). Although not finalized or promulgated, CDPH and RWQCB follow these guidelines when reviewing permits for groundwater recharge with recycled water.

**Salt and Nutrient Management.** The State Water Resources Control Board adopted a Recycled Water Policy in May 2009 encouraging increased use of recycled water and requires management of salts, nutrients, and other significant chemicals in every groundwater basin in the state by 2014. The Salt and Nutrient Management Plan (SNMP) is intended to streamline permitting of new recycled water projects while meeting water-quality objectives and protecting beneficial uses. Three SNMPs will be completed for the Pajaro River Watershed: South Santa Clara County; San Benito County; and the Pajaro Valley Groundwater Basin, downstream of Chittenden Gap, including Watsonville Slough, Corralitos watershed, and the East Area. The SNMPs are being developed as part of the Pajaro River Watershed Integrated Regional Water Management Plan, and will address:

- Improvement of water-quality monitoring
- Definition of water-recycling goals and objectives
- Identification of salt and nutrient sources
- Estimation of the salt and nutrient loading to the basin and its capacity to assimilate the loading
- Development of salt and nutrient mitigation strategies
- Analysis of ways to minimize potential water-quality degradation.

The final Salt and Nutrient Management Plan will include a series of water-quality objectives targeted at reducing the future source contribution of salts and nutrients to the groundwater basin.

**Watershed Management.** Watershed Management involves the development of watershed-wide programs to protect water quality. The main premise of the Watershed Management program is that Regional Board actions and decisions should be guided by consideration of water-quality related impacts within the context of a watershed.

\(^{18}\) As of the 2010 census, the City of Watsonville has a population of approximately 65,000.
The Pajaro River Watershed Integrated Regional Water Management (IRWM) Plan effort is a collaborative effort to identify and implement regional and multi-beneficial projects for the Pajaro River Watershed. The Pajaro River Watershed IRWM Regional Water Management Group (RWMG) consists of:

- Santa Clara Valley Water District (SCVWD)
- San Benito County Water District (SBCWD)
- Pajaro Valley Water Management Agency (PVWMA)

In October 2004, SCVWD, SBCWD, and PVWMA entered into a Memorandum of Understanding (MOU) for the purpose of coordinating water-resources planning and implementation activities watershed-wide. In their MOU, the RWMG identified water conservation, water recycling, desalination, groundwater basin management, water banking, conjunctive use, transfer agreements and storage development as common issues that could be addressed through joint long-term water supply planning. The June 2006 IRWM Plan was completed and adopted in May 2007. The completed IRWM Plan integrates planning efforts for water supply, flood protection, wastewater treatment, watershed planning, environmental protection and water quality into a single document for our region. Public agencies, cities, counties, nonprofit organizations, and private water companies integrate their planning efforts into a single plan that maximizes efficiencies and takes advantage of the synergies available when these entities work together with common goals. In February 2011, the California DWR approved a one million dollar grant to update the IRWM Plan and completing several special studies related to water supply, water quality, flood protection, and habitat protection. Work continues on the IRWM Plan Update and a final plan is scheduled to be completed in the Summer of 2014.

Lower Pajaro River Valley issues of seawater intrusion, water supply and water recycling have been designated as high priority issues through the IRWM Plan process. The BMP Update is the result of a comprehensive planning effort to determine solutions to those issues and its incorporation into the IRWM Plan will address the local needs identified for that area of the watershed. The City of Watsonville's General Plan specifically calls for the city to participate in the BMP.

Non-Point Source (NPS) Program. Non-point sources of contamination are responsible for many significant impairments in the region's water resources. Non-point source discharges include agricultural, forestry, and grazing operations. The most significant problems are elevated levels of pesticides, salts, and trace metals. Other impairments involve low dissolved oxygen, temperature changes, sediment, ammonia, and various contaminants that threaten drinking water supply. The program seeks to address impacts from NPS pollutants through a variety of efforts, including: watershed-based high priority management measures to control and prevent polluted runoff with site specific practices, enforcement of State policies, public education, and financial and technical assistance to projects and programs that address NPS, land use, and watershed management.

Irrigated Agricultural Regulatory Program. This program regulates discharges from irrigated agricultural lands. The purpose of the program is to prevent agricultural discharges from impairing surface water and groundwater. To comply with the conditions of the program, growers must prevent discharges, protect and restore water quality through effective implementation of appropriate management measures, monitor water quality, and implement corrective actions when impairments are found. The CCRWQCB is using a coordinated watershed approach to implement the Agricultural Regulatory Program.

401 Water Quality Certification. This program involves regulation of activities related to the removal or placement of soil, sediment, and other materials in or near water bodies and requires USACE permits under CWA.
Section 404. This program also addresses projects involving the construction of dams, power plants, and other facilities requiring Federal Energy Regulatory Commission (FERC) licenses.

Central Coast Ambient Monitoring Program (CCAMP). This is the CCRWQCB regionally-scaled water-quality monitoring and assessment program. CCAMP is primarily funded by the State Water Board Surface Water Ambient Monitoring Program and by a private endowment held with the Bay Foundation of Morro Bay. The CCAMP mission is to collect, assess, and disseminate scientifically-based water-quality information to aid decision makers and the public in maintaining, restoring, and enhancing water quality and associated beneficial uses.

Underground Storage Tanks (UST). The UST unit provides oversight of the investigation and cleanup of some of the UST sites where unauthorized releases of petroleum and other hazardous substances have occurred. The UST unit provides comments and guidance to the local agencies that oversee the investigations and cleanup of UST sites where unauthorized releases of petroleum have occurred in their jurisdictions.

**Water Rights**

**Surface Water Rights**

By law the State of California owns all surface waters within the state, and a right to use water can be granted to an individual or organization. A water right is a legally protected right to take possession of water and put it to use. All use of water resources in California is subject to the constitutional requirement of reasonable and beneficial use. Before a court will grant relief against any claimed interference with a water right, the party alleging the existence of the prior right must prove all facets of the underlying right, including compliance with the constitutional requirement of reasonable and beneficial use. California’s system of water rights includes both riparian and appropriative rights for surface waters, and overlying and appropriative rights for groundwater (Table 3.9-11).

There are two major types of surface water rights under California State Law: riparian rights and appropriative rights. Riparian rights are those where water is extracted for use on lands that directly border a water course. Any owner of a parcel immediately adjacent to a water course has the right to take water for beneficial use (e.g., domestic and agricultural) at any time unless specific deed restrictions are stated in the title to the land. Riparian rights do not entitle a water use to divert water to storage in a reservoir for use in the dry season or to use water on land outside of the watershed. Any removal of water from a surface water body for delivery to non-adjacent parcels constitutes appropriative use, which requires a permit from the SWRCB Division of Water Rights that establishes an appropriative right. An appropriative right may be established to use water for any reasonable, beneficial purpose on any land no matter where located, and to store water from one season for use in a later season, or from one year for use in subsequent years. As proposed in the BMP Update, a Murphy Crossing diversion to groundwater recharge basins would be a reasonable and beneficial use and would require an appropriative SWRCB permit.
Groundwater Rights

California does not have a comprehensive law governing groundwater rights. Instead, groundwater rights law is based upon a series of court decisions. There are three legally recognized classifications of groundwater in California: subterranean streams, underflow of surface waters, and percolating groundwater. Subterranean streams and underflow of surface waters are subject to the laws of surface waters and are regulated by the State Water Resource Control Board (SWRCB or State Board). Percolating groundwater, on the other hand, has few regulation requirements. In most areas of California, overlying land owners may extract percolating groundwater and put it to beneficial use without approval from the State Board or a court. California does not have a permit process for regulation of groundwater use. In several basins, however, groundwater use is subject to regulation in accordance with court decrees adjudicating the groundwater rights within the basins. Groundwater rights in the Pajaro Valley are not adjudicated.
The California Supreme Court decided in the 1903 case Katz v. Walkinshaw that the “reasonable use” provision that governs other types of water rights also applies to groundwater. The Supreme Court case established the concept of overlying rights, in which the rights of others with land overlying the aquifer must be taken into account. Later court decisions established that surplus groundwater may be appropriated for use outside the basin, although appropriator’s rights are subordinate to those with overlying rights (SWRCB, 2009). Native American tribes assert unquantified reserved water rights pursuant to federal law and the Winters doctrine, which refers to the U. S. Supreme Court decision in the case. Two landmark U.S. Supreme Court cases, Winters v. U. S. (1908) and U.S. v. Rio Grande Dam & Irrigation Co. (1899), established several key principles: 1) federally reserved lands have a right to use sufficient water to fulfill the “primary purpose” of the reservation, and 2) these water rights cannot be destroyed by state water law or by water users acting in accordance with state law (Parr & Parr, 2009).

The State of California mandates and delegates to local health departments the responsibility for environmental health programs. Legal authority for county environmental health programs comes from the California Health and Safety Code, California Code of Regulations, and local ordinances and regulations. The State delegates the regulation of small public water systems to County Environmental Health19, which also enforces County ordinances and regulations pertaining to well construction, individual water systems, and individual sewage disposal systems (septic systems and septic tank pumping). Environmental Health also administers County Service Area 12, which provides programs for improved septic system management throughout the County, with a special focus on implementing the State-approved San Lorenzo Wastewater Management Plan. Environmental Health enforces State and local laws for hazardous materials and wastes countywide, and provides support and staff to the Hazardous Materials Advisory Commission, various water-quality protection programs, and the County Water Resources Management Program. One such relevant program produced the Watsonville Sloughs Watershed Resource Conservation and Enhancement plan (Swanson and others, 2003) for the County Planning Department.

Chapter 7.79 of the Santa Cruz County Code, runoff and pollution control ordinance (no. 5117) complies with Federal and State law concerning stormwater, and intends to protect surface and groundwater quality, groundwater recharge, beneficial uses, marine habitats, watershed health, and ecosystems of the receiving waters of the County (including Monterey Bay) from discharge of pollutants and the adverse effects of hydromodification. The ordinance included compliance required with industrial and construction NPDES stormwater discharge permits. Moreover, the County Planning Department has issued the Construction Site Stormwater Pollution Control Best Management Practices Manual (October 2011), which contains standards for BMPs to be implemented during construction to control erosion, sediment and stormwater pollution within the unincorporated portion of Santa Cruz County. The manual also addresses non-stormwater Best Management Practices, as well as specialized biotechnical erosion and sediment control techniques that are particularly relevant to many areas and projects in the County.

All of the proposed component facilities are within Santa Cruz County. The County has the following policies and objectives relevant to the project:

- Policy 5.6.3: Ensure the development of new major water-supply projects are adequately conditioned to protect beneficial instream uses and riparian habitat.

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19 Santa Cruz County Environmental Health Services is a division of the Public Health program of the County's Health Services Agency.
- Policy 5.7.3: For all new and existing development and land disturbances, require the installation and maintenance of sediment basins, and/or other strict erosion control measures, as needed to prevent siltation of streams and coastal lagoons.

- Objective 5.8a: To protect the quantity and quality of the County's groundwater resources through an integrated program of land-use regulation and runoff management in groundwater-recharge areas, careful water-quality monitoring and management of extractions consistent with long-term sustainable water-supply yields.

- Objective 5.8b: To act directly and coordinate and work with relevant water purveyors and agencies to eliminate long-term groundwater overdraft in all water basins where overdraft has been documented.

**Pajaro Valley Water Management Agency**

The PVWMA operates under the authority of the Pajaro Valley Water Management Agency Act of 1984. The act has several objectives that are relevant to surface water and groundwater management and the proposed BMP Update. These are described below.

**Section 102.** Water resource management activities carried out under this act in the public interest shall recognize the following objectives:

(d) Conservation and economically efficient management of water resources are necessary to meet the needs of agriculture, industry, and urban communities. Economic efficiency requires that water users pay their full proportionate share of the costs of developing and delivering water. Property taxes shall not be used for payment of these costs. Agricultural uses shall have priority over other uses under this act within the constraints of state law.

(e) Water conservation programs appropriately include the ability of a water management agency to recognize existing beneficial uses, and to acquire, buy, and transfer water and water rights in the furtherance of its purpose.

(f) The purpose of this agency is to efficiently and economically manage existing and supplemental water supplies in order to prevent further increase in, and to accomplish continuing reduction of, long-term overdraft and to provide and insure sufficient water supplies for present and anticipated needs within the boundaries of the agency.

(g) It is anticipated that long-term overdraft problems may not be solved unless supplemental water supplies are provided. The water management agency should, in an efficient and economically feasible manner, utilize supplemental water and available underground storage and should manage the groundwater supplies to meet the future needs of the basin.

**Section 704 Right to restore, recapture, distribute, and sell supplemental water.** The agency or other persons pursuant to an agreement with the agency shall have the sole right to store, recapture, distribute, and sell supplemental water in the groundwater basin, subject to subdivisions (d), (f), and (g) of Section 102.

**Section 711 Improvement and protection of water quality; Right to control extractions.** The agency, in order to improve and protect the quality of water supplies may treat, inject, extract, or otherwise control water, including, but not limited to, control of extractions, and construction of wells and drainage facilities. These powers shall include the right to regulate, limit, or suspend extractions from extraction facilities, the construction of new extraction facilities, the enlarging of existing facilities, or the reactivation of abandoned extraction facilities.
Section 714. Power to replenish and augment water supply. The agency shall have the power to take all affirmative steps necessary to replenish and augment the water supply within its territory. In the event the agency imposes restrictions on the operation of extraction facilities, the agency shall purchase, or capture, and distribute supplemental water at the earliest date possible, subject to subdivisions (d), (f), and (g) of Section 102.

**City of Watsonville**

The City of Watsonville owns and operates a regional wastewater treatment facility located two miles west of City Hall on Panabaker Lane adjacent to the Pajaro River. In addition to treating wastewater generated from within the City limits, the plant also serves the Freedom County Sanitation District, the Salsipuedes Sanitation District, the community of Pajaro Dunes and the Pajaro County Sanitation District in Monterey County. In 1998, the City completed improvements designed to process 12 million gallons of effluent per day at a secondary level of treatment. In 2009, the City, in collaboration with the PVWMA, completed an upgrade designed to treat up to 8,600 acre-feet per year of wastewater to the tertiary treatment level (7.7 million gallons per day). This recycled water is supplied to the PVWMA, which distributes the water to coastal farmers using the Coastal Distribution System developed to control seawater intrusion. Excess secondary treated effluent is discharged through the treatment plant’s outfall line that extends more than 70,000 feet into Monterey Bay to the 65-foot depth contour. The Monterey Bay is designated as a National Marine Sanctuary. The City of Watsonville registers and monitors non-point source discharges through its source control office.

The City of Watsonville’s storm water system includes two thousand storm drain inlets that collect water from streets, parking lots and landscaped areas. This water flows directly into the wetlands, creeks, Pajaro River and finally into the Monterey Bay. The City has developed interim hydromodification control standards which are applicable to many new development and redevelopment projects (City of Watsonville, 2011). The Design Guidance is modeled after the hydromodification control standards adopted by Marin County. With an update expected in late 2013, the Design Guidance is considered interim because the City of Watsonville has joined with other Central Coast agencies to develop common hydromodification control standards under the lead of the CCRWQCB. The Design Guidance replaces the City of Watsonville’s Storm Water Land Development Standards. The CCRWQCB is currently in the process of adopting the hydromodification criteria (expected July 2013), which should include retention of a 95 percentile rainfall event (1.5 inches) from impermeable surfaces for new development projects, and 50 percent of that (0.75 inches of rain) for redevelopment projects (pers. com. Robert Ketley, CCRWQCB 831-768-3137).

The City of Watsonville controls pollutants from point and non-point sources through a comprehensive NPDES storm water program administered by the CCRWQCB. All projects shall incorporate Stormwater Best Management Practices that achieve the most effective control of pollutants and flow control practicable (General Plan Policy 11.3.1).

### 3.9.3 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Violate any water-quality standards or waste discharge requirements;
3.9 Surface Water, Groundwater, and Water Quality

- Substantially deplete groundwater supplies or substantially interfere with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
- Substantially degrade quality of surface water or groundwater;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows; or
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam

Impacts of the BMP Update components would be considered significant if it would: (a) cause a Regional Water Quality Control Board (RWQCB) surface water or groundwater-quality objective to be exceeded, (b) cause substantial erosion and sedimentation problems, (c) cause a flood hazard or exacerbate an existing flood hazard, or (d) cause or exacerbate a groundwater overdraft condition.

3.9.4 Impacts and Mitigation Measures by Component

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to all or multiple components are identified for each potential significant impact. If additional specific mitigation measures apply to individual components, then these specific mitigation measures are also identified by component.

3.9.4.1 Construction-related Impacts to Water Quality

Impact HWQ-1: Construction of proposed BMP Update components could result in increased erosion and sedimentation with adverse impacts to water quality. Temporary dewatering of shallow groundwater during construction could also result in increased erosion and sedimentation with adverse impacts to water quality. Additionally, accidental release of fuels or other hazardous materials associated with construction activities could degrade water quality. This potentially significant impact can be reduced to a less-than-significant level with mitigation measures identified in this EIR.

All of the BMP Update components require construction near or in wetlands and/or water bodies and would involve earthmoving activities such as excavation, grading, and soil stockpiling. Most construction would occur within relatively flat areas that eventually drain to the Pajaro River and Monterey Bay. The construction could result in soil erosion and subsequent discharge of suspended sediments to nearby surface waters or drainages. Sedimentation to the waterways could degrade water quality for beneficial uses by increasing channel sedimentation and suspended sediment levels (turbidity), reducing the flood-carrying capacity and thus increasing new channel instability, and adversely affecting associated aquatic and riparian habitats. In addition, hazardous materials associated with construction activities, such as fuels, oils, antifreeze, coolants, paints, solvents, and other substances, could adversely affect water quality if released to surface waters. The required National
Pollutant Discharge Elimination System (NPDES) permit would mandate the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for each BMP Update component, identifying Best Management Practices to reduce erosion of disturbed soils and release of hazardous materials into water bodies. Without mitigation, these water-quality impacts would be considered potentially significant. Implementation of Best Management Practices as required in the SWPPP would reduce potential impacts to less-than-significant levels.

Construction of pipelines would be done primarily by open-trench construction. Excavated spoils would be stockpiled along the trench and then utilized for backfill; excess or unsuitable materials would be transported from the alignment, as necessary. County permit requirements state that no excavated materials would be stockpiled off-site. Large-scale stockpiling of spoil materials is not anticipated. Construction activities would include implementation of Best Management Practices for erosion control along the pipeline routes. Incorporation of standard Best Management Practices, as required under each component’s SWPPP, would reduce this potential impact to a less than significant level.

Mitigation Measure(s):

*Mitigation Measure HWQ-1:* PVWMA shall require contractors to apply for all applicable NPDES permits, including dewatering permits, develop a SWPPP for construction of proposed facilities, and comply with conditions of the permit(s), as required by the CCRWQCB. The objectives of the SWPPP are to identify pollutant sources that may affect the quality of stormwater discharge and to implement Best Management Practices to reduce pollutants in stormwater discharges. The SWPPP for each component of this proposed BMP Update would include the implementation, at a minimum, of the following elements:

- Source identification
- Preparation of a site map
- Description of construction materials, practices, and equipment storage and maintenance
- List of pollutants likely to contact stormwater
- Estimate of the construction site area and percent impervious area
- Erosion and sedimentation control practices, including soils stabilization, revegetation, and runoff control to limit increases in sediment in stormwater runoff, such as detention basins, straw bales, silt fences, check dams, geofabrics, drainage swales, and sandbag dikes
- Proposed construction dewatering plans
- Provisions to eliminate or reduce discharge of materials to stormwater
- Description of waste management practices
- Maintenance and training practices

**Increased Recycled Water Storage at WWTP**

This BMP Update component proposes to increase on-site storage for recycled water by adding two 1-MG storage tanks, which will allow for more nighttime treatment and daytime availability. The tanks will be located immediately south of the existing 500,000 gallon tank, at the same relative elevation. Additional pumps at the existing distribution pump station and an additional 24-inch diameter buried pipe adjacent to and identical to the existing pipe, extending approximately 500 feet to the CDS, will allow for more recycled water to be delivered during the daytime. This BMP Update component would include excavation for the storage tanks and
will occur in close proximity to the water table at that site. This BMP Update component would result in a potentially significant impact due to erosion and sedimentation. Impact HWQ-1 would be significant for this component and Mitigation Measure HWQ-1 would be required to reduce the impact to a less-than-significant level.

**Harkins Slough Facilities Upgrades**

Proposed improvements to the existing diversion and pumping system for this component would include replacement of the pump station within the Harkins Slough and construction of coagulant treatment facilities and additional filters at the existing Harkins Slough filtration facility and 4,000 feet of pipeline to discharge filter backwash waste to the sanitary sewer system. The filter backwash discharge line would be located within the dirt access road to the existing pump station and San Andreas Road, a public roadway. The diversion site, filtration facility, and pump stations are located near the confluence of Harkins Slough and Watsonville Slough northeast of San Andreas Road. This component would also include new extraction wells at the recharge basin that are located northwest of San Andreas Road and Dairy Road, and a new recharge basin with extraction wells. PVWMA will work with landowners to negotiate fair compensation for lands impacted by these projects. Local high water tables may potentially be encountered during construction (specifically, excavation activities) at the filtration, recharge basin, and pipeline sites potentially requiring dewatering. Impact HWQ-1 would be significant for this component and Mitigation Measure HWQ-1 would be required to reduce the impact to a less-than-significant level.

**Watsonville Slough with Recharge Basins**

The proposed facilities for this component would include a new diversion facility on Watsonville Slough, near or upstream of the its confluence with Harkins additional filters at the existing Harkins Slough filtration plant, one or more new recharge basins with extraction wells, and pipelines to deliver water from the diversion site to the filtration facilities, move water between recharge basins, and/or move extracted water from recovery wells to the CDS. PVWMA will work with landowners to negotiate fair compensation for lands impacted by these projects. At the proposed diversion site, Watsonville Slough is a channelized waterway and is considered to meet the requirements of jurisdictional wetland/waters of the U.S. and Waters of the State. The project site is located upstream of the Shell Road tide gates; therefore this portion of the slough is primarily freshwater although recent high storm events have cause stratified salinity profile within the sloughs as far north as this components project area. A dirt road provides access to the existing pump site and filtration plant. The pipelines needed for interconnections between the diversion, filtration facility, recharge basins, and/or CDS would be located within public roadways, and/or along private farm roads. This component involves direct construction within the slough channels and other construction within areas immediately adjacent to the waterways. Local high water tables may be encountered during construction (specifically, excavation activities) at the diversion/pump station, along pipelines, and at recharge basin sites. Impact HWQ-1 would be significant for this component and Mitigation Measure HWQ-1 would be required to reduce the impact to a less-than-significant level.

**College Lake with Inland Pipeline to CDS**

This proposed BMP Update component includes construction of a new adjustable weir structure at a higher elevation downstream of the existing headgate. The new outlet weir would raise the College Lake outlet elevation by 2.3 feet, from 60.2 feet to 62.5 feet (NGVD29). At 62.5 feet, the USACE stage-capacity curve estimates the

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Pajaro Valley Water Management Agency

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storage capacity of College Lake at 1,700 acre-feet (USACE, 2007). In an earlier study, CH2M Hill (1999) estimated storage capacity at 2,000 acre-feet. Construction of the new weir would require work with heavy machinery within the channel of Salsipuedes Creek, including installation of a cofferdam and bypassing flow around the construction site. Potential impacts associated with the construction of the weir include sedimentation of the channels downstream of the construction area, and water-quality impacts such as increased turbidity. Construction of the weir would require a Section 404 permit from the USACE, and 1601/03 Streambed Alteration Agreement from the California Department of Fish and Game (CDFG). Typically, a 401 Water Quality Certification or waiver from the RWQCB would also be required. Installation would occur during the dry season baseflow season and would comply with permit requirements, thereby reducing impacts to water quality to a less-than-significant level.

This proposed BMP Update component would send water from College Lake during the summer through a new pipeline to the recycled water facility storage tank to supply the CDS, with provision to supply inland users along the pipeline. Construction would include approximately 5.8 miles of new 18-inch water main, a new pump station, and a filtration plant with disinfection. The water pumped out of College Lake would be filtered and disinfected at College Lake prior to entering the pipeline. The proposed filtration and pumping facilities would be located near the College Lake outlet to Salsipuedes Creek. Additional evaluation would be completed before the final location of the proposed filtration and pumping facilities is identified. The total footprint of the facilities is approximately one acre, including filtration, filter pumps, and booster pump, fencing, and access road. Pipeline installation would follow established roadways and require open-trench construction techniques. Impact HWQ-1 would be significant for this component and Mitigation Measure HWQ-1 would be required to reduce the impact to a less-than-significant level.

Murphy Crossing with Recharge Basins

The Murphy Crossing with Recharge Basins component includes the construction of (a) a collector well and/or infiltration gallery to divert water from the Pajaro River, (b) recharge basins and monitoring wells, and (c) a pump and pipeline connecting the collector well to the recharge basins.

Though the conceptual design of the facility is pending, a Ranney-type collector well with an infiltration gallery is a typical example of a subsurface diversion facility to be installed at Murphy Crossing. It is installed to site specifications with a single central withdrawal point (or caisson) and a radial arrangement of horizontal slotted pipe forming a large infiltration gallery, often reaching beneath the bed of a river. The infiltration gallery is installed beneath the maximum anticipated flood scour depth. Following site characterization and design, installation of a Ranney-type collector well begins with construction of the large-diameter caisson (13 feet across) near the bank of the river. The caisson is sunk down into the alluvial aquifer by excavating alluvium from the inside of the caisson. After a segment is sunk, the caisson is extended and lowered with further excavation until the design depth reached. A concrete plug is then poured through a tremmie to seal the bottom. Per design specifications, the lateral infiltration gallery is extended outward from the caisson without excavation or the need to bypass or dewatering the river channel. Standard care and best management practices are required during installation to limit construction induced turbidity in the river. Excavated material and groundwater generated during construction would need to be managed. Approximately 300 cubic yards of excavation will be generated to sink the caisson 20 feet. A significant amount of turbid water is generated when initially pumping out the caisson after sealing the bottom and while installing the lateral gallery. This water is typically discharged to a permeable pit and/or swale with straw waddle and silt fencing. Other methods of installing an infiltration gallery would be to excavation in the river bed during summer or to conduct slant drilling beneath the river bed from the
river bank. These methods would generate less excavated material and turbid water during construction. Impact HWQ-1 would be significant for this component and Mitigation Measure HWQ-1 would be required to reduce the impact to a less-than-significant level.

3.9.4.2 Operational Impacts to Water Quality due to Sedimentation and Erosion

**Impact HWQ-2:** Operation of proposed BMP Update components could result in increased erosion and subsequent sedimentation, with adverse impacts to surface water quality. Diversions from Watsonville and Harkins Sloughs resulting in chronic imposed water-level fluctuations may result in increased erosion and sedimentation, including potential bank collapse. College Lake and Murphy Crossing diversions may result in erosion and downstream sedimentation depending upon operations and pump design. This potentially significant impact can be reduced to a less-than-significant level with the following mitigation measure.

**Mitigation Measure(s):**

*Mitigation Measure HWQ-2:* Rapid, imposed water-level fluctuations shall be avoided within the sloughs, Salsipuedes Creek, and the Pajaro River to minimize erosion and failure of exposed (or unvegetated), susceptible banks. This can be accomplished by operating the pumps at an appropriate flow rate, in conjunction with commencing operation of the pumps only when suitable water levels or flow rates are measured in the water body. Criteria for minimizing fluctuations and/or protecting banks from related erosion will need to be developed, as some banks presently are stable and others are not. Control is important, as the mobilized sediment also impairs in-sluough habitat values, and potentially exacerbates bacterial levels in the slough system. It may be that water-level fluctuations may be controlled as well to minimize other impacts, such as desiccation of amphibian eggs or waterlogging of agricultural soils adjacent to the sloughs.

