

5.3.7 Hydrology and Water Quality

This section evaluates the potential effects on surface and groundwater quality from the implementation of the KBSRA General Plan revision and proposed pier rebuild project. The plan does not include the creation of housing, so risks resulting from placing housing within a 100-year flood zone are dismissed from this analysis and not discussed further. Additionally, the plan would not modify the volume of any surface water, therefore this issue is also dismissed. The effects resulting from General Plan implementation under all of the alternatives described herein would be the same regardless of ownership of the Plaza parcels.

The existing conditions and significant resource values related to hydrology and water quality are summarized under the header Hydrology and Water Quality, in Section 2.2.1, Physical Resources, in Chapter 2, Existing Conditions, of this document. A more detailed description of the existing hydrology and water quality conditions at the project site and a summary of pertinent regulations are included in the Resources Inventory and Existing Conditions Report, available on the Kings Beach SRA webpage (www.parks.ca.gov/PlanKBSRA) and at CSP and TRPA offices during normal business hours through consideration of project approval. Relevant project goals and guidelines are summarized under the header Hydrology and Water Quality in Section 4.4.1, Resource Management and Protection, in Chapter 4, The Plan.

Environmental Impacts and Mitigation Measures

Analysis Methodology

The evaluation of potential impacts to surface and groundwater quality is based on a review of documents pertaining to the Plan area, including: previous studies conducted for the Kings Beach watershed; environmental impact reports; background reports prepared for plans and projects in the vicinity; and published and unpublished hydrologic literature. The information obtained from these sources was reviewed and summarized to understand existing conditions and to identify potential environmental effects, based on the thresholds of significance. In determining the level of significance, the analysis assumes that implementation of the General Plan revision would comply with relevant federal, state, and local laws, regulations, and ordinances. In addition, this analysis assumes that all future projects implemented under the proposed General Plan revision (including the pier rebuild project) would comply with the CSP Standard Project Requirements for Hydrology and Water Quality included in Section 4.7, which are summarized below:

- ◆ Prior to the start of construction involving ground-disturbing activities, CSP will prepare and submit a storm water pollution prevention plan (SWPPP) to Lahontan Regional Water Quality Control Board (Lahontan RWQCB) in compliance with the Clean Water Act Section 401 certification process administered by Lahontan RWQCB. The SWPPP will identify temporary best management practices (BMPs) (e.g., tarping of any stockpiled materials or soil; use of silt fences, straw bale barriers, fiber rolls, etc.) and permanent BMPs (e.g., structural containment, preserving or planting of vegetation) for use in all construction areas to reduce or eliminate the discharge of soil, surface water runoff, and pollutants during all excavation, grading, trenching, repaving, or other ground-disturbing activities. The SWPPP will include BMPs for hazardous waste and contaminated soils management and a spill prevention and control plan, as appropriate.
- ◆ All heavy equipment parking, refueling, and service will be conducted within designated areas outside of the 100-year floodplain to avoid water course contamination.

- ◆ The project will comply with all applicable water quality standards as specified in the Lahontan RWQCB Basin Plan.
- ◆ All construction activities will be suspended during heavy precipitation events (i.e., at least 1/2 inch of precipitation in a 24-hour period) or when heavy precipitation events are forecast.
- ◆ If construction activities extend into the rainy season (October 15 through May 1) or if an unseasonal storm is anticipated, the site will be properly winterized by covering (tarping) any stockpiled materials or soils and by constructing silt fences, straw bale barriers, fiber rolls, or other structures around stockpiles and graded areas.
- ◆ Appropriate energy dissipaters will be installed at water discharge points, as appropriate.

Significance Criteria

Significance criteria for determining impacts to hydrology and water quality are summarized below.