**Harkins Slough Recharge Facilities Upgrades**

Diversion pumps in Harkins Slough have been in operation for about 50 years and until the existing PVWMA Harkins Slough project began operating the pumps were operated by Santa Cruz County. Chronic imposed water-level fluctuations associated with operations of the proposed diversion pumping regime for the Harkins Slough Recharge Facilities Upgrades may result in erosion and sedimentation, including due to bank failure of Harkins and Watsonville Sloughs and the Pajaro River lagoon if diversions are not operated properly. This is a significant impact that can be reduced to less-than-significant with implementation of Mitigation Measure HWQ-2.

**Watsonville Slough with Recharge Basins**

As with the Harkins Slough diversions, chronic imposed water-level fluctuations associated with operations of the proposed diversion pumping regime for the Watsonville Slough with Recharge Basins component may result in erosion and sedimentation, including potentially due to bank failure of Harkins and Watsonville Sloughs and the Pajaro River lagoon, if diversions are not operated properly. This component must be designed to not further exacerbate the impacts of erosion and sedimentation on other properties within the vicinity. This is significant impact that can be reduced to less-than-significant with implementation of Mitigation Measure HWQ-2.
3.9 Surface Water, Groundwater, and Water Quality

**College Lake with Inland Pipeline to Coastal Distribution System**

Chronic imposed water-level fluctuations associated with operations of the proposed diversion pumping regime for this component may result in erosion and sedimentation, including due to bank failure, of Salsipuedes Creek and the Pajaro River if diversions are not operated properly. This is a significant impact that can be reduced to less-than-significant with implementation of Mitigation Measure HWQ-2.

**Murphy Crossing with Recharge Basins**

This component proposes a diversion from the Pajaro River of up to 5.0 cubic feet per second (cfs) between December and May and when flows are greater than 45 to 90 cfs. At high flow levels, sediment-transport rates are higher, and pool scour-and-fill processes, bar mobility, and bank instability are active and expected in any river system. In addition, higher flows occur during and following rain storms when water levels in a river are dynamic, typically rising rapidly during the storm and receding as the storm passes (Figure 3.9-12). River stage and fluctuating water levels rise highest during a sequence of storms and develop a seasonal peak of often several thousand cubic feet per second. Two or three seasonal peaks are common during a typical wet season. The natural erosion and sediment transport processes dominate the river system at high flow. The component operations would not result in increased erosion and subsequent sedimentation because the component may reduce high flows only by up to 10 percent. Anticipated potential increases in turbidity would be negligible.

The Pajaro River at the location of the proposed diversion loses water to the underlying aquifer and is known to actively deposit, scour, sort, and transport sand through the reach. Water would be diverted through an infiltration gallery, commonly used and installed at depth adjacent to and/or beneath the riverbed. Its operation has the preferred benefit of dispersing effects and utilizing the bed and bank alluvial material as a sand/gravel filter. In this regard, its location is suitability placed. There is a possibility, though, of increased local erosion if the diversion pumps are operated incorrectly at some river stages. This potentially significant impact can be reduced to less-than-significant with implementation of Mitigation Measure HWQ-2.

**3.9.4.3 Operational Impacts to Water Quality Due to Increased CDS Delivery**

The proposed BMP Update would increase the alternative types of water available to blend with recycled water and therefore, would have a beneficial impact on delivered water quality and crop yields, and a less than significant impact on surface and groundwater quality.

As discussed above, the PVWMA Water Quality and Project Operations Committee advises the PVWMA Board and staff on programs related to water supply, quality and operations related to supplemental water facilities. The Committee also serves to communicate issues and concerns regarding water quality and project operations between PVWMA, landowners, and growers within the PVWMA service area.

Irrigation with recycled water could contribute to loading of specific constituents to soil surfaces and groundwater supplies in the vicinity of irrigation sites. Typical water-quality concerns regarding the use of recycled water include salinity, metals, nitrate, boron and microorganisms. Salinity is commonly measured as specific
3.9 Surface Water, Groundwater, and Water Quality

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The proposed BMP Update would result in continued and increased irrigation of agricultural lands with a blend of recycled water, groundwater and surface water. PVWMA currently collects periodic water samples from supplemental water supply sources as well as on-farm turnouts, for irrigation suitability analysis at a California certified analytical laboratory and implements water-quality objectives for chloride (150 mg/L), sodium (100 mg/L), and SAR (4.0), set by their Board-appointed Water Quality and Project Operations Committee. These objectives were selected with consideration to the relative salt tolerances of crops grown in the Pajaro Valley and are consistent with State Title 22 standards for potable water systems, called Secondary Maximum Contaminant Levels (MCLs) or consumer acceptance contaminant levels (See Tables 3.9-7 and -12). The City of Watsonville, as the “Producer” of recycled water, is required to conduct sampling of the water in accordance with the Master Reclamation Permit (CCRWQCB, 2008). PVWMA, as the “Distributor” of recycled water, conducts other testing, such as soil sampling and groundwater sampling. At the request of the Water Quality and Project Operations Committee, PVWMA contracts with the Monterey County Department of Environmental Health to conduct bacteriological sampling (Total Coliforms, E. Coli, and Clostridium).

The Central Coast Regional Basin Plan has also identified an average annual water-quality objective of 1,000 mg/L for TDS in the Pajaro River at Chittenden, inflowing to the low Pajaro Valley. TDS in the Pajaro River is flow dependent and commonly ranges from 1,400 mg/L (2.15 mmhos/cm @25°C) at low flows to 200 mg/L at high flows (Table 3.9-7, Figure 3.9-21). The Pajaro River recharges the East Area aquifer, which generally has TDS levels exceeding 800 mg/L (Figures 3.9-17 and -20).

Crop yield is dependent on the salinity of irrigation and soil, as well as the tolerance of the crop grown. Crops currently grown in the Pajaro Valley generally have a salt tolerance of 2.0 to 5.0 mmhos/cm @25°C (Table 3.9-8). Water quality guidelines for irrigation and plant toxicity in the Central Coast Regional Basin Plan (Tables 3.9-6 and -12) have generally identified increasing problems at values greater than 0.750 mmhos/cm @25°C and severe problems at values exceeding 3.0 mmhos/cm @25°C (crop dependent). Figure 3.9-22 relates crop yield to the salinity of water and soil, and to the relative tolerance of crops. The yield potential of crops moderately sensitive to salinity should not degrade at a TDS of 1,000 mg/L or a SC of 1.6 mmhos/cm @25°C maintains a crop yield of 100 percent for the crops currently grown in the Pajaro Valley.

Delivered water quality currently depends on the blended amounts of recycled water, City of Watsonville potable water, PVWMA blend water wells, and Harkins Slough Recharge Facility recovery well water. During years 2011 and 2012 of operation, unblended recycled water had a TDS range from low levels of 600 mg/L to a maximum peak of 1,060 mg/L, while the TDS of delivered water ranged from 400 mg/L to 830 mg/L (Table 3.9-12). The College Lake, Harkins Slough, and Watsonville Slough components of the BMP Update would make available more surface water with which to more consistently blend recycled water to meet PVWMA guidelines and maintain lower TDS levels on a consistent basis.

All above-ground irrigation systems shall be operated in accordance with the requirements of Title 22 of the California Code of Regulations and any reclamation permits issued by the CCRWQCB, Central Coast Region and

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20 Specific conductance (SC), also called electrical conductivity (EC), is expressed in units of micromhos per centimeter (umhos/cm) at 25 degrees Celsius, or when divided by 1,000, as mmhos/cm @ 25°C. Total dissolved solids is commonly approximated by multiplying specific conductance in millimhos by 640.

21 Sodium absorption ratio (SAR) = Na/[1/2 (Ca + Mg)]^{1/2}
the Master Reclamation Permit (CCRWQCB, 2008) that are intended to protect human health and maintain adequate water quality on the sites and in downstream water bodies and water that percolates to groundwater basins/aquifers.
### Table 3.9-12 Delivered water quality relative to proposed guidelines

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<th>Recycled water during 2011 and 2012</th>
<th>Delivered water during 2011 and 2012</th>
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</tr>
<tr>
<td>TDS</td>
<td>mg/L</td>
<td>600</td>
<td>1060</td>
<td>400</td>
<td>830</td>
</tr>
<tr>
<td>Conductance&lt;sup&gt;5&lt;/sup&gt;</td>
<td>umhos/cm @ 25C</td>
<td>938</td>
<td>1656</td>
<td>625</td>
<td>1297</td>
</tr>
<tr>
<td>Chloride</td>
<td>mg/L</td>
<td>90</td>
<td>310</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>SAR&lt;sup&gt;6&lt;/sup&gt;</td>
<td>--</td>
<td>2.5</td>
<td>6.4</td>
<td>1.5</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Notes:
1. Reported in BMP Update, delivered water quality during 2011 through 2012 was a blend of recycled water, City of Watsonville potable water, PVWMA blend water wells, and Harkins Slough Recharge Facility recovery well water.
2. State Title 22 Primary Maximum Contaminant Levels (MCLs) for the drinking water chemicals shall not be exceeded in the water supplied to the public.
3. State Title 22 Secondary MCLs. Constituent concentrations lower than the Recommended contaminant level are desirable for a higher degree of consumer acceptance, and concentrations ranging to the Upper contaminant level are acceptable if it is neither reasonable nor feasible to provide more suitable waters.
4. Table 3-3 from Central Coast Regional Basin Plan (2011). Interpretations are based on possible effects of constituents on crops and/or soils. Guidelines are flexible and should be modified when warranted by local experience or special conditions of crop, soil, and method of irrigation.
5. Specific conductance of delivered water was not monitored by PVWMA but it is commonly approximated by TDS divided by 0.64. Crops vary in tolerance SC and TDS.
6. Sodium absorption ratio (SAR) = Na/[1/2 (Ca + Mg)]<sup>1/2</sup>
7. Values for most tree crops and woody ornamentals; most annual crops are not sensitive (use salinity tolerance tables).

nd = not detected
With drip and furrow irrigation, chloride and sodium injury do not generally occur in vegetable and row crops unless salinity in irrigation water is severe. Leaf injury can occur in strawberries, however, particularly under hot, dry conditions. Under sprinkler irrigation, injury may occur to wetted leaves of susceptible plants such as pepper, potatoes, and tomato if the SC exceeds 1.5 mmhos/cm @25 (Grattan, 2002). Chloride moves readily with the soil water and is taken up by the roots and then transported to the stems and leaves. In groundwater, chloride is mobile and conservative (its concentration generally not changing except by dilution). Water quality guidelines for irrigation and plant toxicity in the Central Coast Regional Basin Plan (Tables 3.9-6 and -12) have generally identified increasing problems at values greater than 142 mg/L and severe problems at values exceeding 355 mg/L (crop dependent). An ideal chloride level for strawberries is less than 140 mg/L (Dara 2012), while grapes can tolerate up to 700 ppm or more. In drinking water, State Title 22 secondary MCL standard for chloride is 250 g/L, with an upper level at 500 mg/L (Table 3.9-12). There is no MCL for sodium. However, water-quality guidelines for sodium, expressed as sodium absorption ratio (SAR), in the Central Coast Regional Basin Plan have identified increasing problems at values greater than 3.0 and severe problems at values exceeding 9.0 (crop dependent). An ideal SAR level for strawberry is less than 3.0 (Dara, 2012). During years 2011 and 2012 of operation, delivered water had a chloride range from low levels of 50 mg/L to a maximum peak of 180 mg/L, while the TDS of delivered water ranged from 400 mg/L to 830 mg/L (Table 3.9-12). The SAR of delivered water was 1.5 to 4.3. The additional water deliveries associated with any of the relevant BMP Update components would not result in any significant adverse water-quality impacts due to chloride or sodium.

Some vegetable and row crops are more sensitive to boron than others. Generally, leaf injury must be severe to cause reduced yields and crop quality. Long-term use of irrigation water containing more than 0.5 mg/L boron can reduce the yields of bean, onion, garlic, and strawberry; 0.7 mg/L boron can reduce the yields of broccoli, carrot, potato, and lettuce; and concentrations greater than 2.0 mg/L can reduce yields of cabbage and cauliflower (Grattan, 2002). Under cool, moist climatic conditions, greater levels of boron can be tolerated, and for short-term use, boron levels given here can be doubled (Grattan, 2002). Unlike most annual crops, tree and vine crops are generally sensitive to boron, chloride, and sodium toxicity. Tolerances vary among varieties and rootstocks. Continued use of irrigation water with boron concentrations in excess of 0.75 ppm can reduce the yields of grapes and many deciduous tree and fruit crops. This represents a threshold concentration and does not imply that irrigation water with boron at or slightly above this level cannot be used successfully (Grattan, 2002). There is no MCL for boron. Water quality guidelines for boron in the Central Coast Regional Basin Plan have identified increasing problems at values greater than 0.5 mg/L and severe problems at values exceeding 2.0 mg/L (crop dependent). During 2011 and 2012, the maximum boron concentration in the PVWMA delivered water was 0.28 mg/L and the minimum concentration was 0.08 mg/L (Table 3.9-12); therefore, boron would not be expected to result in reduced crop yields or degradation of water quality. The additional water deliveries associated with any BMP Update components would not result in a significant adverse water-quality impact due to boron.

Metals would not be expected to adversely affect groundwater quality, because all metals in the recycled and blend (i.e., supplemental well and potable water) are expected to be below their respective drinking water MCLs (Table 3.9-5). In addition, metals are removed from water in soils through a complex process of adsorption, precipitation, ion exchange, and complexation (USEPA, 1981). Microorganisms, including bacteria and viruses, are removed from water through filtration, adsorption (adherence to solids), desiccation (drying out of microorganisms), predation (loss of microorganisms to predators), and exposure to other adverse conditions. Bacteria, including coliform, are removed by filtration through the soil; in general, there is greater filtration of bacteria in fine-grained material than in coarse-grained material. Studies of wastewater application indicated that coliforms are normally removed after five feet of percolation through the soil (USEPA, 1981).
During 2011 and 2012, nitrate concentration in Pajaro Valley recycled water ranged from non-detected to a peak concentration of 21 mg/L as N; after blending, delivered water ranged from non-detected to a peak of 14 mg/L as N (Table 3.9-12). The State Title 22 drinking water MCL for nitrate (as nitrogen, or “as N”) is 10 mg/L. Nitrate is absorbed by plants and is readily immobilized in the unsaturated zone through absorption. Typically, the levels of nitrate present in the delivered water are less than the nitrate requirement of crops, and would be expected to be readily absorbed. The potential for recycled water use to add nitrate loading such that it would adversely affect groundwater quality within the area of irrigation is considered low; thus would be considered a less-than-significant impact. The potential for nitrate migration through the root zone of crops would be further reduced by avoiding the over-application of irrigation water (see below).

In groundwater, nitrate is relatively stable and mobile, and the primary mechanism for reducing nitrate levels in groundwater is through dilution. Denitrification can also reduce nitrate level. Extensive analyses of nitrate loading was conducted as part of the City of Santa Rosa’s Subregional Long-Term Wastewater Project EIR/EIS (City of Santa Rosa, 1996). Nitrate levels were monitored by sampling monitoring wells located upgradient, midgradient (in the central portion of irrigated areas), and downgradient of areas irrigated with recycled water. That analysis indicated an overall decrease in nitrate levels in a downgradient direction. If irrigation with recycled water were a significant source of nitrate input to groundwater, the opposite trend would be expected. Possible explanations include the denitrification and off-gassing of nitrogen gas, or that upgradient land use practices provide a greater input of nitrate to groundwater than the land use practices associated with irrigation using recycled water. Thus, while these studies were somewhat inconclusive, they did indicate that irrigation with recycled water would not be expected to result in a significant increase in the nitrate levels in groundwater.

The over-application of recycled water would have the potential to affect surface water quality if it resulted in surface ponding or direct runoff to local creeks or other water bodies. Recycled water should not be applied within 50 feet of creeks or wells (Article 60310, Water Code). Compliance with Title 22 requirements, and CCRWQCB reclamation permits, and continuation of PVWMA and the City’s ongoing monitoring and adaptive management of the Coastal Distribution System will ensure that surface waters are protected, and that potential impacts to surface or groundwater quality would be less than significant.

**Increased Recycled Water Storage at WWTP**

As discussed above, increasing the amount and improving the timing of availability of recycled water to better match user demand would not result in water quality changes in the delivered water. See discussion above about delivered water quality and potential for water-quality impacts to surface water and groundwater due to CDS delivery of water to users in Pajaro Valley.

Compliance with Title 22 requirements, and CCRWQCB reclamation permits, and continuation of PVWMA and the City’s ongoing monitoring and adaptive management of the Recycled Water Facility and Coastal Distribution System will ensure that surface waters are protected, and that potential impacts to surface or groundwater quality would be less than significant.

**Harkins Slough Recharge Facilities Upgrades**

The Harkins Slough Recharge Facilities Upgrades component of the BMP Update would provide greater flows of recovered recharge water for the purpose of blending with delivered water to meet water-quality objectives. The Harkins Slough recharge basin currently receives winter flows diverted from Harkins Slough. Annual quantities of water diverted and recharged at the Harkins Slough recharge basin (that are considered “baseline” for this
3.9 Surface Water, Groundwater, and Water Quality

analysis) from Harkins Slough are tabulated in Table 3.9-13. The planned facility upgrades will not change the current source of water; however, the Harkins Slough Recharge Facilities Upgrades component would increase diversions from Harkins Slough above the baseline conditions up to the permitted diversion amount of 2,000 AFY (given adequate supply and quality), and potentially add a new recharge basin (Monitoring Well #7 Recharge Basin or Southeast Recharge Basin). The future quality of water infiltrating through the recharge basins will be similar to the current quality of water. Other than the recovery wells to be located adjacent to the recharge basins, irrigation wells in the vicinity are not known to extract water from the surficial aquifer in the vicinity of the existing and proposed Harkins Slough recharge basins. The closest third party irrigation wells are shown in Figure 3.9-36. A majority of the recharged water will be extracted by the component’s recovery wells before it reaches the nearest third party well. In addition, studies at the existing Harkins Slough recharge basin show that significant reduction in nitrates and similar pollutants occurs in the soils between the bottom of the recharge basin and the water table (Schmidt et al., 2011a; Schmidt et al 2011b). Other water-quality improvements, particularly reductions in total organic carbon, are anticipated due to soil treatment processes such as those acknowledged by the State of California’s draft Groundwater Replenishment Reuse regulations (see recharge discussion on page 3.9-33). Therefore, it has been documented that in-situ soil treatment will result in improved water quality for diluted and mixed Harkins Slough recharge water that may migrate outside the immediate vicinity of the recharge basins. Therefore, the potential groundwater quality impacts due to the Harkins Slough Recharge Facilities Upgrades component would be less than significant.

### Table 3.9-13: Historical Diversions from Harkins Slough

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>Amount Diverted (AFY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>561</td>
</tr>
<tr>
<td>2003</td>
<td>111</td>
</tr>
<tr>
<td>2004</td>
<td>766</td>
</tr>
<tr>
<td>2005</td>
<td>800</td>
</tr>
<tr>
<td>2006</td>
<td>898</td>
</tr>
<tr>
<td>2007</td>
<td>552</td>
</tr>
<tr>
<td>2008</td>
<td>791</td>
</tr>
<tr>
<td>2009</td>
<td>557</td>
</tr>
<tr>
<td>2010</td>
<td>904</td>
</tr>
<tr>
<td>2011</td>
<td>840</td>
</tr>
<tr>
<td>2012</td>
<td>100</td>
</tr>
</tbody>
</table>

This component would have a beneficial impact on delivered water quality in the Coastal Distribution System. Compliance with Title 22 requirements, and CCRWQCB reclamation permits, and continuation of PVWMA and the City’s ongoing monitoring and adaptive management of the Recycled Water Facility and Coastal Distribution
System will protect surface waters; therefore, potential impacts to surface or groundwater quality would be less than significant.

**Watsonville Slough with Recharge Basins**

The Watsonville Slough with Recharge Basin component of the BMP Update would provide more consistent amounts and flows of blend water to meet guidelines. The Watsonville Slough project would divert, treat, and recharge, up to 2,000 AFY of water using the existing and one or more proposed recharge basins. The recharged water would be stored in a shallow aquifer beneath the recharge basins. The recharged water would be recovered using shallow wells near the recharge basins. The recharge water would be diverted from Watsonville Slough between November 1st and May 31st. After diversion, the water would be filtered to remove particles, and then infiltrated through recharge basins. Studies of the existing Harkins Slough recharge basin, which uses source water with similar constituents as this component, shows that significant denitrification occurs in the soils between the bottom of the recharge basin and the water table (Schmidt et al., 2011a; Schmidt et al 2011b). Other water-quality improvements, particularly reductions in Total Organic Carbon, are anticipated due to soil treatment processes such as those acknowledged by the State of California’s draft Groundwater Replenishment Reuse regulations.

In addition to the documented water-quality improvements due to in-situ soil treatment, the recharged water is intended to be extracted by recovery wells; there would be no adverse long-term water-quality impact on the perched zone water quality. In fact, a beneficial effect is likely to occur because the water quality to be diverted is better than the existing perched water quality. For example, there could be a long-term beneficial impact due to reduced salts and nutrients within the perched zone aquifer. Assuming the recharged water is of better quality than that in the shallow aquifer, the net impact is positive; in particular, if recharged water is not recovered. Other than the recovery wells to be located adjacent to the recharge basins, there are no known irrigation wells that extract water from the perched aquifer in the vicinity of the Watsonville Slough with Recharge Basins component recharge basins proposed by this component; and no known uses of the water in the perched aquifer. The closest third party irrigation wells are over 400 feet from the recharge basins (Figure 3.9-37). The component’s recovery wells will be designed to extract recharged water before it reaches the nearest third party well. This component would have a beneficial impact on delivered water quality in the Coastal Distribution System.

In addition to the considerations above, continued requirements to comply with Title 22 requirements, and CCRWQCB reclamation permits, and implementation of PVWMA and the City’s ongoing monitoring and adaptive management of the Recycled Water Facility and Coastal Distribution System will ensure that surface waters are protected, and that potential impacts to surface or groundwater quality would be less than significant.

**College Lake with Inland Pipeline to CDS**

The proposed component would send filtered water from College Lake during the summer through a new pipeline to the Recycled Water Facility to supply the Coastal Distribution System. Total system water flow into the conveyance pipeline from the College Lake would range from 1,500 gallons per minute (gpm) to 6,000 gpm (or 3.3 to 13.4 cfs). The project would provide a yield of approximately 2,400 acre-feet per year of water diverted at the exiting watershed weir/headgates. The estimated yield includes the volume of the lake of 2,000 acre-feet, plus an estimated inflow of 700 acre-feet during the irrigation season, minus an estimated outflow of 300 acre-feet to satisfy proposed minimum flow requirements downstream for steelhead habitat. Water-quality monitoring at the headgate outfall by PVWMA since 2003 shows TDS concentrations ranging between 100 mg/L and 650 mg/L.
(Table 3.9-7) with means in the low 400’s. As with the Pajaro River, TDS is flow dependent with higher concentrations at lower flows. Nitrate concentrations were less than the State Title 22 Primary MCL drinking water standard of 10 mg/L. The quality of water from College Lake is better than previously delivered water from other sources during 2011 and 2012, and thus when blended, would be expected to improve the quality of delivered water.

Compliance with Title 22 requirements, and CCRWQCB reclamation permits, and continuation of PVWMA and the City’s ongoing monitoring and adaptive management of the Recycled Water Facility and the Coastal Distribution System will ensure that surface waters are protected, and that potential impacts to surface or groundwater quality would be less than significant.

Murphy Crossing with Recharge Basins

The Central Coast Regional Basin Plan has set an annual mean TDS water-quality objective of 1,000 mg/L for the Pajaro River at Chittenden, 7.1 miles upstream of Murphy Crossing. At flows proposed for diversion and groundwater recharge (>45 to 90 cfs), TDS is less than 1,000 mg/L and significantly less than receiving groundwater in the vicinity of proposed Murphy Crossing recharge basins (Figure 3.9-21). This is also the case for nitrate, sulfate, and chloride (Figure 3.9-23, -24, -25, -26). This proposed BMP Update component would, therefore, improve the groundwater quality in the vicinity and downgradient of the proposed recharge basins.

3.9.4.4 Localized Changes in Historical (or Baseline) Groundwater Levels

Impact HWQ-3: Overall, the BMP Update will raise groundwater levels in the basin. Higher groundwater levels will result in reduced pumping costs and marginally greater pumping rates from existing pumps in wells. Therefore, the BMP Update has an overall beneficial impact on groundwater levels. The College Lake component of the BMP Update, however, may seasonally reduce groundwater levels from their baseline elevations at localized areas downstream of the lake. In these areas, project operation could decrease the annual production rate of existing nearby irrigation wells due to localized drawdown. Under extreme conditions, existing or planned land use(s) may not be fully supported. If pumping rates are reduced to the extent that land uses cannot be fully supported, this would represent a potentially significant impact that can be reduced to a less-than-significant level with mitigation. This impact, however, is unlikely; and would only occur locally only in some years and seasons.

Increased Recycled Water Storage at WWTP

This BMP Update component would have only beneficial impacts on groundwater levels and well pumping ability because it involves increases in recycled water deliveries and no additional diversions from surface or extractions groundwater aquifers.

Harkins Slough Recharge Facilities Upgrades

New wells installed as part of the Watsonville Slough project will extract more groundwater from the perched aquifer than is currently extracted; however that extraction will occur after the same amount or more of additional recharge in the associated recharge basin has been verified by metering and monitoring. No additional net groundwater extraction will occur.
Figure 3.9-37 shows the approximate locations of existing irrigation wells near the Harkins Slough recharge and extraction facilities. Most of these wells extract water from the regional aquifer below the confining (or semi-confining) clay. Therefore, the increased aquifer recharge from the slough diversions and extraction that would occur with implementation of this component will not result in an adverse impact on groundwater levels, groundwater quality, or on the annual production rate of nearby wells. This component therefore has a less than significant impact on groundwater levels.

Watsonville Slough with Recharge Basins

New wells installed as part of the Watsonville Slough project will extract more groundwater from the perched aquifer than is currently extracted; however that extraction will occur after the same amount or more of additional recharge in the associated recharge basin has been verified by metering and monitoring. No additional net groundwater extraction will occur.

Figure 3.9-37 shows the approximate locations of existing irrigation wells near the Watsonville Slough recharge and extraction facilities. Most of these wells extract water from the regional aquifer below the confining (or semi-confining) clay. Therefore the increased aquifer recharge from the slough diversions and extraction that would occur with implementation of this component will not result in an adverse impact on groundwater levels, groundwater quality, or on the annual production rate of nearby wells. This component therefore has a less than significant impact on groundwater levels.

College Lake with Inland Pipeline to CDS

The College Lake component could locally lower groundwater levels by seasonally reducing recharge from Salsipuedes Creek in some years. During normal and wet winters, the College Lake with Inland Pipeline to CDS component will likely have no impact on groundwater levels. Once the weir is overtopped, any amount of water entering College Lake will be matched by an equivalent amount of water leaving College Lake. This is similar to existing conditions, resulting in no net loss of flow in Salsipuedes Creek during winter months.