CEQA Criteria

Based on Appendix G of the State CEQA Guidelines, impacts to hydrology and water quality would be significant if the project would:

- ◆ violate any water quality standards or waste discharge requirements;
- ◆ otherwise substantially degrade water quality;
- ◆ substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support the existing land uses or planned uses for which permits have been granted);
- ◆ 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 that would result in substantial erosion, siltation or flooding on- or off-site;
- ◆ create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage, infiltration, and treatment systems or facilities resulting in increased sources of pollutants reaching surface waters or causing detrimental flooding to property or infrastructure;
- ◆ place within a 100-year flood hazard area structures that would impede or redirect flood flows; or
- ◆ expose people or structures to a significant risk of loss, injury, or death involving flooding.

TRPA Criteria

The “Water Quality” criteria from the TRPA Initial Environmental Checklist were used to evaluate the hydrology and water quality impacts of the alternatives. Checklist items that are relevant to the proposed project have been included in the environmental analysis below. Impacts to hydrology and water quality would be significant if it would:

- ◆ change currents, or the course or direction of water movements;
- ◆ discharge into surface waters, or alter surface water quality, including but not limited to temperature, dissolved oxygen, or turbidity;

- ♦ cause the potential discharge of contaminants to the groundwater or alter groundwater quality;
- ♦ change absorption rates, drainage patterns, or the rate and amount of surface water runoff so that a 20 year 1-hour storm runoff (approximately 1 inch per hour) cannot be contained on the site;
- ♦ alter the course or flow of 100-year flood waters; or
- ♦ expose people or property to water related hazards such as flooding and/or wave action from 100-year storm occurrence.

Environmental Impacts

Impact 5.3.7-1: Potential for adverse impacts to water quality

The General Plan revision would not alter existing laws and regulations that require erosion and sediment controls, implementation and maintenance of temporary construction BMPs, waste control measures, and management controls for stormwater runoff. Because regulatory protections are in place to minimize erosion and transport of sediment and other pollutants during construction, and appropriate project-specific mitigation measures would be defined to achieve TRPA, and Lahontan RWQCB standards such that necessary permits and approvals can be secured, construction related impacts for all alternatives would be reduced to a **less-than-significant** level.

The Alternatives 2, 3, and 4 pier rebuild component would require construction activities that would disturb and resuspend lakebed sediments and operation of heavy equipment in or in close proximity to Lake Tahoe where fuel or oil leaks could impair water quality. The marine BMPs incorporated into the project design and enforced through the 401 Certification process would protect surface and groundwater from construction impacts. Operation of the proposed rebuilt pier would involve a continuation of uses at the existing pier and boat ramp and would not alter water quality in the Kings Beach area. Therefore, the potential effects of the Alternatives 2, 3, and 4 pier rebuild project on surface and groundwater water quality would be a **less-than-significant**. Alternative 1 is the no-action alternative and would have **no impact** on water quality.

Alternative 1: No Project

General Plan Revision

Alternative 1 would be a continuation of the existing KBSRA General Development Plan and would not stimulate redevelopment projects within KBSRA, modify land uses, or result in an increase in construction activities within the park. For this reason, Alternative 1 would have **no impact** on water quality.

Pier Rebuild Project

Alternative 1 would not modify or move the existing Kings Beach Pier and would therefore have **no impact** on water quality resulting from pier construction or operation.

Alternative 2: Eastern Pier Alternative (Proposed Project)

General Plan Revision

The proposed General Plan revision would allow for the future development of recreation facilities, administrative and sanitary facilities, and reconfiguring of the existing parking lot. Although this redevelopment would modify the location or size of facilities, the park would continue to operate the

same type of amenities including public parking, restroom facilities, walking paths, picnic areas, and support outdoor recreation. Each completed project would be required to comply with the same TRPA stormwater management protections applied to existing facilities, including infiltration BMPs (TRPA Code Section 60.4.6) and control of pollutant sources in addition to complying with the CSP Standard Project Requirements for Hydrology (see Section 4.7 and summarized in Analysis Methodology, above). Therefore, through implementation of CSP Standard Project Requirements for Hydrology and Water Quality included in the project and compliance with TRPA stormwater management protections, operation of the new and modified facilities proposed by the Alternative 2 General Plan revision would not change surface or groundwater conditions.