There may be some reduced flow in Salsipuedes Creek in the fall, as College Lake is filling. Because more water will be required to fill College Lake after this component is built, it may take longer before the weir is overtopped. In some years, while College Lake is filling behind the new higher weir during this fall/winter time period, there will be reduced flow downstream in Salsipuedes Creek after project implementation than in the baseline existing condition. This intermittent potential reduction in recharge and lower groundwater levels in the areas recharged in the downstream creeks and Pajaro River will only be seasonal; however, it has the potential to impact pumping rates of wells that rely on recharge from Salsipuedes Creek. Therefore, this component has a potentially significant impact on groundwater levels or pumping rates in wells near Salsipuedes Creek. A map showing the approximate locations of wells that may be impacted is shown on Figure 3.9-38. However, with implementation of Mitigation HWQ-3 (below), this impact would be reduced to a less-than-significant level.

Mitigation Measure(s):

Mitigation Measure HWQ-3. If pumping rates in existing wells fall below levels that can support existing or planned land uses, and the reduction in pumping can be attributed to one or many of the project components, then one of several measures may be undertaken to mitigate the loss of pumping. These mitigation measures may include:

1. Improving irrigation efficiency
2. Modifying irrigation and agricultural operations
3. Lowering the pump in the irrigation well
4. Lowering and changing the pump in the irrigation well
5. Adding storage capacity for irrigation supply
6. Replacing or reconditioning the irrigation well
7. Replacing the irrigation water source

To determine if well production loss can be attributed to one of the project components, the PVWMA will allow well owners to enroll in a monitoring and mitigation program (MMP). PVWMA will collect baseline data necessary for establishing significant impacts only from wells that are enrolled in the MMP. If a well is not enrolled in the MMP, to claim a significant impact the well owner will need to provide adequate and reliable baseline data. To claim a significant impact for each well enrolled in the MMP, PVWMA will first establish baseline irrigation well extraction rates, drawdowns, and water quality near planned components. Pumping rate reductions and changes in water quality from these baseline values will be analyzed to assess whether or not they are caused by the project. A pumping rate reduction or adverse change in water quality is assumed to be caused by the Project if: 1) it occurs at the same time as the onset of operations of BMP Update component(s); 2) it occurs in an area reasonably predicted to be affected by the BMP Update component(s); 3) static groundwater levels have dropped; 4) pumping groundwater levels have not dropped more than static groundwater levels; and 5) no other obvious reason exists for the drop in production capacity. For PVWMA or others to identify another reason for loss of production it must be based on the written professional opinion of a qualified hydrogeologist that will be submitted to the PVWMA staff or their designee, for review and concurrence.

**Murphy Crossing with Recharge Basins**

The Murphy Crossing with Recharge Basins component was assessed as to whether it could locally lower groundwater levels by reducing recharge from the Pajaro River downstream of Murphy Crossing. Water diverted at Murphy Crossing could reduce the amount of river flow available for infiltration. Because minimum flows must be maintained in the Pajaro River for habitat and relatively high flows in the river are needed to have the required water quality in diverted water, it is unlikely that the diversions at Murphy Crossing will reduce flows enough to have a significant impact on groundwater levels below Murphy Crossing. Under the worst case scenario, the component will divert 5.0 cfs at Murphy Crossing from a total river flow of 45 cfs. Data produced by Hecht and others (2010, figure 3A) suggest that the seepage rate from the Pajaro River into the shallow groundwater upstream from Murphy Crossing are relatively constant over a range of river flows between approximately 7.0 and 40 cfs. This suggests that reducing stream flows will have little impact on stream recharge and no measurable effect on groundwater levels. Additionally, the continuous blue clays found downstream from the Murphy Crossing area limit percolation to the developed aquifers. Based on the above information, wells in

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22 As discussed in the Section 2, Project Description, and previously in this section, diversions would occur only when the flows are above 45 to 90 cubic feet per second.
the vicinity of Murphy Crossing would not be significantly impacted by lowered groundwater levels that may be induced by this component.

3.9.4.5 Increased Flood Hazards

**Impact HWQ-4:** Development of BMP Update components may expose people and structures to flood hazards or impede or redirect flood flows because many of the BMP Update facilities are located within the FEMA 100-year flood hazard zones. This potentially significant impact can be reduced to a less-than-significant level with mitigation measures identified in this EIR. In addition, these impacts may be exacerbated by climate change in the cumulative.

**Mitigation Measure(s):**

*Mitigation Measure HWQ-4:* Facilities shall be designated to comply with FEMA and County of Santa Cruz requirements to floodproof the facilities and shall not exacerbate upstream or downstream flood hazards on other properties. The FEMA process will require identification of the FEMA floodway zone and may require no increase water elevations for a one percent chance annual flood. The FEMA process will require identification of the FEMA zone type and may require no increase water elevations for a one percent chance annual flood. To meet the specific FEMA requirements for the component, substantial modifications to the facility design and additional mitigation may be required.

**Increased Recycled Water Storage at Treatment Plant**

This BMP Update component proposes to increase on-site storage for recycled water by adding two 1-MG storage tanks, located at the existing treatment plant site immediately south of the existing 500,000 gallon storage tank, at the same relative elevation. The entire treatment plant is within a 100-year flood hazard zone; however, the site has been improved with a ring levee to protect the treatment facilities. Final design and placement of the two additional tanks would include analysis of the effects to the floodway and existing treatment plant facilities and provide appropriate mitigation.

During construction, equipment and material stockpiles may be exposed to flood conditions, which may exacerbate local flood conditions by temporarily constricting capacity and small changes to flood elevations. The effects would be temporary and unlikely to be significant, in particular, if construction activities will be during the dry season.

Currently, this component proposes permanent facilities located within a 100-year flood hazard zone, resulting in the potential for structures to impede or redirect flood flows. Although the proposed component facilities would not be habitable structures in which people would be residing, a potentially significant risk of loss involving flooding may be associated with damage during a flood event. This is significant impact that can be reduced to less-than-significant with implementation of Mitigation Measure HWQ-4.

**Harkins Slough Recharge Facilities Upgrades**

During construction equipment and material stockpiles may be exposed to flood conditions, which may exacerbate local flood conditions by temporarily constricting capacity and small changes to flood elevations. The
effects would be temporary and unlikely to be significant, in particular, if construction activities will be during the dry season.

Currently, this component proposes permanent facilities located within a 100-year flood hazard zone, resulting in the potential for structures to impede or redirect flood flows. Although the proposed component facilities would not be habitable structures in which people would be residing, a potentially significant risk of loss may be associated with a flood event. It is likely that the facility will not be operated for some weeks or months following major floods, due simply to flotsam and other physical hazards as well as the need to test waters for contamination. It may be useful to conduct additional water-quality monitoring following a flooding event so that suitable operational mitigations can be prepared. The recharge basin sites are outside the FEMA 100-year flood hazard zone. This is significant impact that can be reduced to less-than-significant with implementation of Mitigation Measure HWQ-4.

**Watsonville Slough with Recharge Basins**

During construction equipment and material stockpiles may be exposed to flood conditions, which may exacerbate local flood conditions by temporarily constricting capacity and small changes to flood elevations. The effects would be temporary and unlikely to be significant, in particular, if construction activities will be during the dry season.

Currently, this component proposes permanent facilities located within a 100-year flood hazard zone, resulting in the potential for structures to impede or redirect flood flows. Although the proposed component facilities would not be habitable structures in which people would be residing, a potentially significant risk of loss involving flooding may be associated with damage during a flood event. It is likely that the facility will not be operated for some weeks or months following major floods, due simply to flotsam and other physical hazards as well as the need to test waters for contamination. It may be useful to conduct additional water-quality monitoring following a flooding event so that suitable operational mitigations can be prepared. The recharge basin sites are outside the FEMA 100-year flood hazard zone. This is significant impact that can be reduced to less-than-significant with implementation of Mitigation Measure HWQ-4.

**College Lake with Inland Pipeline to CDS**

The proposed BMP Update includes construction of a new adjustable weir structure at a higher elevation downstream of the existing headgate. The new outlet weir would raise the College Lake outlet elevation by 2.3 feet to 62.5 feet (NGVD29), increasing the inundated area from 234 acre feet to 272 acres (Figure 3.9-31) and the total storage capacity to approximately 2,000 acre-feet (CH2MHill, 1999). At 62.5 feet, the USACE stage-capacity curve estimates the storage capacity of College Lake at 1,700 acre-feet (USACE, 2007). The project would require purchase of a flood easement on the 38 additional acres that could be flooded annually. The precise location, dimensions and use of any private property affected by these projects will depend upon meeting environmental concerns, confronting the many issues raised by the agencies whose permits or review are required, seeking financing and partnership arrangements and securing necessary property interests after paying just compensation for such interests. At first approximation (Figure 3.9-31), at the new headgate elevation of 62.5 feet, the upstream flooding would be at a lower elevation than the surface of Paulsen Road, but channel tailwaters and surface ponding is anticipated north of Paulsen Road. This could have the potential for additional sedimentation in Casserly Creek and other smaller channels and ditches at Paulsen Road. Existing sedimentation
of culverts and inflow channels is apparent, and the higher proposed lake level would likely exacerbate this condition.

The existing Federal Emergency Management Agency's (FEMA) 100-year flood zone around College Lake is identified in Figure 3.9-31. The proposed filtration and pumping facilities which would likely be located near the College Lake outlet channel, including potentially on the elevated area on the south bank, and would occupy up to one acre potentially partially within the 100-year flood zone. An additional evaluation will be conducted to identify its final location, including consideration for moving the proposed filtration plant site outside the 100-year flood zone.

During construction equipment and material stockpiles may be exposed to flood conditions, which may exacerbate local flood conditions by temporarily constricting capacity and small changes to flood elevations. The effects would be temporary and unlikely to be significant if construction activities will be during the dry season.

Currently, this component proposes permanent facilities located within a 100-year flood hazard zone, resulting in the potential for structures to impede or redirect flood flows. Although the proposed component facilities would not be habitable structures in which people would be residing, a potentially significant risk of loss involving flooding may be associated with damage during a flood event. This is a significant impact that can be reduced to a less than significant level with Mitigation Measure HWQ-4.

**Murphy Crossing with Recharge Basins**

The infiltration gallery of this component would collect groundwater under the influence of (or recharged by) surface water. It has the advantage over a surface-water diversion by drawing along a length of the reach rather than at a point, and drawing water through the river bed, which filters the water as it percolates into the ground, removing coarse material and eliminating entrainment of living macro organisms. Though the conceptual design of the facility is pending, a common and likely design for the facility is a Ranney-type collector well. Water would be pumped from a vertical 13-foot diameter caisson near the bank of the river, which would be located within the FEMA 100-year flood hazard zone for the Pajaro River. The 13-foot diameter caisson typically rises above the 100-year flood elevation and design of the facility would include analysis effects to the floodway and provided appropriate mitigation. Other infiltration gallery methods or the installation of a series of water wells near the river bank may have a smaller ‘footprint’ within the FEMA 100-year flood hazard zone.

During construction equipment and material stockpiles may be exposed to flood conditions, which may exacerbate local flood conditions by temporarily constricting capacity and small changes to flood elevations. The effects would be temporary and unlikely to be significant in particular, if construction activities will be during the dry season.

Currently, this component proposes permanent facilities located within a 100-year flood hazard zone, resulting in the potential for structures to impede or redirect flood flows. Although the proposed component facilities would not be habitable structures in which people would be residing, a potentially significant risk of loss involving flooding may be associated with damage during a flood event. This is a significant impact that can be reduced to a less-than-significant level with Mitigation Measure HWQ-4.
3.9.4.6 Reduction of Ocean Discharges

Operation of BMP Update components would result in a reduction of volume of treated wastewater discharged into the Pacific Ocean. This represents a beneficial impact and no mitigation is required or recommended.

**Increased Recycled Water Storage**

The Recycled Water Facility (RWF) implemented in 2009, can deliver up to 4,000 acre-feet per year of tertiary treated, disinfected, recycled water through the CDS during the irrigation season. Water not recycled is sent through the City of Watsonville’s ocean outfall after secondary treatment. The RWTF has not produced to its potential capacity of 4,000 acre-feet per year because (a) the demand for recycled water is greater than the availability during daylight hours, and (b) there is insufficient demand during nighttime and in the ‘shoulder’ periods before and after the peak irrigation season. Increased storage is estimated to deliver approximately 750 acre-feet per year (AFY) of recycled water, and the remaining 1,250 AFY of additional recycled water will need to be delivered at night and during the shoulder periods to fully utilize the 4,000 AFY available. The BMP Update proposes strategies to increase recycled water deliveries during the nighttime of the irrigation season by approximately 1,000 AFY, and shoulder period recycled water deliveries by approximately 250 AFY, for a total of 1,250 AFY increased deliveries. Therefore, operation of BMP Update components would result in a reduction of ocean discharge of treated wastewater by approximate 2,000 acre-feet per year below current amounts discharged into the Pacific Ocean.

**Harkins Slough Facilities Upgrades**

*Not applicable*

**Watsonville Slough with Recharge Basins**

*Not applicable*

**College Lake with Inland Pipeline to CDS**

*Not applicable*

**Murphy Crossing with Recharge Basins**

*Not applicable*

### 3.9.5 Overall Combined BMP Update

As identified in this section, implementation of the overall combined BMP Update would have potential significant surface water, ground water, and water-quality impacts. However, all potential impacts would either be less than significant or reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR. Implementation of the BMP Update components would result in improved groundwater conditions by reducing seawater intrusion and basin overdraft as documented in the BMP and . This represents a beneficial impact and no mitigation is required or recommended.
Mean annual precipitation (1880 - 2012) = 22.2 inches

Multiyear droughts are shaded black (recently 2007-09, 1987-82, and 1976-77).

Data source: California Data Exchange Center station WTW. Missing data from 1942 to 2012 correlated to NOAA National Climatic Data Center station 049473; no data for 1932.

Watsonville Precip 8-5-2013.xlsx: Annual chart (1881) b&w

Title: Annual Precipitation Fluctuations
Date: October 2013
Project: 2012-48

Figure 3.9-1
Pajaro Basin Reference Evapotranspiration Variability

Explanation

- Cities & Towns
- Faults
- Pajaro River
- Streams
- Water Bodies
- PVWMA Boundary

ET Variability*

Average Annual (inches)

- Less than 40
- 40 - 41
- 41 to 43
- 43 to 45
- Greater than 45

*PVHM dataset, Hansen et al, 2013

Sources: ESRI, DeLorme, NAVTEQ, TomTom, Intermap, Increment P Corp, GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster-NL, Ordnance Survey, ESRI Japan, METI, ESRI China (Hong Kong), swisstopo, and the GIS User Community
Figure: Pajaro River and Corralitos Creek Monitoring Stations

Date: October 2013

Project: 2012-48
Figure 3.9-6


212177 Pajaro R at Chittenden 8-5-2013 xlsx annual peak chart b&w
Instantaneous Peak Discharge (cfs)

Water Year


Annual Peak Streamflow for the Pajaro River at Chittenden, California, Water Years 1940 to 2012

Date: October 2013
Project: 2012-48
Title: Primary and Channel Recharge Areas
Date: October 2013
Project: 2012-48

Explanation:

- Cities & Towns
- Pajaro River
- Streams
- Water Bodies
- PVWMA Boundary

Recharge Type (HEA, 1978)
- Channel Recharge
- Primary Recharge

Area Designation (USGS, 1972)
- North
- East
- South

*Arrows indicate flow direction

Boron Concentration in Groundwater Pajaro River Area

Explanation
- Sampled Wells
- Boron Contour
- Boron Contour Questionable
- San Andreas Fault Trace
- PVWMA Boundary

Data Source: HEA, 1978

Title: Boron Plume Identifies Sources and Fate of Pajaro River Recharge Within Overall Basin Budget
Date: October 2013
Project: 2012-48

Figure 3.9-8
Pajaro Basin Confining and Semi-Confining Clay Distribution

Title: Pajaro Basin Confining and Semi-Confining Clay Distribution
Date: October 2013
Project: 2012-48

Explanation

- Cities & Towns
- Faults
- Pajaro River
- Streams
- Water Bodies
- Clays in Alluvium*
- Clays in Terrace Deposits*
- PVWMA Boundary

*Data Source: HEA, 1978

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCan, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community.

Figure 3.9-9
Interconnecting aquifers consisting of alluvium, terrace and dune deposits, and the upper portion of the Aromas sands comprise the main groundwater body of the Pajaro Valley. Perched groundwater is found in areas above the blue clay deposits of the alluvial unit and is significant as a potential source of degraded water quality to the heavily used basal aquifer. Deeper wells (not shown) draw groundwater from the lower Aromas Formation and the upper Purisima Formation. Source: Hecht and others, 1984.
Figure 3-9 hydrology: Daily mean streamflow for the Pajaro River at Chittenden and Murphy Crossing, water years 2002 through 2006.

Data source: U.S. Geological Survey Chittenden Station No. 11158000, Murphy Crossing data from Prof. Andy Fisher at U.C. Santa Cruz (Hatch and others, 2010; Ruehl and others, 2005). Applicable for central coast rivers, water year types are characterized each year by Monterey Peninsula Water Management District and are based on flow in Carmel River.

Murphy Crossing with Recharge Basin Component proposes diverting up to 5 cubic feet per second (cfs) from the Pajaro River between December and May and when flows are greater than 45 to 90 cfs.

Following seasonal storms, flows recede during the dry season and can be zero flow at Murphy Crossing, located downstream of Chittenden.
Water levels fluctuate from wet-season recharge and dry-season drawdown with some differentiation across year types.

Data source: Pajaro Valley Water Management Agency. Formal water-year type by Monterey Peninsula Water Management District are based on flow in Carmel River.
Figure 3.9-15

Title: Metered Wells and Turnout Locations

Date: October 2013

Project: 2012-48

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P. Corp., GEBCO, USGS, FAO, NPS, HRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community.
Maximum Total Dissolved Solids Concentration Contours


Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, Increment P.Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community.
Pajaro Basin Chloride Concentration in Groundwater

Explanation

- Cities & Towns
- Faults
- Pajaro River
- Streams
- Water Bodies
- PVWMA Boundary

Chloride

Max Concentration (mg/L)

- 8 - 100
- 101 - 250
- 251 - 500
- >500


Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P-Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community.
File: P:\DDA\Current Projects\2012-48 PVWMA BMP CEQA\Public Review Draft EIR\Working Draft EIR\Figures\3-9 hydrology\Maximum Nitrate Concentration Contours

Title: Maximum Nitrate Concentration Contours

Date: October 2013

Figure 3.9-19

Pajaro Basin Nitrate-NO3 Concentration in Groundwater

Explanation

- Cities & Towns
- Faults
- Pajaro River
- Streams
- Water Bodies
- PVWMA Boundary

Nitrate as NO3 - Max
Max Concentration (mg/L)

- 0.5 - 10
- 11 - 45
- 46 - 100
- >100


Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community.
Total dissolved solids in groundwater collected from water wells in the East Area aquifer. While data are sparse, an overall increase in TDS over time is apparent at a rate that might be characterized as about 30 to 50 mg/L per decade. Though there is no CCRWQCB groundwater objective for the Pajaro Valley, the annual mean water quality objective for Pajaro River at Chittenden is 1,000 mg/L. Source: PVWMA data cited in Hecht and others, 2010.
Total Dissolved Solids in the Pajaro River has increased since the period 1952 to 1992, increasing problems for agricultural irrigation, but at flows proposed for diversion and groundwater recharge TDS is significantly less than receiving groundwater in the vicinity of proposed Murphy Crossing recharge basins. Additional increases would be subject to upstream land use changes and discharges to the Pajaro River. Data source: Pajaro Valley Water Management Agency and U.S. Geological Survey.
Crop yield is dependent on the salinity of irrigation and soil, as well as the tolerance of the crop. Source: Tyler and Collins (1984). Most crops currently grown in the Pajaro Valley are moderately tolerant (ECw = 3 to 5 mmhos/cm). A TDS concentration of 1000 mg/L, or ECw-Water of about 1.6 mmhos/cm should not affect yields of these crops.
Nitrate concentrations have increased since measurements during the period 1952 to 1992, largely owing to agricultural runoff and discharges of treated wastewater to the Pajaro River. At flows proposed for diversion and groundwater recharge, nitrate concentrations are below MCL. Data source: Pajaro Valley Water Management Agency and U.S. Geological Survey.
Average of groundwater samples from PVWMA monitoring well 238, located downgradient of the proposed Murphy Crossing recharge basins = 32 mg/L as N.

Concentrations are lowest during wet-season when diversions at Murphy Crossing would occur for groundwater recharge. Background concentrations of receiving groundwater in the vicinity of proposed recharge basins are significantly higher than in the Pajaro River. Data source: Pajaro Valley Water Management Agency.
At flows proposed for diversion and groundwater recharge, sulfate concentrations are below the Central Coast Basin Plan surface water quality objective and well below concentrations in receiving groundwater in the vicinity of the proposed Murphy Crossing recharge basins. Data source: Pajaro Valley Water Management Agency and U.S. Geological Survey.
Chloride Concentrations in the Pajaro River

At flows proposed for diversion and groundwater recharge, chloride concentrations are below Central Coast Basin Plan surface water objectives, guidelines for irrigation, and concentrations in receiving groundwater in the vicinity of the proposed Murphy Crossing recharge basins. Data source: Pajaro Valley Water Management Agency and U.S. Geological Survey.
Sodium Concentrations in the Pajaro River

At flows proposed for diversion and groundwater recharge, sodium concentrations are below Central Coast Basin Plan surface water objectives, but can be slightly above guidelines for irrigation and concentrations in receiving groundwater in the vicinity of the proposed Murphy Crossing recharge basins. Data source: Pajaro Valley Water Management Agency and U.S. Geological Survey.
Boron toxicity in many agricultural areas is traceable to use of irrigation waters with boron content in excess of 1 mg/L. Boron concentrations less than 0.5 mg/L is generally satisfactory for all crops (U.C. Ag. Extension).

Diversions are proposed for up to 5 cfs when flows are greater than 45 to 90 cfs.

The primary source of boron in the Pajaro R. is fault related and concentrations are highest when flows are low. At flows proposed for diversion and groundwater recharge, boron concentrations in the Pajaro R. are generally similar to concentrations in receiving groundwater in the vicinity of the proposed Murphy Crossing recharge basins, and below water quality objectives. Data source: Pajaro Valley Water Management Agency and U.S. Geological Survey.

Title: Boron Concentrations in the Pajaro River
Date: October 2013
Project: 2012-48

Figure 3.9-28
The introduction of the Pennywort has limited the ability to pump at full capacity due to concerns of entraining plant material in the pumps and/or clogging the pump screens. Additionally, accumulated sediments have built up at the pump station. Initial remedial actions have been taken by PVWMA in 2012. Photo: B. Hecht, June 2012
Under existing conditions, pumping from College Lake to Salsipuedes Creek commences between mid-March and May 1st, depending on the amount of late season rainfall, and is completed by November 1st (Allen Harryman, College Lake Reclamation District, personal communication, 2012 BMP). Source data: Pajaro Valley Water Management Agency.
Water elevation in 3/18/2009 aerial photo was 61.1 ft. at outflow station. All elevations are NAVD88. Contour elevations based on LIDAR from Santa Cruz County, spot corrected with cbc survey data, aerial observations and field inferences. Acreages shown are for a continuous lakebody and exclude isolated ponding in the riparian woodland on the Casserly Creek delta and channel tail waters north of Paulsen Rd.
Total Dissolved Solids in College Lake

Data source: Pajaro Valley Water Management Agency.

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Date: October 2013
Project: 2012-48

Figure 3.9-32
The diagram shows the boron concentrations in College Lake from 2003 to 2013. Boron toxicity in many agricultural areas is traceable to the use of irrigation waters with boron content in excess of 0.75 mg/L. Boron concentrations less than 0.5 mg/L are generally satisfactory for all crops (U.C. Ag. Extension). Data source: Pajaro Valley Water Management Agency.
Sulfate Concentrations in College Lake

Data source: Pajaro Valley Water Management Agency.

Figure 3.9-34

Date: October 2013
Project: 2012-48
Nitrate Concentrations in College Lake

Data source: Pajaro Valley Water Management Agency.

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Date: October 2013
Project: 2012-48

Figure 3.9-35
Pajaro Basin
Managed Aquifer Recharge
Relative Suitability

Explanation

- Cities & Towns
- Faults
- Pajaro River
- Streams
- Water Bodies
- PVWMA Boundary

Recharge Sites

Site Type
- Existing
- Proposed

MAR Relative Suitability*

- High
- Low

*Data Source: Russo et al, 2013
Note: The "Domestic Wells" on this figure are shown in the centroid of the relevant parcels. Specifically, the point is located within the correct parcel, but not necessarily the correct location within the parcel. Also, the domestic wells shown may be repeats of metered wells and City of Watsonville production wells; in addition, some may be inactive or destroyed; therefore, some wells may be represented twice.
Title: Metered and Domestic Wells Near College Lake with Inland Pipeline to CDS Component

Date: 10/15/2013

Scale: 1 inch = 0.4 miles

Project: 2012-48

Note: The "Domestic Wells" on this figure are shown in the centroid of the relevant parcels. Specifically, the point is located within the correct parcel, but not necessarily the correct location within the parcel. Also, the domestic wells shown may be repeats of metered wells and City of Watsonville production wells; in addition, some may be inactive or destroyed; therefore, some wells may be represented twice.
3.10 NOISE AND VIBRATION

3.10.1 ENVIRONMENTAL SETTING

3.10.1.1 Regional Setting

Noise Definitions

Noise is defined as unwanted or objectionable sound. State and local regulations define objectionable noise levels and identify land use compatibility standards. The following analysis describes the characteristics of sound, the location of sensitive noise receptors, and the existing/future noise environment.

Sound is comprised of three variables: magnitude, frequency, and duration. The magnitude of air pressure changes associated with sound waves results in the quality commonly referred to as "loudness." Variations in loudness are measured on the "decibel" (dB) scale. On this scale, noise at zero decibels is barely audible, while noise at 120 to 140 decibels is painful and may cause hearing damage. These extremes, however, are not encountered in commonplace environments. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities.

The second characteristic of sound is frequency. The human ear responds to frequencies that are in the range of 20 to 20,000 hertz. Within the audible range, subjective response to noise varies. People generally find higher pitched sound to be more annoying than lower pitched sounds. Noise is typically characterized using the A-weighted sound level or dBA. This scale gives greater weight to the frequencies to which the human ear is most sensitive.

The third characteristic of noise is duration. Annoyance due to noise is often associated with how long noise persists. To adequately describe a noise environment, it is necessary to quantify the variation in noise levels over time. Acoustical engineers often use a statistical approach that specifies noise levels that are observed to be exceeded over a given percentage of time.

For evaluating noise over extended periods, the "Day-Night Noise Level" scale (DNL or Ldn) or "Community Noise Equivalent Level" (CNEL) are measures of the average equivalent sound level (Leq) during a 24-hour period. The Leq can be thought of as the steady sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period. The CNEL and Ldn account for greater sensitivity of noise receptors at night by penalizing noise occurring during evening and nighttime hours.

Regional Setting

Most of the facilities associated with the project are located in open areas characterized by ambient noise levels of less than 60 dBA CNEL. Ambient noise levels in excess of 60 dBA CNEL are encountered in areas that are adjacent to major roadways such Highway 152, Highway 129 (Riverside Drive), and Highway 1. Because the
majority of the BMP Update component areas are in agricultural use, tractors and other farm equipment and machinery also generate noise during the daytime hours.

The primary sources of noise in the project area are generated by traffic on major roadways, aircraft utilizing the Watsonville Municipal Airport, and rail activities. Ambient noise levels within the City of Watsonville area were measured as part of the City’s General Plan. Noise levels in the higher activity portions of the City range from about 51 to 68 dBA CNEL. Undeveloped areas are expected to have relatively low noise levels on the order of 50 dBA or less.

Groundborne Vibration. No major existing sources of groundborne vibration were identified in the project area. Vehicle traffic on area roadways, particularly heavy-duty trucks, can result in increased groundborne vibration. However, groundborne vibration levels associated with vehicle traffic are typically considered minor and would not exceed applicable criteria at the project site boundaries.

Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both duration and insulation from noise) and the types of activities typically involved. Residential areas, schools, and hospitals generally are more sensitive to noise than commercial and industrial land uses. The majority of project construction would occur in open agricultural areas, with few nearby noise-sensitive receptors. Figure 3.3-1 (from Section 3.3 Air Quality and Greenhouse Gas of this EIR) identifies residential areas and other sensitive land uses in the vicinity of individual component sites.

3.10.1.2 Regulatory Setting

Applicable objectives, goals and policies from the Santa Cruz County General Plan/Local Coastal Program and the City of Watsonville General Plan are presented below. The only proposed BMP Update component located in Monterey County is the diversion structure for the Murphy Crossing with Recharge Basins component and no sensitive noise receptors are located near that site; therefore, Monterey County noise policies are not presented here.

County of Santa Cruz General Plan/Local Coastal Program

The health and safety chapter of the Santa Cruz County General Plan addresses noise issues in Santa Cruz County. The health and safety chapter indicates that a noise level of up to 55 dBA Ldn is considered satisfactory for residential and commercial land uses. A noise level of up to 60 dBA Ldn is considered satisfactory for schools, libraries, churches, and hospitals (County of Santa Cruz, 1994). The health and safety chapter of the Santa Cruz County General Plan does not contain policies that specifically address construction noise.

City of Watsonville Vista 2030 General Plan

The Watsonville 2030 General Plan contains goals and policies to control noise emissions within the City, which includes the following:

Goal 13.8 Noise Hazard Control: Evaluate new and existing land uses in the City for compatibility related to noise effects and require, as appropriate, mitigation where harmful effects can be identified and measurable improvements will result. The policy statements for public safety are oriented toward reduction of risks to life and
property. It is recognized that good planning and management can reduce risk potential, but the City cannot be made risk free.

Policy 13.8.1 Noise: The City shall utilize land use regulations and enforcement to ensure that noise levels in developed areas are kept at acceptable levels, and that future noise-sensitive land uses are protected from noise that is harmful.

3.10.1.3 Setting by Component

**Increased Recycled Water Storage at Treatment Plant**

Proposed facilities under this component include installation of two 1 million gallon storage tanks at the Recycled Water Facility (RWF), 500 feet of 24” diameter pipeline from the RWF to the CDS, and distribution pumps at the RWF. The improvements are proposed at the RWF on previously disturbed lands. Existing noise sources in the area consist of operations at the Wastewater Treatment Plant and RWF, traffic along Beach Road, and agricultural operations. These improvements are located in a sparsely populated agricultural area with no nearby sensitive receptors, with the exception of a single residence along Beach Road located over 600 feet north of the site.

**Harkins Slough Recharge Facilities Upgrades**

The Harkins Slough Recharge Facilities Upgrades component consists of the installation of new shallow extraction wells at the recharge basin, upgrading the pump station and filters at the slough diversion, and construction of a new recharge basin. The recharge basin is proposed at two possible locations: the Southeast Recharge Basin and Monitoring Well #7 sites. The new recharge basins are proposed in sparsely populated agricultural areas with no nearby sensitive receptors. A few residences are located along the proposed pipeline alignment for the filter waste backwash, in the vicinity of San Andreas Road. In addition, an existing residence is located just west of the Harkins Slough Diversion pump station. The area is generally quiet with primary noise sources being agricultural operations.

**Watsonville Slough with Recharge Basins**

The Watsonville Slough with Recharge Basins component proposes to divert water from the Watsonville Slough during winter high flows and storing it in the surficial groundwater aquifer at the proposed North Dunes Recharge Basin and/or at alternative locations near the existing Harkins Slough Recharge Basin (Southeast Recharge Basin and Monitoring Well #7 sites). Water would be diverted just south of the Harkins Slough diversion or after passing through constructed wetlands, proposed by another agency, on an adjacent property. The water would be filtered, pumped to the recharge site through the Harkins Slough Recharge Facilities pipeline and through a new connecting pipeline, and then stored in the surficial aquifer. The new recharge basins are proposed in sparsely populated agricultural areas with no nearby sensitive receptors. See discussion above for Harkins Slough.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

The College Lake with Inland Pipeline to Coastal Distribution System (CDS) component proposes to increase the storage capacity of College Lake, allowing water to be captured, stored, and delivered for irrigation. This project would construct a screened inlet structure, a filter supply pump station, a sand filtration and disinfection system, a booster pump station, and a new outlet weir structure. These facilities would be located near the College Lake
outlet channel. Diverted water would be delivered to a filter supply pump station that would discharge the diverted water to a sand filtration system. This project would also include approximately 5.8 miles of a new water main to transport water from College Lake during the summer to the RWF storage tank to supply the CDS or directly to the CDS, with provisions to supply inland users along the new water main pipeline. The filtered and disinfected water would flow to the booster pump station that would provide the additional pressure needed to pump the water through a new conveyance pipeline to connect to the CDS or other inland agricultural water users. The 200-horsepower booster pumps would be located on a concrete pad near the sand filtration system.

Existing noise sources in the area consist of traffic along Highway 152 and operations of other uses along the highway, i.e., schools, fairgrounds, and agricultural operations. The noise sensitive receptors in the immediate vicinity of the booster pumps include a church and high school. Residential neighborhoods also extend south of the College Lake site near the intersection of Highway 152 and Holohan Road. Numerous sensitive receptors, including residences and schools, are located along various portions of the proposed conceptual pipeline from College Lake to the RWF.

Murphy Crossing with Recharge Basins

The Murphy Crossing with Recharge Basins component would divert water from the Pajaro River between December and May. The project includes the construction of an infiltration gallery, pump station, monitoring wells, recharge basins, and a connector pipeline from the pump station to the recharge basins. The recharge basins would be located just north of the intersection of Highway 129 and Murphy Road. The proposed pipeline would extend from the pump station at the Pajaro River to the recharge basins to the north. Existing noise sources in the area consist of traffic along Highway 152 and agricultural operations. Noise sensitive receptors in the project area are limited to a few residences located near the intersection of Highway 129 and Murphy Road.

3.10.2 SIGNIFICANCE CRITERIA

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- expose persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- expose persons to or generation of excessive groundborne vibration or groundborne noise levels;
- have substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- have a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels; or
- for a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.
For the purposes of this EIR, the project would normally have a significant adverse impact on the environment if it would substantially increase the ambient noise levels of adjoining areas. Short-term construction noise impacts of a project would be considered significant if:

- construction activities were to affect noise-sensitive receptors for a substantial amount of time;
- expected noise levels would endanger the hearing of receptors near the construction site; or
- construction activities would affect receptors during noise-sensitive periods.

### 3.10.3 IMPACTS AND MITIGATION MEASURES BY COMPONENT

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to all or multiple components are identified by potential significant impact. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are identified by component.

In general, operation of the proposed BMP Update components, including pump stations and associated pipelines would not result in the development of significant permanent new noise- or vibration-generating sources. Instead, project-related noise and vibration effects would be limited to construction equipment noise and construction-related traffic. Similarly, the facilities that would be constructed with implementation of the BMP Update are non-habitable infrastructure improvements so a review of the project in comparison to noise-land use compatibility standards would not be required.

#### 3.10.3.1 Construction Noise and Vibration Impacts

Construction of the BMP Update components would intermittently and temporarily generate noise levels above existing ambient noise levels and potentially result in vibration in the vicinity of each component. This impact would be less-than-significant. Implementation of proposed Construction Noise Minimization Practices identified below, would further reduce this less-than-significant impact.

**Construction Noise**

Construction activities would include site preparation work such as grading and excavation, facility construction, and paving. Construction techniques that generate the highest vibration levels, such as impact or vibratory pile driving, are not required for any of the BMP Update components. Noise levels during construction of each component would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment, and the distance of construction activities from sensitive receptors. The effect of construction noise would depend on how much noise would be generated by the equipment, the distance between construction activities and the nearest noise-sensitive uses, and the existing noise levels at those sensitive uses. Specific construction activities and sensitive receptors are described below for each component. As described in Section 2.5 of this EIR, PVWMA will incorporate the following Construction Noise Minimization Practices into plans and contract specifications to minimize noise and vibration and the associated effects on nearby sensitive receptors generated by project construction:
• Contractors shall comply with all local sound control and noise level rules and regulations, and shall notify residents and businesses within ¼ mile of the construction site prior to commencing construction activities.

• Equipment and trucks used for construction activities shall utilize the best available noise control techniques (including mufflers, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) in order to minimize construction noise impacts.

• Impact equipment (e.g., jack hammers, pavement breakers, and rock drills) used for construction activities shall be hydraulically- or electrically-powered whenever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used (such as drilling rather than impact equipment) whenever feasible.

• Stationary noise and vibration sources shall be located as far from sensitive receptors as possible. If they must be located near existing receptors, they shall be adequately muffled.

• Temporary walls may be erected at some locations to reduce noise impacts to residences adjacent to construction sites.

• Construction activities generating noise shall be limited to the hours of 8 a.m. to 5 p.m., Monday through Saturday.

**Construction Vibration**

For purposes of this analysis, excessive groundborne vibration that might result in a significant impact would be 0.2 inches per second, which is the level at which vibration would cause damage to masonry and wood timber buildings and which is recommended as the “architectural damage risk level for continuous vibration” by Caltrans and the U.S. Department of Transportation. (See “Transportation Related Earthborne Vibrations” (California Department of Transportation, 2002a) and “Transit Noise and Vibration Impact Assessment” (U.S. Department of Transportation, 2006). Construction of BMP Update components would generate groundborne vibration. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible vibration. Heavy trucks can also generate groundborne vibration, which varies depending on vehicle type, weight, and pavement conditions. The Federal Transit Authority has published standard vibration levels and peak particle velocities for construction equipment operations. The peak particle velocities (PPV) for typical construction equipment are listed in **Table 3.10-1**, below.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Approximate Peak Particle Velocity at 25 Feet (inches/second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Bulldozers</td>
<td>0.089</td>
</tr>
<tr>
<td>Loaded Trucks</td>
<td>0.076</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>0.035</td>
</tr>
<tr>
<td>Pile Driving</td>
<td>0.644</td>
</tr>
</tbody>
</table>
Vibration levels from construction equipment attenuate as they radiate from the source. The equation that determines vibration levels at a specific distance states:

\[
PPV_{\text{equip}} = PPV_{\text{ref}} \times (25/D)^{1.5}
\]

Where \(PPV_{\text{ref}}\) is the peak particle velocity at a reference distance of 25 feet, and \(D\) is the distance from the equipment to the sensitive receptor (U.S. Department of Transportation, May 2006). The closest sensitive receptors to the BMP Update component construction sites are anticipated to be at least 100 feet away from the acoustic center of construction at their closest point.

Construction would include construction activities such as loaded trucks, which experiences the greatest peak particle velocity values from construction equipment proposed for the BMP Update components. Table 3.10-1 states that a loaded truck produces peak particle velocities of approximately 0.076 inches per second at a reference distance of 25 feet. This vibration level would attenuate to approximately 0.01 inches per second, which would be barely perceptible and would be well under the threshold of 0.2 inches per second. Vibration levels due to construction activities would be below levels that could cause damage to structures, would not result in prolonged interference for sensitive receptors, and would be barely perceptible. For these reasons, construction vibration impacts would be less-than-significant.

**Increased Recycled Water Storage at Treatment Plant**

Ambient sound levels and vibration would temporarily increase during construction activities for this component. This component includes installation of two new 1 million gallon storage tanks, distribution pumps at the Recycled Water Facility (RWF), 500 feet of pipeline from the RWF to the CDS, and distribution pumps at the RFW. Construction activities are expected to last approximately 12 months. Construction techniques that generate high vibration levels, such as impact or vibratory pile driving, are not proposed for this BMP Update component; therefore no excessive vibration would be generated. Because these improvements are located in a sparsely populated agricultural area with no nearby sensitive receptors, this component would result in less-than-significant noise and vibration impacts that will be further reduced due to the proposed implementation of the Construction Noise Minimization Practices above that will be included in the project plans and specifications.

**Harkins Slough Recharge Facilities Upgrades**

The Harkins Slough Recharge Facilities Upgrades component consists of the installation of new shallow extraction wells at the recharge basin, upgrading the pump station and filters at the slough diversion, and construction of a new recharge basin. The recharge basin is proposed at two possible locations: the Southeast Recharge Basin and Monitoring Well #7 sites.

Construction activities are expected to last approximately 12 months. Noise levels during the period would fluctuate depending on the particular type, number, and duration of use of various pieces of construction.
equipment, and the distance of construction activities from sensitive receptors. The effect of construction noise would depend on how much noise would be generated by the equipment, the distance between construction activities and the nearest noise-sensitive uses, and the existing noise levels at those sensitive uses. A few residences are located along the proposed pipeline alignment for the new filter waste backwash, in the vicinity of San Andreas Road. In addition, an existing residence is located just west of the Harkins Slough Diversion pump station. Construction of the facilities in these areas could have short-term noise impacts on nearby residents, but the effects would be of limited duration for any particular residence. In addition, construction techniques that generate high vibration levels, such as impact or vibratory pile driving, are not proposed for this BMP Update component. This component would result in less-than-significant noise and vibration impacts that will be further reduced due to the proposed implementation of the Construction Noise Minimization Practices above that will be included in the project plans and specifications.

**Watsonville Slough with Recharge Basins**

The Watsonville Slough with Recharge Basins component proposes to divert water from the Watsonville Slough during winter high flows and storing it in the surficial groundwater aquifer at the proposed North Dunes Recharge Basin and/or at alternative locations near the existing Harkins Slough Recharge Basin (Southeast Recharge Basin and Monitoring Well #7 sites). Water would be diverted in a pipeline from Watsonville Slough diversion site that will be located in the area between its confluence with Harkins Slough north to the railroad tracks. The water would be filtered, pumped to the recharge site through the Harkins Slough Recharge Facilities pipeline and through a new connecting pipeline, then stored in the surficial aquifer at the existing Harkins Slough recharge basin or one or more of the three proposed new recharge basins. Construction activities are expected to last approximately 12 months. See discussion above for Harkins Slough. Construction of the facilities in these areas could have short-term noise impacts on nearby residents, but the effects would be of limited duration for any particular residence. In addition, construction techniques that generate high vibration levels, such as impact or vibratory pile driving, are not proposed for this BMP Update component. This is a less-than-significant noise impact that will be further reduced due to the proposed implementation of the Construction Noise Minimization Practices, described above, that will be included in the project plans and specifications.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

The College Lake with Inland Pipeline to Coastal Distribution System (CDS) component would construct a screened inlet structure, a filter supply pump station, a sand filtration and disinfection system, a booster pump station, and a new outlet weir structure near the College Lake outlet channel. This component includes the installation of approximately 5.8 miles of new water main from College Lake to the RFW.

Noise levels would increase during construction activities for this component. These noise levels would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment, and the distance of construction activities from sensitive receptors. The effect of construction noise would depend on how much noise would be generated by the equipment, the distance between construction activities and the nearest noise-sensitive uses, and the existing noise levels at those sensitive uses. Construction activities would be expected to last approximately 18 months. The only sensitive receptor in the immediate vicinity of the outlet channel is a church. There are also several residences located in the neighborhood just south of the site near the northwest corner of E. Lake Avenue and Holohan Road, about 500 feet from the outlet. Construction of the facilities near College Lake would have short-term noise impacts on nearby residents, but the effects would be of limited duration for any particular residence. In addition, construction techniques that generate high vibration
levels, such as impact or vibratory pile driving, are not proposed for this BMP Update component. This is a less-than-significant noise impact that will be further reduced due to the proposed implementation of Construction Noise Minimization Practices, described above, that will be included in the project plans and specifications.

The project also includes construction of a new pipeline along a 5.8-mile alignment between College Lake and the RWF. Construction of the pipeline could have significant short-term noise impacts on residents and schools located along the alignment (including portions along E. Lake Avenue, College Road, Lakeview Road, and Highway 129). The noise effects would be of limited duration for any particular receptor, and construction techniques that generate high vibration levels, such as impact or vibratory pile driving, are not proposed for this BMP Update component. Therefore, this component of the BMP Update would have less-than-significant noise and vibration impacts that will be further reduced due to the proposed implementation of Construction Noise Minimization Practices, described above, that will be included in the project plans and specifications.

**Murphy Crossing with Recharge Basins**

The Murphy Crossing with Recharge Basins component would divert water from the Pajaro River between December and May. The project includes the construction of an infiltration gallery, pump station, monitoring wells, recharge basins, and a connector pipeline from the pump station to the recharge basins. The recharge basins would be located just north of the intersection of Highway 129 and Murphy Road. The proposed pipeline would extend from the pump station at the Pajaro River to the recharge basins to the north.

Construction activities would be expected to last approximately 12 months. Noise levels would increase during construction activities. These noise levels would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment, and the distance of construction activities from sensitive receptors. The effect of construction noise would depend on how much noise would be generated by the equipment, the distance between construction activities and the nearest noise-sensitive uses, and the existing noise levels at those sensitive uses. The only noise sensitive receptors in the project area are a few residences located near the intersection of Highway 129 and Murphy Road. Construction of the pipeline and other improvements in these areas could result in short-term noise increases at these nearby residents. The noise effects would be of limited duration for any particular receptor, and construction techniques that generate high vibration levels, such as impact or vibratory pile driving, are not proposed for this BMP Update component. Therefore, this component would result in less-than-significant noise and vibration impacts that will be further reduced due to the proposed implementation of Construction Noise Minimization Practices that will be included in the project plans and specifications.

**3.10.3.2 Operational Noise and Vibration Impacts**

*Operation of pumping facilities for some of the BMP Update components would result in noise increases in the vicinity of these facilities. With proposed designs to enclose pumping facilities or provide acoustical treatments, this impact would be less-than-significant*

As described in Section 2 of this EIR, PVWMA proposes to design all pumping facilities with acoustical treatments (building enclosures, louvered vents, noise walls, etc.) to maintain noise levels at or below ambient levels. Based on common understanding of the facilities proposed, none of the BMP Update components would result in excessive vibration during operation.
3.10 Noise and Vibration

Increased Recycled Water Storage at Treatment Plant

Operation of new distribution pumps at the RWF associated with the additional water storage tanks would be consistent with the types of noise-generating sources already existing at the facility. The new pumps would represent an incremental increase in ambient noise levels. Given the lack of nearby sensitive receptors, this is a less-than-significant impact.

Harkins Slough Recharge Facilities Upgrades

The Harkins Slough Recharge Facilities Upgrades component includes upgrading the pump station and filters at the slough diversion. An existing residence is located about 125 feet west of the pump station; however, the proposed design of pumping and treatment facilities to include acoustical treatments, described above and in Section 2, Project Description, would ensure potential noise impacts remain at less-than-significant levels.

Watsonville Slough with Recharge Basins

The Watsonville Slough with Recharge Basins component includes operation of a new pump station and increased operation of filters at the existing Harkins Slough filtration facilities. An existing residence is located about 125 feet west of the pump station; however, the proposed design of pumping and treatment facilities to include acoustical treatments, described above and in Section 2, Project Description, would ensure potential noise impacts remain at less-than-significant levels.

College Lake with Inland Pipeline to Coastal Distribution System (CDS)

The College Lake with Inland Pipeline to Coastal Distribution System (CDS) component includes a new booster pump station. The 200-horsepower booster pumps would be located on a concrete pad near the sand filtration system. Operation of new booster pumps would generate a new noise source at this location. Noise from the new pumps would represent an incremental increase in ambient noise levels. Proposed pumping facilities have the potential to affect nearby sensitive receptors, depending on the ultimate siting and design of the pumping facility; however, the proposed design of pumping and treatment facilities to include acoustical treatments, described above and in Section 2, Project Description, would ensure this potential noise impact remains at a less-than-significant level.

Murphy Crossing with Recharge Basins

The Murphy Crossing with Recharge Basins component includes a new pump station at the Pajaro River near Murphy Crossing Road. Operation of new pump station would generate a new noise source at this location. However, given the lack of nearby sensitive receptors at this agricultural area near the Pajaro River, this is a less-than-significant impact.

3.10.4 Impacts and Mitigation Measures Overall Combined BMP Update

As identified in this section, construction and operation of the individual BMP Update components would not have significant noise or vibration impacts and similarly, implementation of the overall combined BMP Update would not have significant noise or vibration impacts.
3.11 TRANSPORTATION AND TRAFFIC

3.11.1 ENVIRONMENTAL SETTING

3.11.1.1 Regional Setting

Regional Roadway Network

The Pajaro Valley Basin area is served by a roadway network of state highways (including freeways) and county and local roads. Figure 3.11-1 presents the transportation network in the Watsonville area, highlighting the primary regional roadways.

Highway 1 is a four-lane divided freeway in the Basin area, to approximately one mile south of the Santa Cruz-Monterey County line, where it narrows to two lanes. Direct access to Highway 1 is provided by Highway 129 and Highway 152.

Highway 129 (Riverside Drive/Chittenden Road) provides east-west access through the project area, providing connection between Highway 1 (in Watsonville) and Highway 101. In the vicinity of the Pajaro Gap (near Granite Construction Company quarry and Chittenden Pass), Highway 129 is characterized by numerous curves, frequent changes in elevation, and narrow shoulders. In winter, rockfalls and mudslides commonly result in temporary closure of Highway 129 in the gap. The majority of Highway 129 is two lanes, except in downtown Watsonville, where it is four lanes.

Highway 152 provides east-west access through the project area, stretching east from Highway 1 to the Central Valley. In the west portion of the project area, Highway 152 runs through Watsonville (along Main Street, East Beach Street, Lincoln Street, and East Lake Avenue) to Hecker Pass and Santa Clara County. Due to the winding nature of Highway 152 over Hecker Pass, signs are posted prohibiting trucks over 45 feet in length from using that portion of the highway. The majority of Highway 152 is two lanes, except in downtown Watsonville, where it is four lanes.

Local Roads

Local Roads. Local roads that provide access to the Increased Recycled Water Storage at Treatment Plant, Harkins Slough Recharge Facilities Upgrades, and Watsonville Slough with Recharge Basins components are described as follows. Beach Road is a two-lane roadway that extends west from Highway 1 to Palm Beach along the coast, serving agricultural areas along the road and Pajaro Dunes residential development at Palm Beach. San Andreas Road is a two-lane road that extends north from Beach Road along the coast through the community of La Selva Beach to Highway 1, where an existing interchange is located. San Andreas Road is designated by Santa Cruz County as a coastal bike route.

Local roadways in the College Lake area include Holohan Road, College Road, and Lakeview Road; all are two-lane roads. Holohan Road extends west from Highway 152 to Green Valley Road and areas along Freedom Boulevard. College Road extends east from Highway 152 to Kelly and Drew Lakes through residential neighborhoods. Lakeview Road extends north from Highway 129, providing a connection to College Road. Local roads in the vicinity of Murphy Crossing consist of Murphy Road and Lakeview Road. Murphy Road is a
two-lane roadway that provides north-south access between Highway 129 and County Road G11 (San Juan Road).

**Truck Routes**

Due to its location in an agricultural area, the Pajaro Valley is a major route for truck traffic. Highways 1, 129, and 152 are state and county designated truck routes (with some restrictions). Many of the major roadways in the area also carry a high percentage of trucks.

As part of the City of Watsonville’s *Major Street Master Plan*, truck routes have been designated to limit intrusion into residential neighborhoods and reduce traffic problems downtown. The following roadways are designated truck routes in the City:

- Airport Boulevard—Highway 152 to City Limit
- Highway 152 (Main Street)—Airport Boulevard to City Limit
- West Lake Avenue—Walker Street to Main Street
- Highway 152 (East Lake Avenue)—Main Street to City Limit
- Highway 1 (Cabrillo Highway)—Highway 52 to Highway 129
- South Green Valley Road—Highway 1 to Highway 152
- West Beach Street—Lee Road to Lincoln Street to Highway 152
- Lee Road—across City Limits
- Industrial Road—West Beach Street to Highway 129
- Harvest Drive—West Beach Street to Highway 129
- Walker Street—Ford Street to West Front Street
- Ford Street and Kearney Street—Walker Street to Walker Street
- Highway 129 (Riverside Drive)—Highway 1 to City Limit

Truck volumes are typically expressed in the percentage of overall traffic on a route. *Table 3.11-1* below shows the total truck percentage on four of the City’s primary truck routes (*Watsonville Vista 2030 General Plan*).

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Location</th>
<th>Average Daily Traffic</th>
<th>Average % Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport Blvd.</td>
<td>North of Freedom Blvd.</td>
<td>13,730</td>
<td>1%</td>
</tr>
<tr>
<td>Highway 152 (Main St.)</td>
<td>West of Green Valley Rd.</td>
<td>24,300</td>
<td>3%</td>
</tr>
<tr>
<td>West Beach St.</td>
<td>West of Walker St.</td>
<td>7,940</td>
<td>4%</td>
</tr>
<tr>
<td>Highway 129 (Riverside Dr.)</td>
<td>East of Blackburn St.</td>
<td>10,720</td>
<td>7%</td>
</tr>
</tbody>
</table>

**3.11.1.2 Regulatory Setting**

Applicable objectives, goals and policies from the Santa Cruz County General Plan/Local Coastal Program and the City of Watsonville Vista 2030 General Plan are presented below. The County and City’s performance standards for roadway facilities are expressed in “level of service.” Level of service (LOS) is a measure of the
quality of the operating conditions of a roadway facility associated with varying levels of traffic, ranging from LOS A to F, as described in Table 3.11-2 below.

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Relatively free-flow. No restrictions to vehicle maneuverability or speed. Very slight delay.</td>
</tr>
<tr>
<td>B</td>
<td>Stable flow. Some slight reduction in maneuverability and speed. Vehicle platoons form. This is a suitable level of operation for rural design. Slight delay.</td>
</tr>
<tr>
<td>C</td>
<td>Stable flow or operation. Higher volumes. More restrictions on maneuverability and speed. This level of operation is suitable for urban planning purposes. Acceptable delay.</td>
</tr>
<tr>
<td>D</td>
<td>Approaching unstable flow or operation. Queues develop. Little freedom to maneuver. Tolerable delays for short periods.</td>
</tr>
<tr>
<td>E</td>
<td>Unstable flow or operations. Low operating speed; momentary stoppages. This condition is not uncommon in peak hours. Congestion; intolerable delay.</td>
</tr>
<tr>
<td>F</td>
<td>Forced flow or operation. Many stoppages; jammed conditions.</td>
</tr>
</tbody>
</table>

**County of Santa Cruz General Plan/Local Coastal Program**

Policy 3.12.1 of the 1994 General Plan and Local Coastal Program for the County of Santa Cruz identifies LOS D as the minimum acceptable level of service (where costs, right-of-way requirements, or environmental impacts of maintaining LOS are excessive, capacity enhancement may be considered infeasible). Projects that would cause the LOS at an intersection or on an uninterrupted highway segment to fall below LOS D during the weekday peak hour are required to mitigate their traffic impacts.

Policy 3.94 of the 1994 General Plan and Local Coastal Program for the County of Santa Cruz requires that contractors and utility companies doing roadside work maintain the road edge in the best possible condition during construction and, upon project completion, improve the road shoulder to the preconstruction condition or better.