The construction activities associated with implementation of the General Plan revision may involve vegetation removal, grading, excavation, and temporary stockpiling of soils, all of which could expose soils to wind and water erosion and potentially transport pollutants into Lake Tahoe during storm events. In addition, construction activities would involve on-site staging of construction equipment and vehicles, and construction-related vehicle trips. Fuels and other chemicals could be accidentally spilled or leaked, or could otherwise be discharged into drainage systems or to Lake Tahoe.

Although construction activities have the potential to adversely affect surface and groundwater quality, all projects would be required to comply with stringent TRPA and Lahontan RWQCB water quality protections. Chapters 33 and 60 of the TRPA Code of Ordinances require the installation of temporary construction BMPs as a condition of project approval. BMPs would be required to meet the installation and use standards described in the TRPA Best Management Practices Handbook (TRPA 2014). BMPs would include, but not be limited to:

- ◆ Temporary erosion control BMPs (e.g., silt fencing, fiber rolls, drain inlet protection) installed and maintained to prevent the transport of earthen materials and other waste from a construction site.
- ◆ Tree protection fencing installed around trees that are to remain in place throughout construction.
- ◆ Mandatory pre-grading inspections by regulatory agencies at the construction site to ensure proper installation of the temporary construction BMPs prior to the initiation of construction activities.
- ◆ Requirements to limit the area and extent of all excavation to avoid unnecessary soil disturbance.
- ◆ Requirements to winterize construction sites by October 15 to reduce the water quality impacts associated with winter weather. Winterization typically includes installation of erosion controls, vegetation protection, removal of construction debris, site stabilization, and other measures.
- ◆ Dust control measures to prevent transport of materials from a project site into any surface water or drainage course. Dust control measures typically include sweeping, watering, covering of disturbed soils and stockpiles, vehicle washing, and other measures.
- ◆ Requirements to remove surplus or waste earthen materials from project sites, as well as requirements to stabilize and protect stockpiled material.
- ◆ Stabilization of drainage swales disturbed by construction activities with appropriate soil stabilization measures (e.g., revegetation, rock armoring) to prevent erosion.

- ◆ Temporary BMPs to capture and contain pollutants from fueling operations, fuel storage areas, and other areas used for the storage of hydrocarbon-based materials. These may include spill prevention plans and other measures.
- ◆ Temporary BMPs to prevent the tracking of earthen materials and other waste materials from project sites to offsite locations, including stabilized points of entry/exit for construction vehicles/equipment, designated vehicle/equipment rinse stations, and sweeping operations.
- ◆ Regular inspection and maintenance of temporary BMPs.

As described in the analysis methodology, Lahontan RWQCB requires the development of a project-specific SWPPP prior to the start of any project involving ground disturbance. The SWPPP would describe the site, construction activities, proposed erosion and sediment controls, means of waste disposal, maintenance requirements for temporary BMPs, and management controls for potential pollutant sources other than stormwater runoff. In addition, the SWPPP would require the implementation of a hazardous materials spill response plan, which would reduce the potential of directly and indirectly effecting water quality through construction-related hazardous material spills. Water quality controls outlined in a SWPPP must be consistent with TRPA requirements (including Chapter 4.5 of the TRPA BMP Handbook), the federal antidegradation policy, and maintain designated beneficial uses of Lake Tahoe.

All future projects implemented under the proposed General Plan revision would be subject to existing laws and regulations requiring erosion and sediment controls, implementation and maintenance of permanent and temporary BMPs to capture, detain, and infiltrate or otherwise control and properly manage stormwater runoff, and prevent water quality degradation. Because regulatory protections are in place to minimize erosion and transport of sediment and other pollutants, and appropriate project-specific mitigation measures would be defined to secure necessary permits and approvals, construction related impacts would be minimized. Therefore, this impact would be **less than significant**.