**City of Watsonville Vista 2030 General Plan**

The City of Watsonville General Plan, which was adopted in early 2013, has a timeframe that extends to the year 2030. The 2030 General Plan reinforces the City’s goals to provide adequate capacity on its roadway system. The General Plan identifies LOS D as an acceptable level of operation for roadway facilities within urban areas, and requires street improvements when traffic volumes exceed LOS D on roadway segments and at signalized intersections, except for those accepted to operate at less than a LOS D that are identified in the 2005-2030 Major Streets Master Plan (MSMP).

The MSMP identified several roadway improvements to accommodate project growth within Watsonville to 2030, as follows:

- A new 2-lane collector street connecting Buena Vista Drive to Freedom Boulevard with connections at Calabasas Road
- A new collector street connecting Atkinson Lane to Highway 152 with Crestview Extension
- Full diamond interchange at Harkins Slough Road and Highway 1
- Widening of Airport Boulevard to a 4-lane arterial street with center turn lane between Freedom Boulevard and Green Valley Road including widening of the bridge over Corralitos Creek
3.11.3 Setting by Component

**Increased Recycled Water Storage at Treatment Plant**

The WWTP is located west of Highway 1 in unincorporated Santa Cruz County. Roadways that may be affected by the improvements to increase recycled water storage at the WWTP include Highway 1 and Beach Road. Vehicles traveling to and from the Recycled Water Treatment Facility can access the plant’s entry road via Beach Road.

**Harkins Slough Recharge Facilities Upgrades**

The Harkins and Watsonville Sloughs are located west of Highway 1 in unincorporated Santa Cruz County. The local roadways that may be affected by the Harkins Slough upgrades include Beach Road and San Andreas Road. San Andreas Road extends north from Beach Road along the coast and is designated by the County as a coastal bike route.

**Watsonville Slough with Recharge Basins**

The Harkins and Watsonville Sloughs are located west of Highway 1. See discussion for Harkins Slough above.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

College Lake is located north of the City of Watsonville in unincorporated Santa Cruz County, north of Highway 152. The local roadways that may be affected by the College Lake improvements include Holohan Road, College Road, and Lakeview Road, all two-lane facilities.

**Murphy Crossing with Recharge Basins**

Murphy Crossing is located east of the City of Watsonville in unincorporated Santa Cruz County, south of Highway 129 adjacent to the Pajaro River. Roadways near the Murphy Crossing with Recharge Basins Components that may be affected include Highway 129, Murphy Road, and Lakeview Road.

3.11.2 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), relevant plans, policies and/or guidelines, and agency standards, a project impact would be considered significant if the project would:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
- Conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
3.11 Transportation and Traffic

- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access;
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

The project components would generate very few permanent new vehicle trips and therefore, would not result in any long-term degradation of the operating conditions or levels of service on nearby roadway facilities. For the purposes of this EIR, the project would be considered to have a potentially significant short-term traffic impact during construction if it results in any of the following:

- The short-term increase in construction traffic is substantial in relation to the existing traffic load and capacity of the street system;
- Construction activities substantially impede local access, including emergency access; or
- Movement of heavy vehicles would cause substantial damage or wear of public roadways (Note: These latter criteria do not lend themselves to quantitative thresholds of significance, and the determination of significance will be based on professional judgment.)

3.11.3 IMPACTS AND MITIGATION MEASURES BY COMPONENT

Potential impacts associated with BMP Update components are identified below. Mitigation measures that would apply to each specific component are identified for each potential impact. If specific mitigation measures apply to individual components in addition to the previously identified measures, these specific mitigation measures are identified.

3.11.3.1 Impacts Associated with Construction Traffic

Construction of BMP Update components would temporarily increase traffic on area roadways from project-generated vehicle trips by construction workers and construction vehicular activities. This impact would be less-than-significant. Implementation of proposed Construction Traffic Minimization Practices identified below, would further reduce this less-than-significant impact.

Construction activities would include site preparation work such as grading and excavation, facility construction, and paving. Transportation of materials, equipment and workers to individual work sites would vary throughout a given day and over the construction period for any BMP Update component. Construction traffic would be limited and temporary. As described in Section 2.5 of this EIR, PVWMA will incorporate the following Construction Traffic Management Practices into plans and contract specifications to minimize traffic and the associated effects on nearby roadways during construction of project components:

- Schedule truck trips outside peak commute hours (avoid weekdays from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.).
- Use haul routes that minimize truck traffic on local roadways to the extent possible.
Increased Recycled Water Storage at Treatment Plant

Construction activities for the recycled water storage basins would generate short-term traffic increases associated with the following activities: trucks hauling equipment and materials to the site; trucks hauling excavated materials from the site; trucks importing new fill to the site; and the daily arrival/departure of construction workers to the site. Construction of this component is expected to require an average of 5 to 10 workers per day, or 10 to 20 daily vehicle trips. The project would also generate an estimated 19 daily truck trips during construction. Based on the existing roadway network in the project area, truck and construction worker vehicle traffic are assumed to use a combination of facilities to travel to/from the site, including Highway 1, Beach Road, and San Andreas Road in the immediate proximity.

Construction of the proposed improvements at the WWTP would be temporary, and therefore, would not result in any long-term degradation in operating conditions or level of service for roadways. The primary off-site impacts from the movement of construction trucks would include short-term and intermittent reduction of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles. The temporary increase in daily vehicular trips from the movement of equipment and materials to and from the site, as well as construction workers, would account for small increases in daily traffic volumes on the nearby highways, including Highways 1 and 129, and would fall within the daily fluctuations of traffic and, therefore, would not significantly disrupt daily traffic flow on freeways and arterials. The effect of project traffic on roadways with lower traffic volumes, including Beach Road, would be greater. However, given the anticipated pace of construction, the duration that project haul trucks would be required to use any given local roadway would be relatively brief.

Most project-related hauling and deliveries would be dispersed throughout the day, thus lessening the effect on peak-hour traffic. Project truck traffic occurring during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. would coincide with peak-hour traffic, and therefore, have the greatest potential to impede traffic flow during these time periods. Minimizing truck traffic during the morning and afternoon peak periods would further lessen disruption of traffic flow on affected roadways. As described in Section 2.5 of this EIR and summarized above, PVWMA will include this as part of the Construction Traffic Management Practices that will be incorporated into plans and contract specifications to minimize traffic and the associated effects on nearby roadways during construction.

Harkins Slough Recharge Facilities Upgrades

Construction activities for the Harkins Slough Recharge Facilities Upgrades would generate short-term traffic increases associated with the following activities: trucks hauling equipment and materials to the site; trucks hauling excavated materials from the site; trucks importing new fill to the site; and the daily arrival/departure of construction workers to the site. Construction of this component is expected to require an average of 5 to 10 workers per day, or 10 to 20 daily vehicle trips. The component would also generate an estimated 11 daily truck trips during construction. Based on the existing roadway network in the project area, truck and construction

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1 Construction truck trip estimates for each component are based on assumptions for construction emissions (refer to Section 3.3 Air Quality and Greenhouse Gases).
worker vehicle traffic are assumed to use a combination of facilities to travel to/from the site, including Highway 1, Beach Road, and San Andreas Road.

Construction of the upgrades to Harkins Slough facility would be temporary and, therefore, would not result in any long-term degradation in operating conditions or level of service for roadways in the area. The primary off-site impacts from the movement of construction trucks would include short-term and intermittent reduction of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles.

The temporary increase in daily vehicular trips from truck traffic and construction workers would account for small increases in daily traffic volumes on the nearby highways, including Highways 1 and 129, and would fall within the daily fluctuations of traffic and, therefore, would not significantly disrupt daily traffic flow on freeways and arterials. The effect of project traffic on roadways with lower traffic volumes, including Beach Road and San Andreas Road, would be greater. However, given the anticipated pace of construction, the duration that project haul trucks would be required to use any given local roadway would be relatively brief.

Most project-related hauling and deliveries would be dispersed throughout the day, thus lessening the effect on peak-hour traffic. Project truck traffic occurring during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. would coincide with peak-hour traffic, and therefore, have the greatest potential to impede traffic flow during these time periods. Minimizing truck traffic during the morning and afternoon peak periods would further lessen disruption of traffic flow on affected roadways. As indicated above, PVWMA will include this as part of the Construction Traffic Minimization Practices that will be incorporated into plans and contract specifications to minimize traffic and the associated effects on nearby roadways during construction.

**Watsonville Slough with Recharge Basins**

See above discussion for Harkins Slough. The Watsonville Slough with Recharge Basins component involves more excavation and associated truck trips than the Harkins Slough Recharge Facilities Upgrades component, at an estimated 22 truck trips per day, which would be spread out over the day. Restricting truck traffic during the morning and afternoon peak periods would further minimize disruption of traffic flow on affected roadways. As described in Section 2.5 of this EIR, PVWMA will include this restriction as part of the Construction Traffic Minimization Practices that will be incorporated into plans and contract specifications to minimize traffic and the associated effects on nearby roadways during construction.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

Construction activities for the College Lake with Inland Pipeline to Coastal Distribution System (CDS) component would generate short-term traffic increases associated with the following activities: trucks hauling equipment and materials to the site; trucks hauling excavated materials from the site; trucks importing new fill to the site; and the daily arrival/departure of construction workers to the site. Construction of this component is expected to require an average of 5 to 10 workers per day, or 10 to 20 daily vehicle trips. The project would also generate an estimated 2 daily truck trips during construction.

Construction of the proposed improvements at College Lake would be temporary, and therefore, would not result in any long-term degradation in operating conditions or level of service for roadways. The primary off-site impacts from the movement of construction trucks would include short-term and intermittent reduction of
roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles.

The temporary increase in daily vehicular trips from the movement of equipment and materials to and from the site, as well as construction workers, would account for small increases in daily traffic volumes on the nearby highways, including Highways 152 and 129, and would fall within the daily fluctuations of traffic and, therefore, would not significantly disrupt daily traffic flow on freeways and arterials. The effect of project traffic on roadways with lower traffic volumes, including Holohan Road, College Road, and Lakeview Road, would be greater. However, given the anticipated pace of construction, the duration that project haul trucks would be required to use any given local roadway would be relatively brief.

Most project-related hauling and deliveries would be dispersed throughout the day, thus lessening the effect on peak-hour traffic. Project truck traffic occurring during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. would coincide with peak-hour traffic, and therefore, have the greatest potential to impede traffic flow during these time periods. Minimizing truck traffic during the morning and afternoon peak periods would further lessen disruption of traffic flow on affected roadways. As described in Section 2.5 of this EIR, PVWMA will include this as part of the Construction Traffic Minimization Practices that will be incorporated into plans and contract specifications to minimize traffic and the associated effects on nearby roadways during construction.

**Murphy Crossing with Recharge Basins**

Construction activities for the Murphy Crossing with Recharge Basins component would generate short-term traffic increases associated with the following activities: trucks hauling equipment and materials to the site; trucks hauling excavated materials from the site; trucks importing new fill to the site; and the daily arrival/departure of construction workers to the site. Construction of this component is expected to require an average of 5 to 10 workers per day, or 10 to 20 daily vehicle trips. The project would also generate an estimated 7 daily truck trips during construction. The installation of conveyance pipelines to the proposed recharge basins would require installation across and within a portion of Highway 129 as well as other possible roadways. This is further addressed under Impact TR-2 below.

Construction of the proposed improvements at Murphy Crossing would be temporary, and therefore, would not result in any long-term degradation in operating conditions or level of service for roadways. The primary off-site impacts from the movement of construction trucks would include short-term and intermittent reduction of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles.

The temporary increase in daily vehicular trips from the movement of equipment and materials to and from the site, as well as construction workers, would account for small increases in daily traffic volumes on the nearby highways, including Highway 129, and would fall within the daily fluctuations of traffic and, therefore, would not significantly disrupt daily traffic flow on freeways and arterials. The effect of project traffic on roadways with lower traffic volumes, including County Road G11 (San Juan Road), Murphy Road, Carlton Road, and Lakeview Road, would be greater. However, given the anticipated pace of construction, the duration that project haul trucks would be required to use any given local roadway would be relatively brief.

Most project-related hauling and deliveries would be dispersed throughout the day, thus lessening the effect on peak-hour traffic. Project truck traffic occurring during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. would coincide with peak-hour traffic, and therefore, have the greatest potential to impede traffic flow during
these time periods. Minimizing truck traffic during the morning and afternoon peak periods would further lessen disruption of traffic flow on affected roadways. As described in Section 2.5 of this EIR, PVWMA will include this as part of the Construction Traffic Minimization Practices that will be incorporated into plans and contract specifications to minimize traffic and the associated effects on nearby roadways during construction.

3.11.3.2 Impacts to Traffic/Access During Construction

Construction of some BMP Update components could increase traffic delays for vehicles traveling through the construction zone and potentially also adversely affect general access and emergency access. This is a less-than-significant impact. Implementation of proposed Construction Traffic Management Practices identified below, would further reduce this less-than-significant impact.

As described in Section 2.5 of this EIR, PVWMA will incorporate the following Construction Traffic Management Practices into plans and contract specifications to minimize traffic and the associated effects on nearby roadways during construction of project components:

- The construction contractor shall prepare traffic safety and control plans to show specific methods for maintaining traffic flows. This shall include identifying roadway locations where special trenching techniques would be used to minimize impacts to traffic flow and operations. The traffic control plan shall be subject to the review/approval by Caltrans and the governing Public Works Department(s), as applicable. Construction trenches shall be covered by steel trench plates to allow access to driveways. Contractors shall notify police, fire, and emergency services of the timing, location, and duration of construction activities in roadway right-of-ways and identify the locations of any detours and lane closures. Install construction signs that provide advanced public notification of construction schedule along affected roadways.

Increased Recycled Water Storage at Treatment Plant

The improvements associated with the Increased Recycled Water Storage at Treatment Plant component do not include construction within roadway right-of-way and, therefore, would not affect general vehicle or emergency access.

Harkins Slough Recharge Facilities Upgrades

The Harkins Slough Recharge Facilities Upgrades include installation of pipeline within San Andreas Road along an approximate 2,000-foot segment. The specific alignment of the pipeline would be identified during the design phase of the project. Assuming open trench activities proceeding at an average rate of 100 feet per day, impacts would be relatively brief at any one location along the alignment. The temporary increase in construction-generated trucks on nearby roadways would interact with other vehicles such as other large trucks, slow moving agricultural vehicles (in farm areas), and recreational vehicles (traveling to/from beaches and other recreational areas). Potential conflicts could also occur between construction traffic and bicycles and pedestrians. San Andreas Road and Beach Road are identified on the Santa Cruz County Bikeways Master Plan. However, implementation of standard construction traffic controls, as planned, would not result in a significant impact. As described in Section 2.5 of this EIR and summarized above, PVWMA will include this restriction as part of the
Construction Traffic Minimization Practices that will be incorporated into plans and contract specifications to minimize traffic delays and associated effects on nearby roadways during construction.

**Watsonville Slough with Recharge Basins**

See above discussion for Harkins Slough.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

The majority of the pipelines required for improvements within the immediate College Lake area would not be installed within roadways. However, the proposed pipeline alignment would be adjacent to, or within a portion of Highway 152 (E. Lake Avenue). The alignment would also cross Highway 152, Holohan Road, and Lakeview Road. The pipeline alignment for the inland distribution system from College Lake to the RWF could involve installation within roadways including Holohan Road, College Road, Lakeview Road, Highway 129, and Beach Road. The specific alignment of the pipeline would be identified during the design phase of the project. Assuming open trench activities proceeding at an average rate of 100 feet per day, impacts would be relatively brief at any one location along the alignment. Special construction methods (e.g., jack and bore, directional drilling) would be used to install pipelines under roadways as needed.

Existing transportation and circulation patterns in the vicinity of the proposed pipeline alignments would be temporarily disrupted by construction and heavy equipment use in the affected roadways. Pipeline construction would temporarily disrupt traffic flows and roadway operations, such as lane blockages, roadway closures, reduction in travel lanes, or traffic re-routing. However, implementation of standard construction traffic controls, as planned, would not result in a significant impact. As described in Section 2.5 of this EIR and summarized above, PVWMA will include this restriction as part of the Construction Traffic Minimization Practices that will be incorporated into plans and contract specifications to minimize traffic delays and associated effects on nearby roadways during construction.

**Murphy Crossing with Recharge Basins**

The proposed conveyance pipelines to the proposed recharge basins would require installation across and within a portion of Highway 129 as well as other possible roadways. The specific alignment of all pipe would be identified during the design phase of the project. Assuming open trench activities proceeding at an average rate of 100 feet per day, impacts would be relatively brief at any one location along the alignment. Special construction methods (e.g., jack and bore, directional drilling) would be used to install pipelines under Highway 129.

Existing transportation and circulation patterns in the vicinity of the proposed pipeline alignments would be temporarily disrupted by construction and heavy equipment use in the affected roadways. Pipeline construction would temporarily disrupt traffic flows and roadway operations, such as lane blockages, roadway closures, reduction in travel lanes, or traffic re-routing. However, implementation of standard construction traffic controls, as planned, would not result in a significant impact. As described in Section 2.5 of this EIR and summarized above, PVWMA will include this restriction as part of the Construction Traffic Management Practices that will be incorporated into plans and contract specifications to minimize traffic delays and associated effects on nearby roadways during construction.
3.11 Transportation and Traffic

3.11.3.3 Degradation of Roadways from Construction Traffic

*Impact TR-1:* Construction of BMP Update components would increase wear and tear on area roadways used by construction vehicles. With mitigation identified in this EIR, the impact would be reduced to a less-than-significant level.

The use of heavy trucks to transport equipment and material to and from the project site could affect road conditions by increasing the rate of road wear or cause direct damage to roads and bridges. The degree to which this impact would occur depends on the project-generated traffic and the design (pavement type and thickness) and existing condition of the roadways. Although they would be used, the BMP Update components would have minimal impact on major arterials and highways that are designed to accommodate a mix of vehicle types, including heavy trucks.

**Mitigation Measure(s):**

*Mitigation Measure TR-1:* Conduct a preconstruction survey of road conditions on key access routes to the project sites (e.g., San Andreas Road). The pavement conditions of local streets judged to be in good condition for use by heavy truck traffic shall be monitored. Roads damaged by construction shall be repaired to a structural condition equal to, or better than, that which existed prior to construction activity.

**Increased Recycled Water Storage at Treatment Plant**

Local-serving roads that would be used, such as San Andreas Road, may not be built with a pavement thickness that would withstand large heavy truck volumes. The projected increase in use of this or other local roadways by heavy trucks could result in significant wear on these roadways. Mitigation Measure TR-1 would apply, ensuring potential effects are reduced to less-than-significant levels.

**Harkins Slough Recharge Facilities Upgrades**

Local-serving roads that would be used, such as Beach Road and San Andreas Road, may not be built with a pavement thickness that would withstand large heavy truck volumes. The projected increase in use of this or other local roadways by heavy trucks could result in significant wear on these roadways. Mitigation Measure TR-1 would apply, ensuring potential effects are reduced to less-than-significant levels.

**Watsonville Slough with Recharge Basins**

See above discussion for Harkins Slough. Mitigation Measure TR-1 would apply, ensuring potential effects would be reduced to less-than-significant levels.

**College Lake with Inland Pipeline to Coastal Distribution System (CDS)**

Local-serving roads, such as Holohan Road, College Road, and Lakeview Road, may not be built with a pavement thickness that would withstand large heavy truck volumes. The projected increase in use of this or other local roadways by heavy trucks could result in significant wear on these roadways. Mitigation Measure TR-1 would apply, ensuring potential effects are reduced to less-than-significant levels.
Murphy Crossing with Recharge Basins

Local-serving roads, such as County Road G11 (San Juan Road), Murphy Road, Carlton Road, and Lakeview Road, may not be built with a pavement thickness that would withstand large heavy truck volumes. The projected increase in use of this or other local roadways by heavy trucks could result in significant wear on these roadways. Mitigation Measure TR-1 would apply, ensuring potential traffic effects are reduced to less-than-significant levels.

3.11.4 IMpacts AND Mitigation Measures Overall combined BMP Update

As identified in this section, implementation of the overall combined BMP Update would result in short-term traffic impacts during construction activities associated with increased volumes, and potential delays and interruption of access. However, as previously identified, these impacts would be less than significant or reduced to a less-than-significant level with the incorporation of mitigation measures identified in this EIR.
4 OTHER CEQA CONSIDERATIONS

4.1 CUMULATIVE IMPACTS

4.1.1 Introduction

The State CEQA Guidelines Section 15130(a) requires that an EIR discuss cumulative impacts of a project “when the project’s incremental effect is cumulatively considerable.” As defined in Section 15065(a)(3), “cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects.

According to Section 15355 of the CEQA Guidelines, cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

An evaluation of cumulative impacts is required by CEQA when they are significant. When the combined cumulative impact associated with the project’s incremental effect and the effects of other projects is not significant, the EIR shall briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. According to the California State CEQA Guidelines Section 15130(a)(1), there is no need to evaluate cumulative impacts to which the project does not contribute.

CEQA Guidelines section 15130(a)(3) indicates that an EIR may determine that a project’s contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant when, for example, a project funds its fair share of a mitigation measure designed to alleviate the cumulative impact. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project’s contribution to any significant cumulative effects.

CEQA Guidelines Section 15130(b) further indicates that the discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

4.1.2 Approach

Section 15130(b) of the CEQA Guidelines provides guidance with respect to how an adequate cumulative impact analysis might be completed and indicates that the analysis be based on one of two possible approaches for identifying cumulative projects and impacts:
1. **List Approach** - A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or

2. **Summary of Projections/General Plan Approach** - A summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect. Such plans may include: a general plan, regional transportation plan or plans for the reduction of greenhouse gas emissions. A summary of projections may also be contained in an adopted or certified prior environmental document for such a plan.

When utilizing a list, factors to consider when determining whether to include a related project should include the nature of each environmental resource being examined, the location of the project and its type. Location may be important, for example, when water quality impacts are at issue since projects outside the watershed would probably not contribute to a cumulative effect. Project type may be important, for example, when the impact is specialized, such as a particular air pollutant or mode of traffic.

The proposed project is a long-term management plan to address groundwater overdraft and seawater intrusion issues in the Pajaro Valley. The project includes implementing seven components: Conservation, Increased Recycled Water Deliveries, and construction and installation of facilities (Increased Recycled Water Storage at Treatment Plant; Harkins Slough Recharge Facilities Upgrades; Watsonville Slough with Recharge Basins; College Lake with Inland Pipeline to Coastal Distribution System (CDS); and Murphy Crossing with Recharge Basins). Based upon an assessment of timing issues for implementation, some components of the proposed BMP Update could be implemented within the near-term (2015-2024), while some components, such as Murphy Crossing with Recharge Basins, are not likely to be constructed until 2025-2035.

To evaluate the local and regional cumulative impacts of the proposed BMP Update, the analysis in this EIR primarily uses the first approach -- the "list" approach. Thus, similar management plans or water facility/infrastructure projects were considered. The overall approach also considers the geographic area for each cumulative impact being analyzed, which is primarily within the Pajaro Valley Water Management Agency jurisdiction. The analysis also considers cumulative impacts related to growth and buildout accommodated by the City of Watsonville General Plan. Additionally, potential cumulative projects were identified based on the impacts identified in this EIR for the proposed project: agricultural land conversion, biological resources; hydrology and water quality; and construction-related impacts.

### 4.1.3 Cumulative Projects

Based on the approach outlined in subsection 4.1.2 above, **Table 4-1** lists the projects that were considered in the evaluation of cumulative impacts. This evaluation considers cumulative impacts related to all components of the BMP Update based on the geographic scope of the affected environmental resource.
<table>
<thead>
<tr>
<th>Project / Lead Agency</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pajaro River Flood Risk Reduction Project - U.S. Army Corps of Engineers (USACE), Santa Cruz County Zone 7, Monterey County Water Resources Agency</td>
<td>Rebuild or replace USACE flood protection levees along 11 miles of the Lower Pajaro River from the ocean to Murphy Crossing Road and along 5 miles of Salsipuedes and Corralitos Creeks.¹</td>
<td>Final levee construction design alternatives for the Pajaro main stem and the Pajaro tributaries (Corralitos and Salsipuedes Creeks) were formulated and described in the General Re-evaluation Report (GRR), Pajaro River (US Army Corps, Working Draft 2011). The project team is currently revising project alternatives and completion of the draft EIR/EIS for the GRR is expected in 2014.</td>
</tr>
<tr>
<td>Pajaro River Bench Excavation Project – Santa Cruz County Zone 7, Monterey County Water Resources Agency</td>
<td>Excavation of excess sediment from select locations along the upper terrace benches inside the Pajaro River to improve flood carrying capacity and maintain a shaded low-flow channel for critical fish passage with revegetation and instream/bench habitat improvements. This is an interim measure until the levee reconstruction project is finalized and implemented.</td>
<td>Phase 1 completed.</td>
</tr>
<tr>
<td>Middle Watsonville Slough Restoration Project – Santa Cruz County Resource Conservation District &amp; Land Trust of Santa Cruz County</td>
<td>Restoration of a 12 to 20-acre area adjacent to Watsonville Slough to provide increased wetland buffer, to retire marginal, often flooded, farmland and to restore wetland habitat and reduce sediment input into the wetlands as well as improve water quality by installing buffer areas and filtration swales.²</td>
<td>Preliminary Design complete, awaiting results of the Watsonville Sloughs Hydrologic Study to complete detailed design.</td>
</tr>
<tr>
<td>Pajaro River Watershed Integrated Regional Water Management Plan (IRWMP) Project</td>
<td>IRWM Plan identifies critical water resources, flood protection, and riparian and environmental projects in the Pajaro River watershed that provide water supply, protect water quality, preserve or increase flood attenuation, and provide wildlife habitat and connectivity.</td>
<td>Original plan adopted in 2007. Updated plan scheduled to be completed in 2014.</td>
</tr>
<tr>
<td>* Corralitos Creek Water Supply – City of Watsonville</td>
<td>Expand surface water treatment facilities to allow increased diversions from Corralitos Creek during the winter flows to optimize and increase water supplies from the Creek with reduced summer diversions.</td>
<td>First phase of project complete. Additional treatment units will be added as funding is secured.</td>
</tr>
</tbody>
</table>

¹ [http://www.pajarowatershed.org/Content/10017/flood_protection.html](http://www.pajarowatershed.org/Content/10017/flood_protection.html)
² [Land Trust of Santa Cruz County Website: http://www.landtrustsantacruz.org/watsonvilleslough/stewardship_education.htm](http://www.landtrustsantacruz.org/watsonvilleslough/stewardship_education.htm)
## 4 Other CEQA Considerations

<table>
<thead>
<tr>
<th>Project / Lead Agency</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lee Road-Watsonville Slough Flood Protection Project – City of Watsonville</td>
<td>Watsonville Slough Flood Protection, Water Quality, Public Access and Habitat Enhancement – Lee Road – Includes creation of 1,900 feet of recreational pedestrian and bicycle trails along Watsonville Slough that will provide recreational access along the slough system as an extension of the existing Watsonville Scenic Trails Network.</td>
<td>Design in Progress. Construction schedule is dependent on securing funding.</td>
</tr>
<tr>
<td>• Watsonville Slough Enhancement Walker Street – City of Watsonville</td>
<td>Permanently protect and preserve wetland and riparian habitat, implement best management practices for urban storm water run-off, restore native upland habitat along Watsonville Slough and provide an important public trail connection for recreational access within the Watsonville Scenic Trails Network between Walker Street and Ford Street.</td>
<td>Design in Progress. Construction schedule is dependent on securing funding.</td>
</tr>
<tr>
<td>• Salsipuedes Creek Bench Excavation – City of Watsonville</td>
<td>Sediment removal (nearly 20,000 cy) at 7 sites and habitat restoration project along the Salsipuedes Creek portion of the Pajaro River Federal flood control project.</td>
<td>Design &amp; CEQA Review in Progress. Construction schedule is dependent on securing funding.</td>
</tr>
<tr>
<td>• Beach Road – County of Santa Cruz</td>
<td>Asphalt raise of West Beach Road up to 12” height along 3,600 linear feet.</td>
<td>Project alternatives under consideration</td>
</tr>
<tr>
<td>City of Watsonville Trails Plan</td>
<td>Construction of new trails near/adjacent to sloughs as part of Watsonville trail network, totaling over 100 acres, including bridges over sloughs, creeks and the Pajaro River.</td>
<td>Plan adopted in November 2012.</td>
</tr>
<tr>
<td>City of Watsonville 2030 General Plan Buildout</td>
<td>4,100 new households and 7,500 new employees within City, including three areas currently outside City limits.</td>
<td>EIR certified and General Plan adopted in 2012</td>
</tr>
</tbody>
</table>

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4.1.4 Evaluation

A two-step approach was used to analyze cumulative impacts. The first step was to determine whether the combined effects from the proposed project and other projects would be cumulatively significant. This was done by adding the proposed project’s incremental impact to the anticipated impacts of other probable future projects and/or reasonably foreseeable development. Where the combined effect of the projects and/or projected development was determined to result in a significant cumulative effect, the second step was to evaluate whether the proposed project’s incremental contribution to the combined significant cumulative impact would be cumulatively considerable as required in Section 15064(h)(1) of the CEQA Guidelines.

It should be noted that Section 15064(h)(4) of the CEQA Guidelines states that “[t]he mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project’s incremental effects are cumulatively considerable.” Therefore, it is not necessarily true that, even where cumulative impacts are significant, any level of incremental contribution must be deemed cumulatively considerable.

Conversely, it is not necessarily true that if the proposed project’s individual impact is less-than-significant, its contribution to a significant cumulative impact would not be cumulatively considerable. Depending on circumstances, an impact that is less-than-significant when considered individually may still be cumulatively considerable in light of the impact caused by all projects considered in the analysis.

Aesthetics

The geographic scope of cumulative impacts to visual quality are the viewsheds that could be affected by project implementation, specifically, the views from designated scenic routes identified in Section 3.1 (State Highways 1, 129, and 152; Beach Road, and San Andreas Road). None of the project components would result in impacts to scenic views or scenic resources, and most components would result in low profile structures or elements that would not substantially degrade the visual character of the surrounding areas. Implementation of the components proposed under the BMP Update could, in conjunction with other projects, result in minor infrastructure improvements and/or alteration of landforms associated with construction of recharge basins proposed as part of several BMP Update components and wetland enhancement projects, i.e., Middle Watsonville Slough Restoration Project. The addition of recycled water tanks at the Recycled Water Facility (RWF) and pump station and treatment facilities at College Lake that are part of the proposed BMP Update components could have some aesthetic impacts on the surrounding area, but none of the other cumulative projects would result in similar types of structures that would result in a cumulative impact. Most of the other cumulative projects identified in Table 4-1 would result in minor land alterations related to wetland enhancement, Pajaro River excavation, IRWM Plan projects, and development of additional trails as part of the Watsonville Slough Trail system. The Pajaro River Flood Risk Reduction Project could result in additional impacts, but the final conceptual designs have not been approved. Development in the City of Watsonville as accommodated by the General Plan would result in new structural development, i.e., residential, commercial and industrial buildings, but the future development of proposed BMP Update components would not result in construction of new habitable structures, and thus, would not contribute to any potential aesthetic impacts resulting from such development. Therefore, no significant cumulative impacts related to aesthetics have been identified.
Agricultural Resources and Land Use

Construction of the components proposed under the BMP Update would contribute to the cumulative loss of prime farmland in the region. The geographic area for consideration of cumulative impacts is the PVWMA service area. Implementation of the BMP Update could lead to conversion of approximately 30 to 40 acres of prime or unique farmland as discussed in section 3.2 of this EIR. Implementation of the Middle Watsonville Slough Restoration project could result in conversion of approximately 12 to 20 acres of agricultural land as part of the proposed wetland restoration project. Most other proposed and pending cumulative projects would not affect agricultural lands, except for future improvements to the Pajaro River levee and potential development accommodated by the Watsonville General Plan. According to Watsonville's General Plan EIR, approximately 280 acres of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance would be converted to non-agricultural uses.

The preferred alternative for the Pajaro River Flood Risk Reduction Project has not yet been selected. However, past studies conducted for the project have indicated that the project could convert approximately 56 to 330 acres of agricultural land depending on which alternative is selected; an additional 12 to 75 acres could be converted with improvements to four Salsipuedes Creek tributary project areas (U.S. Army Corps of Engineers, April 6, 2004). Thus, this project could result in conversion of approximately 68 to 405 acres of agricultural land depending on the alternative ultimately selected. More precise information likely will also be provided in the CEQA and NEPA environmental review documents to be prepared for the project. The 2004 Army Corps of Engineers study also identified a potential conversion of an additional 1,550 acres of agricultural land with a levee project with larger setbacks (about 800 feet) in the lower reach, but this alternative was identified as being economically infeasible and expected to be unacceptable to floodplain residents. It is not an alternative currently under consideration, and therefore, it is not considered for the purpose of this cumulative impacts review. It is also noted that agricultural lands may indirectly benefit from a flood improvement project along the Pajaro River to the extent that existing flooding and resulting crop damages may be reduced.

Cumulative projects could result in conversion of approximately 380 to 750 acres of agricultural land to non-agricultural uses over the next 5 to 20 years, which is considered a significant cumulative impact not directly related to implementation of the proposed BMP Update. The exact amount potentially attributed to a Pajaro River Flood Risk Reduction Project will not be known until a preferred alternative is selected. Similarly, the actual amount of agricultural land converted as a result of development accommodated by the Watsonville General Plan is not known. The above estimate is a worst-case estimate. The BMP Update's incremental contribution to this significant cumulative impact is considered cumulatively considerable, because it represents approximately 5 to 10 percent of the cumulative impact. No mitigation is available for this impact. The BMP Update would therefore, have a significant and unavoidable cumulative impact due to conversion of agricultural land to non-agricultural uses.

Air Quality and Greenhouse Gas

For Construction analysis of this topic, see below under Construction-Related Impacts.

Operation. Because the project involves construction and operation of water supply infrastructure that would replace groundwater pumping and would not directly or indirectly induce population growth, there will not be any impacts related to consistency with the MBUAPCD air quality plans and a consistency determination is not necessary (see additional information on Growth Inducement in Section 4.2, below).
Criteria pollutants emissions due to implementation of the BMP Update would not contribute to cumulative air pollutant emission in a cumulatively considerable way, and thus the BMP Update would have a less than significant cumulative impact on regional air quality.

Cumulative operational emissions of greenhouse gases related to past, present and reasonably foreseeable future projects have been acknowledged universally by the regulatory and scientific communities to result in significant cumulative climate change impacts. The BMP Update’s contribution to this cumulative significant impact is not cumulatively considerable and thus, less than significant based on the analysis provided in Section 3.3 of this EIR.

**Biological Resources**

**Construction.** The BMP Update Project components involve construction activities that could impact riparian and wetland habitat, special status wildlife species (California red-legged frog, western pond turtle, and steelhead), nesting birds, and special status plants along portions of Harkins Slough, Watsonville Slough, the Pajaro River, and in the College Lake area. The seasonal timing of construction as well as implementing pre-construction avoidance and minimization measures would mitigate these short-term, construction-related impacts. Mitigation measures included in this EIR will protect special status species and potential nesting birds during construction and will reduce project impacts to a less-than-significant level.

If another project within the project area is initiated at the same time as one or more of the BMP Update components, temporary cumulatively significant impacts on biological resources could occur. The Middle Watsonville Slough Restoration project (RCD and Land Trust) and the Pajaro River IRWMP Project for Lee Road and Watsonville Slough are located in close proximity to the Harksins Slough and Watsonville Slough diversion work area and it is possible that the projects could be implemented at or near the same time. In addition, the City of Watsonville, Corralitos Creek Water Supply and Fisheries Enhancement Project are in close proximity to College Lake and the County of Santa Cruz’s proposed improvements to Beach Road is in close proximity to pipeline connections between the Harksins Slough and Watsonville Slough to the City of Watsonville Treatment Plant. The Pajaro River Flood Risk Reduction, Bench Excavation, or other flood control project(s) may be located within proximity to the Murphy Crossing area of the Pajaro River and/or College Lake.

Construction-related activities from the BMP Update components and these other projects could result in potential construction-related impacts on special status wildlife (e.g., steelhead, California red-legged frog, and western pond turtle). As none of the projects have completed 100 percent design and are funded, the amount of potential overlap in the construction period is not known at this time. However, due to policies and regulations protecting special status species and sensitive habitats in the project area, potential construction-related impacts would be mitigated similar to the measures set forth is this EIR for the proposed BMP Update components. Additionally, the City of Watsonville General Plan 2030 EIR found that activities associated with infill development areas are not expected to affect upland habitat for special status species, although impacts to upland habitat for these species could occur as a result of construction in the specific plan areas. Mitigation measures are included to ensure that species are protected. Thus, cumulative impacts would be related to overlapping construction periods of the proposed project and other projects, and with implementation of required mitigation and avoidance/minimization measures, the cumulative impact would not be significant.
Operation. The Increased Recycled Water Storage at Treatment Plant component would not result in direct or indirect impacts to sensitive habitats or special status species as none exist at the site. Thus, this project component would not contribute to cumulative biological impacts related to biological resources.

Changes in the inundation level of College Lake may result in more long-term habitat alterations; however, some alterations would be beneficial as additional wetland and riparian vegetation (including foraging and nesting habitat for birds) may establish or grow due to slightly higher seasonal inundations. Changes to Corralitos Creek flows that would occur due to the above-referenced Water Supply and Fisheries Enhancement Project would increase fish passage flows in Corralitos Creek and potentially Salsipuedes Creek, including creating additional spring time flow in Corralitos Creek. The Santa Cruz RCD is in the process of developing a feasibility analysis of potential management and other measures at College Lake to improve wildlife habitat and flood conditions. There are no known projects that would exacerbate or worsen the significant impact of operation of the College Lake with Inland Pipeline to Coastal Distribution System (CDS) component on aquatic wildlife species.

The Murphy Crossing project that would divert water during storm events that cause high flows in the Pajaro River would have a potential impact on flows and water quality in the Pajaro River during operation; however, as documented in Section 3.9, Hydrology, Groundwater, and Water Quality, these potential impacts are reduced to a less than significant level with mitigation in this EIR.

Cultural Resources

Implementation of the components proposed under the BMP Update could, in conjunction with other projects, adversely affect cultural resources within the project area as many areas are identified in the County’s General Plan as being potentially sensitive for archaeological resources. Potentially significant archaeological resources, including recorded archaeological sites, are located throughout the Pajaro Valley area that could be affected by other cumulative projects. However, any of the identified cumulative projects within the unincorporated Santa Cruz County area or within the City of Watsonville would be subject to policies and regulations of those agencies which call for review of cultural resource impacts for projects located within sensitive areas. The 1994 County General Plan and Local Coastal Program outlines a series of objectives and policies that enhance and support CEQA related to cultural resources. The policies stipulate when archaeological site surveys are required and indicate that the significance of any identified sites shall be determined and appropriate protective measures stipulated. The County also has a range of code requirements regarding cultural resources that must be implemented in the event of any unanticipated discoveries, including the need for archaeological permits for projects that would disturb an archaeological site. All of the cumulative development identified in Table 4-1 could result in potential impacts to buried cultural and paleontological resources; however, impacts are site specific and are evaluated and mitigated on a project-by-project basis. With implementation of measures required by CEQA and other state regulations and by the County and City of Watsonville, the potential site-specific cultural resource impacts associated with cumulative development would be less than significant. Thus, the BMP Update would not have a cumulatively considerable effect, and thus a less-than-significant cumulative impact related to cultural resources.
4 Other CEQA Considerations

Energy, Services and Utilities

Based upon review of recent planning and environmental documents for the BMP Update area, there are no known, previously identified significant impacts on services and utilities due to existing and proposed cumulative projects identified in Table 4-1. In addition, the BMP Update would not result in significant cumulative impacts as identified in Section 3.5. Therefore, no significant cumulative impacts related to energy, services, and utilities have been identified.

Geology and Soils

Implementation of the projects listed in Table 4-1 and the BMP Update would result in potentially significant impacts related to exposure to seismic hazards (primarily ground shaking and liquefaction), exposure to soils constraints, and potential erosion during construction. Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of ground shaking and liquefaction. Given County requirements for preparation of geotechnical investigations, other cumulative projects also would be required to develop designs consistent with recommendations of project-specific geotechnical and environmental investigations. Similarly, implementation of the proposed BMP Update components and other cumulative projects will be required to develop and implement erosion control plans in accordance with County regulations and requirements, which will ensure that potential impacts related to erosion and water quality degradation or avoided or minimized. Thus, the BMP Update would not be anticipated to have a cumulatively considerable affect due to geology and soils conditions, and thus, the BMP Update would have a less-than-significant cumulative impact related to geology and soils.

Hazards and Hazardous Materials

Construction. The BMP Update components and the projects listed in Table 4-1 involve construction that could disturb potentially contaminated soils (e.g., from agricultural chemicals, hydrocarbons, etc.). Mitigation is identified for the BMP Update components to characterize onsite soils prior to ground disturbance activities and remediate contamination in accordance with appropriate regulations. Ground disturbance for the cumulative projects would be subject to similar requirements on soils suspected of contamination. Therefore, the cumulative use exposure of hazardous materials from excavation activities would not result in a significant cumulative impact.

Operation. Implementation of the projects listed in Table 4-1 and the BMP Update components would involve the use and storage of limited amounts of hazardous materials. The transport, use, and storage of hazardous materials are strictly regulated on the local, state, and federal level to minimize exposure of such substances to the public. Therefore, the individual project and cumulative use of hazardous materials would not result in a significant cumulative impact.
4 Other CEQA Considerations

Hydrology, Groundwater, and Water Quality

Surface Water Flows

None of the cumulative projects listed in Table 4.1 directly involve increases in surface water diversions. Changes to Corralitos Creek flows would occur due to the above-referenced Water Supply and Fisheries Enhancement Project that would reduce summer flow diversions (i.e., increase flows) in Corralitos Creek, and potentially, Salsipuedes Creek. The effect of the Water Supply and Fisheries Enhancement Project on the College Lake with Inland Pipeline to CDS component would be beneficial as there would be reduced backflows up Salsipuedes Creek into College Lake during the winter, and it would not affect other flows into or out of College Lake under existing and proposed operations.

The existing PVWMA monitoring program will be carefully reviewed and adjusted as necessary based on project–level environmental mitigation and permit conditions, This may include additional monitoring and/or metering of PVWMA surface water diversions as well as effects on flows in downstream water bodies to acquire data and to report on the basin’s response to such. Permit conditions imposed by required SWRCB water rights permits will also prescribe surface water management measures that would reduce impacts. Therefore, the BMP Update would not have a cumulatively considerable change to surface water flows; and thus, a less-than-significant cumulative impact on surface and groundwater hydrology.

Surface Water Quality

Section 3.9 Hydrology, Hydrogeology, and Water Quality systems presents a discussion of surface water quality, as related to Total Maximum Daily Loads (TMDLs). As described therein, Monterey Bay south, Watsonville Slough and segments of the Pajaro River are designated as impaired water bodies for several pollutants by the California State Water Resources Control Board. In the future, the TMDLs will be used to initiate basin-wide corrective actions to reduce pollutant loading to impaired water bodies from non-point source pollutants including pesticides, metals and sediment. The existing impairment of water bodies in the Pajaro Valley may be considered to be a relatively severe and thus, significant background cumulative impact condition. The proposed BMP Update itself, however, would result in no measurable change to surface water quality during operation based on the information in Section 3.9 and the lack of measurable pollutant discharges anticipated on a long-term basis associated with the BMP Update components; therefore, the BMP Update would not have a cumulatively considerable impact on surface water quality. The BMP Update would have less-than-significant cumulative impacts on surface water quality.

Groundwater

The Pajaro Valley Hydrologic Model analyzed specific future cumulative influences on the deeper aquifers of the Pajaro Valley, including changes to groundwater extraction, sea level rise, and other influences on recharge and extraction. Overall, the BMP Update is beneficial to the water quality within the Pajaro Basin because it reduces groundwater extraction from the critical aquifers, allows the groundwater levels to increase, and actively reduces the threat of seawater intrusion. Without implementation of the BMP Update, cumulative development and anticipated continued groundwater pumping to support existing and future land uses in the basin area may continue to tax the aquifers,
reduce groundwater levels, and irreversibly degrade groundwater quality by allowing seawater to intrude into the fresh groundwater resources. Cumulative projects listed in Table 4-1, in particular, the Pajaro River Flood Risk Reduction Project, would result in loss of substantial acres of farmland due to expansion of flood areas and levee construction, that would reduce groundwater pumping in the BMP Update area and thus have a net benefit on seawater intrusion. In addition, as discussed in Section 3.3 Air Quality / Greenhouse Gas/Climate, one of the documented effects of global climate change includes increased sea levels resulting in increased seawater intrusion in coastal aquifers. This significant cumulative impact is not a result of implementation of the BMP Update and the components of the BMP Update are considered to mitigate the seawater intrusion issue (i.e., would reduce the severity of seawater intrusion when implemented). Therefore, the BMP Update components would also be considered to be adaptive mitigation for the potential future effects of climate change on the water supply conditions of the Pajaro Valley.

**Noise**

For construction analysis of this topic, see below under Construction-Related Impacts.

*Operation.* Implementation of the projects listed in Table 4-1 and the BMP Update components could result in long-term noise level increases depending on the ultimate buildout of facilities. Some of the BMP Update components include pumping facilities that would generate noise if not properly designed. The incorporation of appropriate noise attenuation measures to the BMP Update and cumulative projects, where necessary, would minimize noise level increases. Therefore, the cumulative increase in permanent noise sources would not have in a significant cumulative impact.

**Traffic**

For Construction analysis of this topic, see below under Construction-Related Impacts. The BMP Update components would have a less than cumulatively considerable effect on traffic volumes during operations due to the lack of new uses with daily trip generation and, therefore, would not contribute to cumulative traffic impacts associated with the projects listed in Table 4-1.

**Construction-Related Cumulative Impacts**

Implementation of the BMP Update components would result in temporary noise, air quality, and traffic impacts during construction. Construction of other projects listed in Table 4-1 also would result in similar construction impacts in the PVWMA area. These would be temporary impacts. As stated in Chapter 2.0, Project Description, implementation of the early proposed BMP Update components is expected to occur within 10 years, with construction of other components staggered throughout the next 25-year period. Most of the cumulative projects listed in Table 4-1 would not coincide with construction of BMP Update components as these projects are expected to be completed within the next two to three years, except for the Pajaro River Flood Risk Reduction Project that is expected to be developed further in the future. If project construction did happen simultaneously, impacts would fall within the categories of temporary environmental impacts related to increased truck and worker traffic as well as increased noise and air emissions. However, most cumulative projects are not located near sensitive receptors, would not result in large construction projects over a prolonged period of time and are not located near or within the same timeframe as the proposed BMP Update components. Thus, cumulative project construction would
not result in significant impacts related to construction-related traffic, noise and air emissions. Additionally, construction of the BMP Update components and other cumulative projects would be contingent on the issuance of permits from local agencies. Through the permitting process, construction projects near the BMP Update components could be identified and coordinated to avoid cumulative construction-related impacts, such as with traffic.

### 4.2 Growth Inducement

CEQA requires that any growth-inducing aspect of a project be discussed in an EIR. Pursuant to the State CEQA Guidelines section 15126.2(d), this discussion should include ways in which the project could directly or indirectly foster economic or population growth or construction of new housing in the surrounding area. Projects which could remove obstacles to population growth (such as major public service expansion) must also be considered in this discussion as well as characteristics of the project that may encourage and facilitate other activities that could result in significant impacts. According to CEQA, it must not be assumed that growth in any area is necessarily beneficial, detrimental or of little significance to the environment.

Implementation of the BMP Update’s proposed components would not result in construction of residential, commercial, or industrial structures, and thus would not directly foster population or economic growth. The overall objectives of the BMP Update is to prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation, while managing existing and supplemental water supplies to control overdraft and to provide for present and future water needs. The BMP Update components would provide for conservation, increased deliveries of recycled water and additional recharge that collectively could contribute approximately 12,000 acre-feet per year estimated to be needed to solve more than 90 percent of the seawater intrusion and basin overdraft problems in the Pajaro Valley groundwater basin.

Therefore, the intent of the proposed program is to balance the groundwater basin by developing conservation and programs to help offset groundwater pumping. The project is not providing a new potable water supply, nor is the PVWMA a water purveyor. The BMP Update does not provide water supply for municipal or industrial uses that would support growth of residential, commercial or industrial uses. PVWMA’s enabling act includes provisions indicating that no water shall be imported for purposes other than agricultural use. Through components of the BMP Update, the provision of agricultural irrigation water to areas served by the proposed components would not induce urbanization of lands receiving the water. These lands are in agricultural use and the proposed supplemental water supplies are expressly intended to support continuation of that agricultural use in keeping with the PVWMA charter and due to the distribution facilities being designed for recycled water distribution. The legislation that established the PVWMA gives priority to agriculture, as allowed by law, and restricts imported water use to agricultural (with one exception for the Aromas Water District). Thus, the implementation of the project would not indirectly foster population or economic growth.

Although the Pajaro groundwater basin is and has been in state of overdraft for decades, there is no current restriction on or obstacle to growth in either the unincorporated Santa Cruz county area or within the City of Watsonville. While the intent of the project is to reduce impacts on the groundwater basin related to overdraft and seawater intrusion, implementation of the BMP Update components would not remove an obstacle to growth as growth is not currently restricted due to water supply availability.
4.3 **IRREVERSIBLE ENVIRONMENTAL CHANGES**

Section 15126(f) of the State CEQA Guidelines requires EIRs to include a discussion of significant, irreversible environmental changes that would result from project implementation. CEQA Section 15126.2(c) identifies irreversible environmental changes as those involving a large commitment of nonrenewable resources or irreversible damage resulting from environmental accidents.

The project would develop water supply facilities aimed at reducing groundwater pumping and seawater intrusion conditions. Irreversible changes associated with the project include the use of nonrenewable resources during construction, including building materials (such as concrete, glass, some types of plastic) and use of petroleum products. During the operational phase of the project, some electricity would be used for pumping, lighting, and appurtenant facilities, such as automation and data collection/information technology. These irreversible environmental changes would be considered negligible and not a large commitment of nonrenewable resources in relation to the breadth of projects utilizing the same resources throughout the region and world. No significant environmental accidents would be anticipated based on the scale of this project.
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5 ALTERNATIVES TO THE BMP UPDATE

5.1 INTRODUCTION

CEQA Guidelines §15126.6 requires the consideration of a range of reasonable alternatives to the Proposed Project (in this case, the BMP Update) that could feasibly attain most of the basic objectives of the project. The CEQA Guidelines further require that the discussion focus on alternatives capable of eliminating significant adverse impacts of the project or reducing them to a less-than-significant level, even if the alternative would not fully attain the project objectives or would be more costly. The range of alternatives required in an EIR is governed by the “rule of reason,” which requires an EIR to evaluate only those alternatives necessary to permit a reasoned choice. An EIR need not consider alternatives that have effects that cannot be reasonably ascertained and/or are remote and speculative.

In compliance with CEQA, this section discusses the "No Project Alternative" as well as other alternatives and compares them to the Proposed BMP Update. Through a comparative analysis of the environmental impacts and merits of the alternatives, this section is focused on those alternatives capable of eliminating significant adverse environmental impacts of the project, or reducing them to a less-than-significant level.

This chapter describes and evaluates alternatives that were presented in some detail in the BMP Update. This EIR incorporates by reference all previous alternative analyses that have been conducted in previous EIRs on the PVWMA's BMPs and Local Water Supply Projects, including those evaluated in the following PVWMA EIRs:

- 1993 BMP EIR (PVWMA, 1993 at pages 11-1 through 11-36),
- 1999 Local Water Supply EIR (PVWMA/ESA, 1999 at pages 10-1 through 10-7), and
- 2002 Revised BMP EIR (PVWMA/ESA, Draft, 2001 and Final, 2002 at pages 6-1 through 6-30).

These alternatives are summarized in Section 5.2, below, and maps showing the key project locations and summaries of the environmental analyses of these alternatives from the EIRs are provided in Appendix D.

This EIR analyzes a "No Project" alternative, a demand management only alternative, Water Supply Facilities Alternatives (or structural alternatives), and an alternative considering other locations for BMP Update components. Alternatives that were not recommended in the BMP Update have been eliminated from discussion in this EIR for the reasons identified in Section 5.5. One of the reasons that alternatives may be eliminated from further consideration is if the alternative is not able to attain most of the basic objectives of the BMP Update, which are as follows:

- To prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation;
- To manage existing and supplemental water supplies to control overdraft and to provide for present and future water needs;
- To create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley;
- To develop water conservation programs; and
Section 5 Alternatives to the BMP Update

• To recommend a program that is cost effective and environmentally sound.

The alternatives analysis is intended to focus on eliminating, or reducing in significance, those project impacts identified in the DEIR as significant and unavoidable. The Draft EIR identified that the BMP Update would result in significant and unavoidable impacts to agricultural resources (specifically, conversion of agricultural land to non-agricultural uses). The Draft EIR determined that all other significant impacts could be reduced to a less-than-significant level through the incorporation of mitigation or project design features, including the following impact areas: aesthetics, air quality / greenhouse gas, biological resources, cultural resources, energy utilities & services, geology / soils, hazards and hazardous materials, surface water, groundwater, and water quality, and transportation / traffic.

5.2 ALTERNATIVES FROM PREVIOUS BMP AND LOCAL WATER SUPPLY EIRs


Proposed Project in the 1993 BMP EIR

PVWMA’s first BMP EIR (hereafter, the “1993 BMP EIR”) evaluated the environmental impacts of six distinct alternative plans presented in the 1993 BMP, each of which was capable of achieving the BMP 1993 objectives. The BMP Alternative 8A – College Lake, Feeder Canal, San Felipe was the preferred alternative and the proposed action analyzed in the 1993 BMP EIR. Its key feature was to develop a substitute coastal-zone water supply to groundwater pumping. Initially, water would be supplied from a 10,000 acre-feet (AF) College Lake Reservoir supplemented by water from Corralitos Creek and the Pajaro River via feeder canal. A review of likely yields from Kelly and Tynan Lakes indicated that these lakes offer minimal additional water. Further, because of the potential impacts on existing uses of the lakes that would result from water level fluctuations caused by operations, it was concluded that the Feeder Canal should be connected only to College Lake. Later, water from the San Felipe Division of the Central Valley Project (hereafter, the “San Felipe Division”) would be imported in to the Basin to further augment supplies. See Appendix D-1 for a map of the facilities and additional information.

Alternatives to the 1993 BMP Proposed Project

The following summarizes other alternatives considered in the 1993 BMP EIR:

BMP Alternative 2 - This alternative included water conservation, a seawater intrusion barrier, wastewater reclamation, and the Corncob Canyon reservoir. The intrusion barrier, comprised of injection wells along the coast, using reclaimed wastewater from Watsonville, would reduce the area requiring a substitute water supply. The barrier was assumed to require a substitute supply of 2,000 AFY to serve existing pumpers in the area along the coast where the seawater intrusion barrier would create a mound for maintaining a land-to-sea hydraulic gradient.

BMP Alternative 5 - This alternative would import wastewater from Santa Cruz to Watsonville for treatment at, and distribution from, a new wastewater reclamation plant. Coastal pumping would be eliminated and substitute supplies would be made available to the coastal area.
**BMP Alternative 8** - This alternative included use of College Lake, Kelly, Tynan Lakes, the Feeder Canal, and the San Felipe Division water. Coastal pumping would be eliminated and substitute supplies would be delivered to the coastal area in the Feeder Canal from College Lake and the San Felipe Division pipeline with storage in these lakes.

**BMP Alternative 10** - This alternative included importation of San Felipe Division water into the Basin, which in combination with reclaimed water injected to form a seawater intrusion barrier, could enhance long-term sustainable pumping.

**BMP Alternative 11** - This alternative included conservation, wastewater reclamation and reuse, and dams at Bolsa de San Cayetano and on Pescadero Creek. Coastal pumping would be eliminated and substitute supplies would be made available from wastewater reclamation and new reservoirs.

As with this EIR, the 1993 BMP included a No Project Alternative that assumed no remedial action, including no plans, policies, programs, or projects that would be undertaken by the PVWMA or others in the Basin to reduce groundwater pumping and seawater intrusion problems. In addition, the 1993 BMP EIR considered a Demand Management alternative that would use only mandatory basin-wide pumping controls for residential, agricultural, and industrial users.

A map of the key facilities and summary of conclusions of the environmental analyses of the proposed project and alternatives in the 1993 BMP EIR are included in Appendix D-1.

### 5.2.2 Local Water Supply and Distribution Environmental Impact Report (1999)

**Proposed Project in the 1999 Local Water Supply and Distribution EIR**

In March 1994, PVWMA initiated investigation to identify and define potential local water supply projects. An evaluation of 16 water sources and 47 potential sites resulted in a recommendation of further investigation of the following concepts and facilities, all of which were evaluated in the 1999 Local Water Supply and Distribution EIR (see map of key proposed project facilities and more information in Appendix D-2):

- **College Lake** – This proposed project element in the 1999 Local Water Supply and Distribution EIR was generally the same as the currently proposed College Lake with Inland Pipeline to the CDS, except for the pipeline alignments and distribution system connection points.
- **Harkins Slough** – This proposed project element is essentially the same as the existing operational Harkins Slough Managed Aquifer Recharge and Recovery project that began operations in 2002.
- **Murphy Crossing** – This 1999 proposed project element was similar to the currently proposed Murphy Crossing with Recharge Basins component except, in addition to diversion of Pajaro River water for recharge only, the water was proposed to be stored and extracted for conveyance to the coastal service area.
- **Watsonville Wastewater Reclamation Option** – This 1999 proposed project element was originally considered in future phases of the water supply project implementation because it was thought that imported water would be required to provide 5:1 dilution of recycled water. As described previously in this Draft EIR, the City of Watsonville and PVWMA completed construction and began operating the Recycled Water Project and Coastal Distribution System that is consistent with this alternative in 2009.
Section 5 Alternatives to the BMP Update

- **Distribution Systems/Service Areas** – The following three irrigation distribution system/service areas were considered in the 1999 Local Water Supply and Distribution EIR: (1) Coastal Service Area: adjacent to and between Highway 1 and the Pacific Ocean, approximately 8,200 acres, (2) Murphy Crossing Service Area: around Murphy Crossing, approximately 2,100 acres and, (3) Inland Service Areas: along the proposed import pipeline from Highway 1 east to Murphy Crossing and north of the Pajaro River, approximately 5,800 acres.

Alternatives to the 1999 Local Water Supply EIR Proposed Project

In the 1999 Local Water Supply and Distribution EIR, other alternatives were considered including the No Project Alternative and the Demand Management Only Alternative, both of which were described in detail in the 1993 BMP, referenced in the above section. In addition, the EIR described and evaluated the following Structural Alternatives (see map of key alternatives and more information in Appendix D-2):

- **Pajaro Recharge Canal to College Lake** – This alternative would include diversion from the Pajaro River into a 20-foot-bottom-width recharging canal that would discharge residual flows into College Lake for storage and reuse. The facility was eliminated primarily due to cost and lack of land with suitable recharge capacity in the appropriate area. In addition, the canal would cause potentially significant unavoidable impacts to migrant birds and wetlands.

- **College Lake Reservoir** - This alternative would include a 27-foot high dam be constructed at the location of the existing College Lake drainage pumphouse to create a 10,000 AF storage facility. The reservoir would be supplied with a supplemental 25 cubic feet per second (cfs) diversion from Corralitos Creek in the winter months, yielding 3,400 AFY, as well as water diverted from the Pajaro River, as described in the element above. The reservoir would also be supplied with natural runoff. The coastal distribution system would receive water through a 5-mile, 30-inch diameter pipeline along Lake Avenue and Beach Road. This element could be phased into use by initially using the existing storage capacity of College Lake (approximately 1,400 AF) and supplementing it with nearby groundwater pumping. For the proposed 1999 project and the currently proposed College Lake with Inland Pipeline to CDS, the structure of the facility was altered due to adverse impacts of raising College Lake levels that were not expected to be offset by sufficient beneficial storage capacity. In addition, this larger alternative would result in the loss of 400 acres of prime farmland.

- **College Lake Injection/Extraction Wells** – This element proposed seven wells that would inject diverted surface runoff that is currently captured in College Lake into the Aromas aquifer. The injection wells would have been south of the proposed College Lake Dam. The wells would have a conjunctive use function with the San Felipe Division project during dry years when the San Felipe Division water is reduced, the wells could be used for extraction of groundwater. In the future, the injection wells could be converted to extraction wells to supplement flows captured in College Lake for delivery in the coastal area for crop irrigation. This option was eliminated primarily because the relationship of cost and impacts to potential yield was not as efficient as with other alternative structural facilities.

- **Bolsa De San Cayetano Reservoir** – This alternative would include a 4,000 AF reservoir at Bolsa De San Cayetano. A 90-foot high dam would be constructed across the mouth of a topographic depression, south of Trafton Road. The reservoir would store tertiary-treated water produced at the Watsonville Wastewater Treatment Plant during the winter months. The reservoir would have
been supplied via a pipeline from the Plant, and stored reclaimed water would be released into the coastal distribution system. Storage would allow seasonal distribution of reclaimed water as required for direct crop irrigation reuse. At the time, this project would have required treatment upgrades at the Wastewater Treatment Plant to produce tertiary or reclaimed water.

- **Corncob Canyon Reservoir** – This element requires construction of a 21,000 AF reservoir at Corncob Canyon. A 160-foot high dam would be constructed at the intersection of Vega and Lewis Roads. In addition to the main dam, five saddle dams would also be constructed. An intake canal, pumping plant, pipeline, and associated spill outlet would be located at the main dam, and a delivery pipeline would also have been components of this element. The reservoir would be supplied with a 200 cfs surplus winter diversion off the Pajaro River, downstream of Murphy Crossing. This element would deliver 10,000 AFY to the coastal distribution system via pipeline along Garin, Elkhorn, and Trafton Roads. This option was eliminated due to impacts on existing homes and resources in the Corncob area.

- **Pescadero Reservoir** – This element requires the construction of a 20,000 AF reservoir at Pescadero Creek. A 190-foot high dam would be constructed approximately 1,500 feet upstream from the Pescadero Creek and Pajaro River confluence. Natural watershed runoff and a 75 cfs surplus winter diversion from the Pajaro River would supply the reservoir. The riverflow diversion would require a static pumping lift of approximately 200 feet. Water would be delivered through at 13-mile, 42-inch diameter coastal distribution system. This element would yield 7,600 AFY, but was eliminated due to infeasibility and environmental impacts.

A map of the key facilities in the proposed project and alternatives and summary of conclusions of the environmental analyses of the proposed project and alternatives in the 1999 Local Water Supply and Distribution EIR are included in Appendix D-2.

### 5.2.3 Revised Basin Management Plan Environmental Impact Report (2002)

#### Proposed Project in the 2002 Revised BMP EIR

The 2002 Revised BMP EIR described and evaluated the following two potential projects in detail, the BMP 2000 Alternative and the Local-Only Alternative. A map of the key facilities in these proposed alternatives in Appendix D-3.

**BMP 2000 Alternative** – This alternative included the following components:

- **Water Conservation** – This component, based on the Water Conservation report (PVWMA, 2000), included water metering program, agricultural and urban water conservation.
- **Water Recycling** – The recycling component of the BMP 2000 Alternative included construction of tertiary treatment facilities at the Watsonville Wastewater Treatment Facility and pumping, blending, storage, and distribution facilities to offset a portion of the irrigation demands in the coastal area during the irrigation season. This facility was completed in 2009.
- **Groundwater Banking** – This alternative involves importing surface water and using it in lieu of groundwater whenever it is available, allowing for natural recharge of the groundwater basin. During droughts and dry periods when little or no surface water may be available, PVWMA would then pump the groundwater that was “saved” or “banked” during wet periods. The Groundwater Banking component of the BMP 2000 Alternative includes construction of an
inland distribution system and a pipeline to link the Pajaro Valley with the Santa Clara Conduit of
the San Felipe Division facilities. The design capacity available to PVWMA in the Santa Clara
Conduit is 75 cfs. The facilities associated with the Groundwater Banking component include the
Import Pipeline, supplemental wells, and Inland Distribution System.

- **Harkins Slough and Murphy Crossings Projects** – as described in the 1999 EIR.
- **Coastal and Inland Distribution Systems.** A significant portion of the proposed Coastal
Distribution System was built between 2006 and 2009 and is shown in Figure 2-3 of Section 2 of
this Draft EIR. The Inland Distribution System was originally proposed in the 1999 Local Water
Supply and Distribution Project to include irrigation pipelines to deliver non-potable water to
areas along the Central Valley Project import pipeline from Highway 1 east to Murphy Crossing
and north of the Pajaro River.

**Local-Only Alternative** – This alternative aimed to eliminate seawater intrusion through the
implementation of local water supply projects and demand management measures, without importing
water from outside the basin. This alternative would implement some of the projects that are proposed
under the BMP 2000 Alternative, including recycled water and water conservation, in addition to other
local water supply projects, which include the following:

- **Intensified Water Conservation** – The conservation component was proposed to be similar to the
BMP 2000 Alternative with expanded programs.
- **Water Recycling and Storage** – This element of the Local-Only Alternative includes many of the
same aspects of the Water Recycling element of the BMP 2000 Alternative; however, it also
includes year-round treatment and storage during low-demand periods.
- **Expanded College Lake with Corralitos Creek, Pinto Lake, Watsonville Slough, and Harkins
Slough Diversion with Aquifer Storage and Recovery Program** – The Expanded College Lake
project proposes an increase in the total storage capacity of College Lake to 4,600 AF. Water
diverted from Harkins and Watsonville sloughs, Corralitos Creek, and Pinto Lake would be
stored at College Lake and subsequently conveyed to the Coastal Distribution System or injected
into the groundwater basin for temporary storage and subsequent recovery.
- **Coastal Distribution System** – This component was proposed to be similar to the BMP 2000.

**Alternatives to the 2002 BMP EIR Proposed Project**

In the 2002 Revised BMP EIR, other alternatives were considered including the following:

- **No Project Alternative** – The 2002 EIR incorporates by reference the No Project Alternative used in the
1993 BMP, which is detailed in section 5.2.1.
- **Modified BMP 2000 Alternative** – This alternative was developed based on input from local stakeholders.
The Modified BMP 2000 Alternative involves the injection of Central Valley Project water into the
groundwater basin for storage. This alternative includes the following components:

  - An Import Pipeline
  - Injection/Extraction Wells for Central Valley Project water
  - Modified local water supply projects including: Coastal Distribution System, Conservation
    (Seven-Year Plan), Harkins Slough project with recharge basin and supplemental wells and
connection, Recycled Water Facility, and 54-inch Import Pipeline with injection/extraction wells for Central Valley Project water

**Modified Local-Only Alternative** – This alternative addresses the fundamental shortcoming of the Local-Only Alternative, that it requires a significant amount of agricultural land. This alternative adds another new recharge basin for recycled water, referred to as the Southeast Dunes recharge basin. The specific water supply, transmission, and storage projects comprising the alternative include:

- Harkins Slough Facilities
- Pinto Lake Diversion
- Watsonville Slough Diversion
- Import Central Valley Project Water
- Recycled Water Facility
- College Lake
- North Dunes recharge basin
- Southeast recharge basin

**Regional Serving Alternative** – At the time that this EIR was written, this alternative had not yet been developed. It was included upon request of the Soquel Creek Water District (SCWD). This alternative considers a joint water supply project between SCWD and PVWMA. PVWMA and SCWD entered into a Memorandum of Agreement (MOA) to set forth the parties’ intent to work together toward development of a potential project in which PVWMA would acquire and distribute a water supply of approximately 2,000 AFY to SCWD in order to meet its long-term water supply needs, and provide a new amount of water to the Pajaro Valley. If the agencies determined that a viable project could be developed between them, the agencies could enter into a binding agreement at that time.

**Alternative Alignments to the Import Pipeline** – PVWMA considered several pipeline route variations for the Import Pipeline. The alternative routes were proposed because of engineering design considerations and flexibility in final site selection, and are not complete alternatives to the project as their implementation would involve only construction of the Import Pipeline to bring water into the PVWMA service area.

A summary of conclusions of the environmental analyses of the proposed project and alternatives in the 2002 BMP EIR is included in Appendix D-3.

### 5.3 NO PROJECT ALTERNATIVE

The No Project alternative is defined as no remedial action. By definition it includes no plans, policies, programs, projects, or components that would be undertaken by the PVWMA or any other body or individual in the Basin relative to development of BMP components considered by this EIR. Groundwater, recycled water, and Harkins Slough diversions (up to 2,000 AFY) would continue to be the source of water for agricultural irrigation as described in Chapter 2. Industrial, commercial, and domestic residential use of water within the City of Watsonville would continue as in the current condition (see Chapter 2). Groundwater extraction by the City of Watsonville may increase to meet any potential higher future water demand; however, the City is implementing aggressive water conservation programs and is also planning for expansion of alternative water supplies, including surface water diversions. The City of Watsonville’s stated goal regarding water demand is to have no net increase in groundwater use (Steve
Palmisano, Board of Directors/Ad Hoc BMP Committee Joint Meeting, August 2012). The Basin's overdraft condition is anticipated to continue without implementation of the BMP Update. Seawater intrusion would continue to advance beneath the coastal lands at the current rate of 1,900 AFY or higher. On coastal acreage that do not receive delivered water, irrigation with groundwater would continue until the salt content in the soils builds up to the point where existing agricultural crops typical of the area could not grow. Production of more salt tolerant crops may occur; however, the economy of the area would change. This alternative assumes with continued overdraft and encroaching seawater, wells would eventually become unusable and lands would be fallowed. This would represent a significant impact due to loss of agricultural lands that may be affected by seawater intrusion and that are not served by the coastal distribution system.

5.4 **DEMAND MANAGEMENT ONLY ALTERNATIVE**

This alternative would use only demand management measures to achieve the PVWMA's water management objectives, which are to balance water use and supply in the Basin and progressively decrease seawater intrusion. The Basin would be brought into balance through mandatory basin-wide pumping controls only, for residential, agricultural, and industrial users. Groundwater modeling has indicated that it would be necessary to reduce groundwater pumping by 12,000 AFY. This 12,000 AFY represents the difference in the water budget (Inflows less Outflows = -12,000 AFY) based on the 33 Basecase simulation developed between the Agency and the USGS. The Basecase assumed 7,150 AFY of delivered water, among other things. The analysis was based on a basin-wide evaluation. Hydrometrics then tested the BMP scenarios and found that the proposed projects and programs would balance the basin and eliminate the majority of SWI. Since municipal and industrial water uses comprise approximately 18 percent of current water use, the major reduction would fall on agricultural users (PVWMA, 2013). The City of Watsonville’s stated goal regarding water demand is to have no net increase in groundwater use (Steve Palmisano, Board of Directors/Ad Hoc BMP Committee Joint Meeting, August 2012). This alternative would be most likely to occur if PVWMA fails to implement the BMP Update or any of its components. Without any additional BMP Update, the State Water Resources Control Board or a private entity may intervene. In this case, the State, by statutory adjudication, or the courts by judicial order, would designate an authority, possibly PVWMA, to regulate and oversee the management of water in the Basin, and may impose stringent pumping controls.

However, the Demand Management alternative would conflict with one of the primary BMP Update alternative formulation criteria and thus would not meet a key project objective: provide for needs of all Basin water users. In addition, this alternative would have significant and far worse impacts on agricultural land resources and would adversely affect the economy of the region. For this reason, a Demand Management Only alternative was not pursued in the BMP Update and is not considered further herein.

5.5 **WATER SUPPLY FACILITIES ALTERNATIVES**

A wide variety of structural facilities (i.e., projects or BMP components) were considered as potential projects in the BMP Update during the early phases of BMP Update development. In fact, a primary task of the BMP Update was project alternative development and screening. The project development and screening was a two-stage project review process, consisting of a fatal flaw screening, followed by a more
detailed development of feasible projects. The process began with an extensive list of supplemental water supply projects that could help replenish the basin and bring it back into balance, including projects from the 2002 BMP, committee-developed projects, community group-developed projects, IRWM regional projects, and consultant-developed projects. Project summary sheets and cost estimates for 44 projects considered during the BMP Update effort are included as Appendix B of the BMP Update. Most of these projects were eliminated from consideration due to feasibility (technical and cost) considerations; however, environmental issues and regulatory constraints were also considered.

From the entire list of projects and programs, the BMP Update process narrowed this list to a ranking of fourteen programs/projects, as displayed in Table 5-1 below. As displayed, the first seven programs/projects contain the primary components ultimately selected for evaluation as the "proposed project" within this EIR for the BMP Update. Table 5-1 shows that with the exception of the Murphy Crossing with Recharge Basins component, the remaining programs/projects can potentially be implemented within the first 10 years of the implementation of the BMP Update (i.e., by the year 2025). The remaining selected programs/projects in the BMP Update, including the Murphy Crossing with Recharge Basins component, may be implemented after 2025 depending on the success of the primary components/projects in halting seawater intrusion. The potential environmental impacts of the seven proposed components included in the BMP Update portfolio are analyzed within this EIR at a programmatic level.
### Table 5-1 BMP Update Summary of Projects and Programs

<table>
<thead>
<tr>
<th>Project or Program</th>
<th>Estimated Yield AFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-6 Increased Recycled Water Deliveries</td>
<td>1,250</td>
</tr>
<tr>
<td>D-7 Conservation</td>
<td>5,000</td>
</tr>
<tr>
<td>S-22 Harkins Slough Recharge Facilities Upgrades</td>
<td>1,000</td>
</tr>
<tr>
<td>R-6 Increased Recycled Water Storage at Treatment Plant</td>
<td>750</td>
</tr>
<tr>
<td>S-2 Watsonville Slough with Recharge Basins</td>
<td>1,200</td>
</tr>
<tr>
<td>S-3 College Lake with Inland Pipeline To CDS (See Note 2)</td>
<td>2,400¹</td>
</tr>
<tr>
<td>S-1 Murphy Crossing with Recharge Basins</td>
<td>500</td>
</tr>
<tr>
<td>I-1 CDS Expansion</td>
<td>Footnote²</td>
</tr>
<tr>
<td>R-11 Winter Recycled Water Deep Aquifer ASR</td>
<td>3,200</td>
</tr>
<tr>
<td>S-11 River Conveyance of Water for Recharge At Murphy Crossing</td>
<td>2,000</td>
</tr>
<tr>
<td>G-3 San Benito County Groundwater Demineralization at WWTP</td>
<td>3,000</td>
</tr>
<tr>
<td>S-4 Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and Aquifer Storage and Recovery</td>
<td>2,000</td>
</tr>
<tr>
<td>SEA-1 Seawater Desalination</td>
<td>7,500</td>
</tr>
<tr>
<td>S-5 Bolsa De San Cayetano with Pajaro River Diversion</td>
<td>3,500</td>
</tr>
</tbody>
</table>

**Key:**
- **Bold** = Could be implemented within the first 10 years of the BMP (by 2025)
- **Italic** = Could be implemented after 2025, based on ongoing adaptive management assessment.
- **Dark Outline** = Seven projects included in proposed BMP Update (called “primary” in this section)
- not outlined in bold = seven projects that potentially be added in the future if needed (called “secondary” in this section)

**Notes:**
1. College Lake with Inland Pipeline to CDS yield changed to a range of 2,100 to 2,400 AFY based on RCD College Lake Study (2013).
2. Since the project conveys water from other projects, it does not have a yield.

This alternative description considers implementation of one or more of the “secondary” programs/projects (i.e., those that could potentially be added in the future, if needed) for implementation.
Section 5 Alternatives to the BMP Update

instead of one or more of the five (5) components with potentially significant impacts.¹ These secondary components were not included in the primary suite of BMP Update components for various reasons during the BMP 2012 Ad Hoc Committee Alternatives Review process; therefore, they may require additional environmental review prior to implementation. However, they will be considered in this section as replacements for certain BMP Update primary components in this Alternatives Analysis to the extent that they may reduce one or more significant impacts identified in this EIR. These alternative projects/programs include:

- I-1 CDS Expansion
- R-11 Winter Recycled Water Deep Aquifer ASR
- S-11 River Conveyance of Water for Recharge At Murphy Crossing
- G-3 San Benito County Groundwater Demineralization at Watsonville WWTP
- S-4 Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and Aquifer Storage and Recovery
- SEA-1 Seawater Desalination
- S-5 Bolsa De San Cayetano with Pajaro River Diversion

A brief summary of these alternatives is provided below and more detail is included in Appendix E, including conceptual project plan and schematics. A qualitative summary of potential environmental impacts of these programs/projects is presented in the descriptions below and a comparative analysis to the proposed BMP Update components is provided in Section 5.7.

5.5.1 CDS Expansion

The existing Coastal Distribution System (CDS) was installed to deliver water to coastal growers. Depending on the success of conservation, expansion of the CDS may be needed to expand the delivered water area and stop seawater intrusion and balance the basin. This alternative does not create additional water; therefore, it has no project yield, but rather contains the infrastructure required to deliver the water from other (existing and proposed) projects to coastal growers outside of the existing delivered water zone. The proposed alignment would extend north from the existing CDS to serve agricultural land south of Zils Road. The expanded area has an average water demand of approximately 2,000 AFY. The pipeline routing could be modified if the North Dunes recharge basin (part of the Watsonville Slough with Recharge Basin component) is built.

Potential environmental effects associated with this project would primarily be related to construction-related impacts, as the pipeline expansion would most likely be located nearly entirely within existing roadways (or unpaved agricultural roads). Potential construction-related impacts would include impacts to Air Quality, Greenhouse Gas Emissions, Noise, Erosion, and Traffic, all of which would be less than significant or could be mitigated to a less than significant level with standard mitigation. This alternative BMP Update component would be the most useful with successful implementation of one or more of the following: Conservation (thus freeing up CDS water for more agricultural land), College Lake and Inland

¹ Specifically, the Conservation and Increased Recycled Water Deliveries involve no direct physical changes to the environment and require no new physical facilities, thus no significant adverse impacts were identified for these components and alternatives to reduce impacts are not warranted.
Pipeline to CDS, Harkins Slough Recharge Facility Upgrades, or Watsonville Slough with Recharge Basins, all of which provide additional water for the use in the CDS. Without successful implementation of one of those, it would not be technically effective. This alternative component would also be more useful if the Increased Recycled Water Deliveries or the Conservation Programs do not result in their expected benefits.

5.5.2 Winter Recycled Water Deep Aquifer ASR

The Watsonville Recycled Water Treatment facilities have the capacity to produce approximately 3,200 AF of recycled water during the winter months when there is little or no irrigation demand. During the winter, this tertiary treated water would be injected into deep aquifers confined by overlying and underlying geologic formations that do not produce water. The water would then be recovered from the same wells later during times of peak demand. This alternative involves the construction of approximately eight 2,000 to 2,500-foot deep injection wells located on the western side of the CDS. The number of wells and recovery yield may vary depending on individual well site conditions.

Potential environmental impacts associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, geology and soils, hydrology and water quality, noise, traffic, and utilities) due to construction of injection wells and associated pipelines and backflush facilities. The project may also potentially result in significant impacts in the following resources/issue areas:

- biological resources due to permanent or construction-related disturbance to habitat areas or direct impacts to plants or wildlife species,
- water quality and hydrology impacts due to changes in groundwater flows and quality and temporary disturbances to soils resulting in changes to water quality in surface water bodies during construction,
- geology & soils impacts due to incompatible or unstable soil properties, seismicity/faulting, and erosion,
- cultural resources due to disturbance to known or unknown resources that may be discovered during ground-disturbing activities, and
- air quality and increased GHG emissions due to higher energy demands (i.e., electricity for pumping).

This alternative may be feasible from a technical perspective, but may be more difficult to achieve regulatory and permitting requirements due to recycled water groundwater injection regulations of the RWQCB and the California Department of Public Health and would be more expensive to implement.

5.5.3 River Conveyance of Water for Recharge at Murphy Crossing

The project would convey water from an unidentified source via the Pajaro River for groundwater recharge from the eastern edge of the groundwater basin to Murphy Crossing. Unidentified water from out of the basin would be released to the Pajaro River during months of relatively low flow, commonly June through December.

The project would convey water from an unidentified source via the Pajaro River for groundwater recharge from the eastern edge of the groundwater basin to Murphy Crossing. Unidentified water from
out of the basin would be released to the Pajaro River during months of relatively low flow, commonly June through December.

This alternative would potentially result in construction-related impacts (air quality, greenhouse gas emissions, geology and soils, hydrology and water quality, noise, traffic, and utilities) due to construction of Central Valley Project pipelines and backflush facilities. The alternative may also result in significant impacts in the following resources/issue areas:

- biological resources due to permanent or construction-related disturbance to habitat areas or direct impacts to plants or wildlife species,
- water quality and hydrology impacts due to changes in groundwater flows and quality, and temporary disturbances to soils resulting in changes to water quality in surface water bodies during construction,
- geology & soils impacts due to incompatible or unstable soil properties, seismicity, faulting, and erosion,
- cultural resources due to disturbance to known or unknown resources that may be discovered during ground-disturbing activities, and
- air quality and increased GHG emissions due to higher energy demands (i.e., electricity for pumping).

Although this alternative component could assist in meeting most of the basic project objectives, it would require complex permitting efforts and agreements amongst numerous stakeholders, thus was not considered to be implementable in the near term (i.e., through 2025). It was also considered to be slightly more expensive than other alternative components.

5.5.4 San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant

The Santa Clara Valley Water District (SCVWD) and the San Benito County Water District (SBCWD) performed a feasibility study of desalinating groundwater within the San Juan Valley. The groundwater contains high levels of total dissolved solids (TDS) and would require treatment to reduce these levels. This alternative differs from that outlined in the feasibility study in that the desalination would occur at the Watsonville Wastewater Treatment Plant to facilitate brine management and disposal. Approximately 3,000 AFY of groundwater would be pumped from the San Juan groundwater sub-basin to the Watsonville Wastewater Treatment Plant for treatment. The project includes building seven new groundwater wells, a pump station, approximately 19-miles of conveyance pipeline, and a reverse osmosis treatment and disinfection system at the Wastewater Treatment Plant. Treated water would be discharged directly to the City of Watsonville through an existing water line running to the plant, to agricultural users through the CDS, and potentially inland agricultural users if the College Lake pipeline is constructed. The waste brine would be discharged through the Wastewater Treatment Plant’s existing outfall.

Potential environmental impacts associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, noise, and traffic) due to construction of injection wells, pump station, treatments systems, and associated pipelines and backflush facilities. The project potential may also result in significant impacts in the following resources/issue areas:
• biological resources due to permanent or construction-related disturbance to habitat areas or direct impacts to plants or wildlife species and to marine resources due to disposal of brine,
• water quality and hydrology impacts due to changes in groundwater flows and quality from extraction of groundwater and creation of brine evaporation ponds, and temporary disturbances to soils resulting in changes to water quality in surface water bodies during construction,
• geology & soils impacts due to incompatible or unstable soil properties, seismicity, faulting, and erosion.
• cultural resources due to disturbance to known or unknown resources that may be discovered during ground-disturbing activities, and
• air quality and increased GHG emissions due to higher energy demands (i.e., electricity for pumping).

This alternative was considered to be feasible from a technical perspective and could assist in meeting most of the basic project objectives, but may not be financially feasible and had institutional constraints due to agreements needed with SBCWD.

5.5.5 Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and Aquifer Storage and Recovery (ASR)

College Lake is a seasonal water body in a fault-controlled depression located to the north of Holohan Road west of Highway 152, near St. Francis Cemetery. The lake captures runoff from an 11,000 acre watershed during the winter. The Expanded College Lake Project would increase the total storage capacity of College Lake to 4,600 AF, increase the water supplies to College Lake, and add a seasonal storage component. This project would divert water from Corralitos Creek, Pinto Lake, and Watsonville Slough and provide ASR injection during the winter and recovery during the summer. During the late spring, summer and fall months, Pinto Lake experiences heavy blooms of blue green algae (also known as cyanobacteria). Blue green algae blooms are an emerging health threat in the United States and many other countries. These blooms often produce toxins, which can be harmful to humans and animals. A filtration and disinfection system would treat water from College Lake prior to entering the distribution pipeline. Two pipelines would be required; one to convey filtered water to the injection system wells, and a second to convey water from the slough to College Lake in the winter and also to convey College Lake and well water to the CDS during the irrigation season. This project would include the construction of College Lake main dam and saddle dam, filtration and disinfection facilities, pump stations, ASR wells, and approximately 15 miles of new conveyance pipeline. Note: The Harkins Slough yield (1,100 AF) was included in the 2002 BMP; however, it is no longer considered as part of the suite of BMP Update components because it has already been built, and is in operation, and therefore, is considered an existing condition.

Potential environmental effects associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, hydrology/water quality, noise, traffic, utilities) that would occur in a large geographic area due to the amount/extent of construction activities (including dam, wells, pipelines, pump stations, filtration facilities, and appurtenant facilities). This alternative would have the same and greater impacts than the College Lake project including impacts to biological resources (habitat, special-status plants, steelhead, and birds), hydrology, water quality, flooding, cultural resources, and geology & soils (due to incompatible or unstable soil properties, seismicity, faulting, and erosion),
and potential blue green algae toxin issues at Pinto Lake that could have an unacceptable and significant human health impact. Operational emissions of air pollutants and greenhouse gas emissions would be greater than with the proposed BMP components due to the amount of pumping necessary for the various conveyance facilities.

This alternative may be feasible from a technical perspective and could assist in meeting most of the basic project objectives, but may not be financially feasible.

5.5.6 Seawater Desalination

This project includes construction and operation of a seawater desalination facility that would produce potable water from seawater. The project consists of a seawater intake structure(s) and pipeline, desalination plant, brine discharge and outfall facilities, product water conveyance pipelines to the recycled water treatment plant clearwell and three City of Watsonville potable wells (8 miles of 24-inch pipe), and storage facilities. The treated water would be used for agricultural irrigation during the irrigation season via an expanded CDS, and as potable water for the City of Watsonville during winter months.

Potential environmental effects associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, noise, hydrology/water quality, traffic, and utilities) due to construction or upgrades to intake facilities, treatment plant, brine disposal facilities and product water conveyance facilities. Potentially significant and more severe operational impacts would be expected in most resource issues/topics, including aesthetic resources, air quality, biological (including marine) resources, climate change, coastal resources, cultural resources, geology & soils, greenhouse gas, utilities/services, growth inducement, and water supply/quality. This project component has numerous and more severe potentially significant environmental impacts, including due to brine disposal impacts on water quality and marine biological resources, potential marine life impingement/entrainment, and use of energy resulting in higher greenhouse gas emissions than any other alternative. If included as a BMP Update component, it could reduce the significant and unavoidable impact of the BMP Update due to conversion of agricultural land to non-agricultural uses.

This project would be more costly, more difficult to achieve regulatory compliance and permits, and result in increased impacts on the environment in the issue areas identified above.

5.5.7 Bolsa de San Cayetano with Pajaro River Diversion

This project consists of two options, one involving surface water only and one involving both surface and recycled water. Option 1 involves the construction of the Bolsa De San Cayetano Dam and Reservoir for seasonal surface water storage to allow up to 5,000 AF in peak storm flow years of Pajaro River water to be diverted and pumped to the reservoir in the winter and used to meet irrigation demand in the summer. The dam and reservoir would be located in Monterey County on the south side of the Pajaro River and adjacent to Trafton Road. The reservoir site is surrounded by 100- to 150-foot high terrace upland that has been eroded to form a canyon. The earth fill dam would be located across the mouth of the canyon to form the reservoir. A small saddle dam would also be constructed on the north ridge. The Pajaro River diversion would consist of an infiltration gallery, filtration system, and pump station facilities. The diversion would be located approximately 0.5 miles upstream of the confluence of Salsipuedes Creek and the Pajaro River. It is assumed the water would need to be filtered and disinfected after storage to meet...
user requirements. Option 2 involves using the reservoir for both surface water and recycled water storage. Option 2 uses the same infrastructure as Option 1 and also includes lining the reservoir as may be required by the Regional Water Quality Control Board for surface storage of recycled water. Having the availability to store recycled water increases the average project yield since some years sufficient surface water is not available for diversion.

Potential environmental effects associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, hydrology/water quality, noise, traffic, and utilities) due to construction of the dam, pump station, diversion facilities, and conveyance pipelines. The construction impacts would be greater than many of the other alternative components. The project would be expected to have significant impacts to biological resources (including potential impacts to birds due to tree removal, sensitive plant species and habitat), coastal resources, hydrology, water quality, cultural resources, and geology & soils. Operational impacts due to air quality and greenhouse gas emissions would also be anticipated; however, to a lesser extent than most of the other alternative components because most of the storage would be downgradient from the diversion point.

Of the fourteen alternatives carried into the last alternatives screening process, this alternative is the most expensive and thus, may not be considered feasible.

5.6 ALTERNATIVE LOCATIONS FOR BMP UPDATE COMPONENTS

This section describes the potential for each component to be located at a different location, in terms of feasibility and the ability to reduce significant impacts of the BMP Update. A brief summary of these alternatives is provided below. A qualitative analysis of potential environmental impacts of these programs/projects is presented in the descriptions below and a more detailed comparative analysis to the proposed BMP Update components is also provided.

5.6.1 Alternative Locations for Conservation

No alternative locations are needed to reduce impacts of this component as it would not result in any significant impacts.

5.6.2 Alternative Locations for Increased Recycled Water Storage at Treatment Plant

Alternative sites of adequate size are not feasibly available at or near the Recycled Water Facility site without significant and more severe impacts on agricultural land or biological resources, and/or such sites would require cost-prohibitive property acquisition.

5.6.3 Alternative Locations for Harkins Slough Recharge Facilities Upgrades

Because this BMP Update component requires only upgrades to the existing pump station and treatment facilities, those components do not warrant relocation to reduce significant impacts. The proposed filter backwash to waste pipeline is proposed within existing roadways with very little traffic and no significant impacts that cannot be mitigated with standard construction practices; therefore, an alternative alignment is unnecessary to reduce significant impacts. Construction of a new recharge basin for the Harkins Slough Recharge Facilities Upgrades component has been identified as resulting in significant and unavoidable impacts to agricultural resources. There have been several potentially feasible recharge basins...
sites identified in the vicinity of the existing Harkins Slough Recharge Basin; however, the recharge basins that may be considered most feasible and least costly to construct are the Southeast Recharge Basin and the Monitoring Well #7 site due to their proximity to existing facilities. The proposed new recharge basin for this component (either the Monitoring Well #7 or the "Southeast" recharge basin), would have a significant impact on agricultural land; however, the alternative sites would also affect agricultural land (and would be similar on an acre-by-acre basis), the impacts of those basins have been evaluated in the Watsonville Slough with Recharge Basins component in Chapter 3. Other suitable sites may be presented that reduce impacts due to farmland conversion; however, currently there are no known feasible sites available. The proposed locations are currently considered the optimal locations due to soil types, hydrology, and percolation/recharge characteristics. In addition, the sites are relatively disturbed and lack quality habitat. Furthermore, feasible alternative locations that might achieve the basic project objectives may not reduce the number or severity of significant adverse impacts, assuming the same or similar design and operational characteristics. Specifically, pursuant to investigations to date, there is no environmentally superior location that could feasibly meet the BMP objectives. The conceptual design of this component minimizes the construction and operational environmental impacts of the proposed component through inclusion of the least environmentally damaging methods and facilities while still meeting the basic objectives of increasing the yield of the component up to the existing water right to maximize its benefit to the water supply portfolio and groundwater basin.

5.6.4 Alternative Locations for Watsonville Slough with Recharge Basins

The Watsonville Slough with Recharge Basins project has significant impacts in the following resource areas: agricultural resources, biological resources, geology and soils, operational and construction water quality, and traffic, all of which except agricultural resources impacts can be reduced to a less-than-significant level with mitigation. To better reduce these significant impacts beyond the mitigation measures already proposed in this EIR and/or to provide better operational characteristics / flexibility and success toward achieving groundwater basin benefits, several alternative locations for the diversion of slough water were analyzed during preparation of the Draft EIR. These include the following:

- an “off-stream” or “isolated stent” or “pond” in the general vicinity and/or associated with potential future wetland construction projects,
- a location north of the railroad tracks owned by Santa Cruz County Transportation in the vicinity of the confluence of Watsonville Slough and Hanson Slough, and
- other sloughs in the vicinity.

Off-Stream near Watsonville Slough Alternative

The physical location of the diversion point would be similar to the proposed Watsonville Slough component (i.e., within the general vicinity of the existing Harkins Slough diversion point or the area of the slough between that point and the railroad tracks to the north), but the diversion would be located "off-stream" in an isolated "stent" or "pond" area; the off-stream area may be a pond next to Watsonville Slough, or it may be an existing open-water area isolated from immediate connection with Watsonville Slough. This alternative “pond” would have a volume of between 50 and 150-acre feet (for example, 10-acres at 10-feet deep) and would require proper fish screening, CRLF screening (if possible), and turbidity/floatables management. A similar volume in one of the other sloughs or drainage ways might
also be used. Water flow would be managed into the pond through the use of self-adjustable valves. Ponds would receive diversions at high water, or (much more slowly) at lower water. Water from the pond would be sent through the treatment plant and to the recharge basins as proposed by the Watsonville Slough with Recharge Basins component. This alternative could be integrated with the NRCS-proposed wetland area at the confluence of the two sloughs. Prefiltration or treatment of water may be feasible in an isolated pond or slough. A pond on the east side of Watsonville Slough may draw in some of the moderately salty water within the ‘perched aquifer’ (as defined by California Department of Water Resources Bulletin 5, 1953); ponds on the west side of the slough are not as susceptible to this risk.

This alternative would have increased impacts on agricultural resources (i.e., due to conversion of agricultural land to a pond/stent system. The project also may significantly impact water quality and biological resources during operation. Construction impacts would be greater, but those are anticipated to be able to be mitigated to a less-than-significant level and operational air quality, aesthetics, noise, and traffic impacts would be similar to the Watsonville Slough with Recharge Basins component.

Based on current data and experience, PVWMA staff believes this type of project could not be feasibly planned, built and operated in the vicinity of the sloughs within the timeframes required. The ability of the pond or stent to receive adequate flows of water to feed into the filtration plant and ultimately to the recharge basins is questionable. No suitable sites have been identified within the vicinity of the existing filtration facilities and existing and proposed recharge basins.

**Hanson Slough near Watsonville Slough Alternative**

As part of preparation of this Draft EIR, the PVWMA BMP and EIR Team investigated in a change the point of diversion to a point in the lower reach of the Hanson Slough (i.e., within approximately ¼ mile of the Hanson Slough/Watsonville Slough junction). This alternative would require new pipelines to connect the diversion point to the Harkins Slough treatment plant site. Although it was thought to be preferable due to better water quality at this site and greater amounts of water year round, the PVWMA staff and its consultants determined that a new diversion in this location of Hanson Slough, and the connecting pipeline to the filtration plant (i.e., the pipeline would have to pass under the railroad tracks and under Watsonville Slough and/or Harkins Slough) would be prohibitively costly and potentially technically infeasible. In addition, there would be greater environmental impacts due to increased areas of construction disturbance.

This alternative would have increased impacts on agricultural resources, but could have fewer and less severe significant impacts during operation on water quality (lower salts and potentially, turbidity/sedimentation, including due to bank erosion). Biological resources impacts would be greater, including due to more temporary and permanent impacts to habitat. The same or similar impacts to red-legged frogs from construction in the sloughs and diversion impingement/entrapment of fish and other wildlife would be expected to occur with implementation of this alternative. Construction impacts would be greater, but those could all be mitigated to a less-than-significant level.

**Alternative Sloughs**

An alternative slough, or stormwater drainage facility, could be used as a source of diversion water for recharge. These other diversion sites would have similar facilities including pipelines to the filtration plant and recharge basins. However, this type of alternative project would not be able to use existing and
upgraded Harkins Slough facilities, including recharge basin sites; therefore, this alternative does not meet the criteria for inclusion as a potential alternative. Under this alternative, significant impacts may still occur due to temporary changes to the environment: construction impacts on habitat and species; water quality and hydrology; geology and soils; utilities; noise and traffic. In addition, air quality and due operational, long-term impacts due to conversion of agricultural land to non-agricultural use, increased air quality and greenhouse gas emissions, and of entraining fish and other aquatic wildlife. Site-specific information, including project design details, would be needed to assess impact and to conclude whether impacts would be greater or less severe with implementation of this type of alternative. Construction of a similar facility on another slough, channel, or storm drain outfall would likely have greater impacts overall related to construction of new pipelines, and potentially new filtration facilities and recharge basins, depending upon the location of diversion and whether there would need to be new filtration facilities rather than use of the existing.

5.6.5 Alternative Locations for College Lake with Inland Pipeline to CDS

This project cannot be replicated in another location due to uniqueness of the College Lake hydrologic conditions. Specifically, the lake is already seasonally drained by the Reclamation District creating the potential for diversion of that water for another beneficial use with appropriate flow maintenance in downstream creeks and the Pajaro River. As evidenced by the previous alternatives analyses, these conditions cannot be replicated at another location, making an alternative location infeasible.

5.6.6 Alternative Locations for Murphy Crossing with Recharge Basins

This component of the BMP was developed as part of the 1999 Local Water Supply Project EIR (CH2M Hill, 1997, 1999a, and 1999b) and was further evaluated during development of the currently proposed BMP Update (Carollo and PVWMA, 2012) and EIR (B. Hecht and M. Woyshner, Balance Hydrologics and G. Kittleson, Kittleson Environmental Consulting, personal communication, 2013). The proposed location is the optimal location due to soil types, hydrology, and percolation/recharge characteristics of the Pajaro River at this location. In addition, the site is relatively disturbed and lacks quality habitat. Furthermore, feasible alternative locations that might achieve the basic project objectives would not reduce the number or severity of significant adverse impacts, assuming the same or similar design and operational characteristics. Specifically, pursuant to investigations to date, there is no environmentally superior location that could feasibly meet the BMP objectives.

5.7 ALTERNATIVES IMPACTS COMPARISON

The purpose of this section is to present a comparison of the alternatives and to identify the environmentally superior alternative. Consistent with the CEQA Guidelines (Section 15126.6[a]), the comparison of alternatives and determination of the environmentally superior alternative is based on the ability of the alternative to meet the basic objectives of the project while avoiding or substantially lessening any significant impacts. Consequently, this section presumes implementation of mitigation measures identified in the EIR.
5.7.1 No Project Alternative

The No Project Alternative would not have the significant environmental impacts associated with the BMP Update. However, this alternative would have significant, and in some cases, unavoidable impacts on potentially thousands of acres of agricultural lands. Furthermore, this is the only alternative that would result in a continuance of groundwater overdraft, which would become more severe, and therefore, would not meet the most basic objectives of the BMP Update. Therefore the No Project alternative would not be the environmentally superior alternative.

5.7.2 BMP Update Alternative Secondary Components

The BMP Update alternative secondary components would not directly replace the primary components (i.e., the BMP Update components described in Section 2, Project Description and evaluated in Section 3) on a one-for-one basis. An alternative for the proposed project could include any number of primary and alternative component combinations that meet the objectives of the proposed project (see Section 2) including water supply yield (see Table 5-1). The development of alternative components can potentially be restricted by the development of another component because of project size (including cost), geographic constraints with other projects, or timeframe for implementation.

The tables below (5-2 through 5-5) compare the BMP Update Alternative (Secondary) Components to the Proposed BMP Update primary components for the following impact areas:

- Agriculture and Land Use;
- Biological Resources;
- Surface Water, Groundwater & Water Quality; and,
- Construction-Related Impacts (air quality, cultural resources, geology and soils, noise, transportation / traffic, and utilities conflicts).

Agriculture and Land Use

Table 5-2 compares the agriculture impacts of the BMP Update alternative or “secondary” components to those found to occur with implementation of the primary BMP Update components described in Section 2, Project Description. The proposed BMP Update had significant unavoidable impacts to agricultural resources due to conversion of prime farmland for Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to convert agricultural land to public infrastructure use, resulting in impacts that would be the same (on an acre-by-acre basis) or more severe than the proposed BMP Update. Those secondary alternatives that would result in more severe or a greater number of significant impacts are shown with “+”, respectively, in Table 5-2. Those resulting in the same or similar impacts are shown with a “=” and those with fewer or less impacts or that would have no impact on agriculture resources are shown in with a “—”. Replacing the primary components that convert agricultural land with alternative (secondary) components that do not convert agricultural land would potentially avoid or lessen significant impacts, perhaps to a less-than-significant level. Taking into account feasibility, cost, and timeframe which are critical to the BMP Update, other combinations or suites of project components may not be
environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce agricultural impacts.
### Table 5-2 Agriculture Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components

<table>
<thead>
<tr>
<th>BMP Update Alternative (Secondary) Component</th>
<th>Proposed BMP Update (Primary) Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased Recycled Water Storage at Treatment Plant</td>
</tr>
<tr>
<td>CDS Expansion</td>
<td>+</td>
</tr>
<tr>
<td>Winter Recycled Water Deep Aquifer ASR</td>
<td>+</td>
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<tr>
<td>River Conveyance of Water for Recharge at Murphy Crossing</td>
<td>+</td>
</tr>
<tr>
<td>San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant</td>
<td>+</td>
</tr>
<tr>
<td>Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and ASR</td>
<td>+</td>
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<tr>
<td>Seawater Desalination</td>
<td>=</td>
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<tr>
<td>Bolsa de San Cayetano with Pajaro River Diversion</td>
<td>+</td>
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</tbody>
</table>

**Key:**
+ The Alternative (Secondary) Component contains more severe and/or additional impacts due to conversion of agricultural land when compared to the Primary Component.
- The Alternative (Secondary) Component contains less severe and/or fewer impacts due to conversion of agricultural land when compared to the Primary Component.
= The Alternative (Secondary) Component due to conversion of agricultural land are similar to, or the same as, the Primary Component.
Biological Resources

Table 5-3 compares biological resources impacts of the BMP Update alternative or secondary components to those found to occur with implementation of the primary components. The proposed project had significant impacts to biological resources due to temporary and permanent direct changes to habitat for Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to impact biological resources that would be the same or more severe than the primary components. Those secondary alternatives that would result in more severe or a greater number of impacts are shown with “+”, respectively, in Table 5-3. Those resulting in the same or similar impacts are shown with “=” and those with fewer or less impact or no impact to agriculture are shown in with a “—”. Replacing the primary components that significantly impact one biological resource with alternative (secondary) components that would not impact biological resources would potentially avoid or lessen significant impacts to those resources. Taking into account feasibility, cost, and timeframe, which are critical to the BMP Update, other combinations or suites of project components may not be environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce biological impacts.
### Table 5-3 Biological Resources Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components

<table>
<thead>
<tr>
<th>BMP Update Alternative (Secondary) Component</th>
<th>Proposed BMP Update (Primary) Component</th>
<th>Increased Recycled Water Storage at Treatment Plant</th>
<th>Harkins Slough Recharge Facility Upgrades</th>
<th>Watsonville Slough with Recharge Basins</th>
<th>College Lake with Pipeline to CDS</th>
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<td>CDS Expansion</td>
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<tr>
<td>Winter Recycled Water Deep Aquifer ASR</td>
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<tr>
<td>River Conveyance of Water for Recharge at Murphy Crossing</td>
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<td>Seawater Desalination</td>
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</tbody>
</table>

Key:
+ The Alternative (Secondary) Component contains more severe and/or additional impacts to biological resources when compared to the Primary Component.
- The Alternative (Secondary) Component contains less severe and/or fewer impacts to biological resources when compared to the Primary Component.
= The Alternative (Secondary) Component impacts to biological resources are similar to, or the same as, the Primary Component.
Surface Water, Groundwater & Water Quality

Table 5-4 compares surface water, groundwater, and water quality impacts of the BMP Update alternative or secondary components to those found to occur with implementation of the primary components. The proposed BMP Update was found to have potentially significant impacts to surface water (including flooding), groundwater, and water quality resources due to temporary and permanent direct changes to water bodies and flood hazard zones in the case of the Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to impact resources or pose a risk to people/structures that would be the same or more severe. Those secondary alternatives that would result in more severe or a greater number of impacts are shown with “+”, respectively, in Table 5-4. Those resulting in the same or similar impacts are shown with “=”; and those with fewer or less impact or no impact to surface water, groundwater, and water quality are shown in with a “—”. Replacing the primary components that significantly impact these resources with alternative (secondary) components that do not impact these resources would potentially avoid or lessen significant impacts to water resources. Taking into account feasibility, cost, and timeframe, which are critical to the BMP Update success, other combinations or suites of project components may not be environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce these impacts.
Table 5-4 Surface Water, Groundwater & Water Quality Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components

<table>
<thead>
<tr>
<th>BMP Update Alternative (Secondary) Component</th>
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Key:
+ The Alternative (Secondary) Component contains more severe and/or additional impacts to Surface Water, Groundwater & Water Quality when compared to the Primary Component.
- The Alternative (Secondary) Component contains less severe and/or fewer impacts to Surface Water, Groundwater & Water Quality when compared to the Primary Component.
= The Alternative (Secondary) Component impacts to Surface Water, Groundwater & Water Quality are similar to, or the same as, the Primary Component.
Construction-Related Impacts

Table 5-5 compares construction-related impacts of the BMP Update alternative or secondary components to those found to occur with implementation of the primary components. The proposed BMP Update was found to result in potentially significant impacts to air quality, noise, traffic conditions and utilities due to temporary construction activities for Increased Recycled Water Storage at Treatment Plant, Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to have impacts in these areas that would be the same (on an acre-by-acre basis) or more severe. Those secondary alternatives that would result in more severe or a greater number of impact are shown with “+”, respectively, in Table 5-5. Those resulting in the same or similar impacts are shown with “=”; and those with fewer or less impact or no impact related to construction activities are shown in with a “—”. Replacing the primary components that significantly impact the environmental during construction with alternative (secondary) components could potentially avoid or lessen significant short-term, construction impacts. Taking into account feasibility, cost, and timeframe, which are critical to the BMP Update success, other combinations or suites of BMP Update components may not be environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce these impacts.
### Table 5-5 Construction Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components

<table>
<thead>
<tr>
<th>BMP Update Alternative (Secondary) Component</th>
<th>Increased Recycled Water Storage at Treatment Plant</th>
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</table>

**Key:**

+ The Alternative (Secondary) Component contains more severe and/or additional construction-related impacts when compared to the Primary Component.
- The Alternative (Secondary) Component contains less severe and/or fewer construction-related impacts when compared to the Primary Component.
= The Alternative (Secondary) Component construction-related impacts are similar to, or the same as, the Primary Component.
5.8 **ENVIRONMENTALLY SUPERIOR ALTERNATIVE**

CEQA requires that an environmentally superior alternative to the Proposed Project be specified, if one is identified. In general, the environmentally superior alternative is supposed to minimize adverse impacts to the environment while achieving most of the basic objectives of the project. The "No Project" alternative could lessen some of the direct significant and unavoidable impacts to agricultural land (conversion of agricultural land to non-agricultural use) associated with the Proposed BMP Update. However, this alternative does not achieve the basic project objective and, in fact, the EIR analysis found that seawater intrusion conditions in the Pajaro Valley groundwater basin would continue to worsen under the No Project Alternative. CEQA Guidelines §15126.6(e)(2) states: “If the environmentally superior alternative is the ‘no project’ alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.”

Based on the above comparative alternatives analyses, there are several secondary components or alternatives that would have less environmental impacts than specific primary components included in the portfolio of BMP Update projects for certain resource issues/topics. As shown in Tables 5-2 through 5-5, some secondary components could reduce environmental impacts in some topics/issues. However, each would involve trade-off environmental impacts and trade-offs related to differences in siting, design, proximity to other BMP components, technical and economic feasibility, permitting/regulatory constraints, and ability to meet basic project objectives. Alternative locations for several of the components were described in Section 5.6, Alternative Locations for BMP Update Components, that would meet the basic project objectives and would potentially reduce significant impacts were thoroughly investigated for the Watsonville Slough with Recharge Basins component, but none have yet to be defined to the extent that they can be found to be economically and technically feasible and reduce environmental impacts, as described above.

All of the alternatives involve a series of trade-offs in terms of feasibility, severity of environmental impacts, and attainment of project objectives. Based on the above analysis, there is no clear Environmentally Superior Alternative that would be capable of eliminating or avoiding the significant and unavoidable impact of loss of agricultural land and could feasibly meet the project objectives. Given the basic objectives of the project to provide a reliable water source, minimize future degradation of water resources, and prevent the long-term loss of agricultural productivity, the proposed BMP Update could be considered the Environmentally Superior Alternative for the following reasons:

1) all of the significant impacts of the project can be reduced to a less than significant level with mitigation, with the exception of conversion of agricultural land to non-agricultural uses, and

2) eliminating the most implementable and feasible BMP Update components would likely result in far greater long-term impacts to agricultural land due to continued saltwater intrusion and basin overdraft. Ultimately, the impacts of ongoing overdraft basin-wide would require pumping reductions to achieve a balanced basin, whether through regulatory pumping restrictions or adjudication.

Based on the complete record of the alternatives analyses and comparison of the proposed BMP Update components described in Section 2, Project Description to all other considered alternatives, the proposed BMP Update would feasibly meet the project objectives and would likely result in fewer and less severe environmental impacts overall, thus is considered the Environmentally Superior Alternative.
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Kathy Lyons – Principal
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