Pier Rebuild Project

The Alternative 2 pier rebuild project would require the removal of the existing pier deck and pilings, pile driving or drilling and placement of 33 piles (13 for the fixed section and 14 for the floating pier section), and the construction of the new pier deck. The removal of the existing pier and the construction of rebuilt pier would be completed using heavy equipment operated from or mounted on a floating or amphibious barge.

Piling removal and placement of new pier pilings would disturb the lakebed and re-suspend sediments resulting in a temporary decrease in water quality within the project vicinity. These sediment levels could exceed TRPA and Lahontan RWQCB pollutant concentration limits for surface waters (a limit of 250 mg/L for suspended sediment). This temporary impact to water quality would be minimized through project design and the water quality protections required through the Clean Water Act Section 401 certification process administered by Lahontan RWQCB. As described in Section 5.1.2, General Plan Revision and Pier Rebuild Project Alternatives, the pier rebuild component would protect water quality through the incorporation of marine construction BMPs and described in the TRPA BMP Handbook (TRPA 2014). These BMPs and any others that Lahontan RWQCB determines to be necessary would be included as conditions of the 401 Water Quality Certification. Through this process the project applicant must demonstrate to Lahontan RWQCB that the discharge will not violate the applicable water quality standards. Anticipated BMPs include but are not limited to the following:

- ◆ Caissons, sleeves, or turbidity curtains must be used during removal or placement of pilings to prevent re-suspension and discharge of lakebed sediments. The control measures will be inspected and maintained as necessary to prevent discharge of suspended sediment outside the containment area.
- ◆ No debris, cement, concrete (of wash water therefrom), oil or petroleum products must enter into or be placed where it may be washed from the project site by rainfall or runoff into surface waters. When operations are complete, any excess material must be removed from the project area and from any areas adjacent to the work area where such material may be transported into surface waters.
- ◆ The applicant must prevent discharge from any materials foreign to the lake water from the implementation of this project, including discharge of welding metals during the welding process.
- ◆ Construction equipment must be monitored for leaks, and removed from service if necessary to protect water quality.
- ◆ An emergency spill kit must be at the project site at all times.

Operation of the rebuilt pier would not alter water quality in the area. The uses proposed for the pier are the same as those currently taking place at the existing pier (during high water years) and boat ramp. Non-motorized boating will continue to be supported, temporary mooring spaces for the purposes of loading and unloading passengers will be included for motorized watercraft however no overnight mooring would be allowed and no fueling facilities would be included. An increase in localized motorized boat traffic in the area could increase the potential for a fuel spill or leak, however the potential localized increased watercraft activity at the pier would be partially offset by the closure and removal of the existing boat ramp.

In summary, the proposed pier rebuild project would require construction activities that would disturb and resuspend lakebed sediments and operation of heavy equipment in or in close proximity to Lake Tahoe. These activities have the potential to adversely affect water quality. However, the marine BMPs incorporated into the project design and enforced through the Lahontan RWQCB 401 certification process would protect surface and groundwater from construction impacts. Operation of the proposed pier rebuild project would involve a continuation of uses at the existing pier and boat ramp and would not alter water quality in the Kings Beach area. Therefore, the potential effects of the Alternative 2 pier rebuild project on surface and groundwater water quality would be a **less-than-significant** impact.

Alternative 3: Central Pier Alternative

General Plan Revision

The potential water quality effects of Alternative 3 would be the same as those discussed for Alternative 2 above. For the same reasons, future construction and operation of the facilities implemented through the Alternative 3 General Plan revision would have a **less-than-significant** impact on water quality.

Pier Rebuild Project

The Alternative 3 pier rebuild project is similar in nature to Alternative 2, however the floating dock section of Alternative 3 would require 6 fewer piles than Alternative 2. This would result in a decrease in the area of lakebed disturbance and the volume of sediments resuspend during construction activities. As with Alternative 2, the potential water quality impacts of pier construction would be

minimized through implementation of marine construction BMPs incorporated into project design and enforced through the 401 certification process. Operation of the proposed pier would involve a continuation of uses at the existing pier and boat ramp and would not alter water quality in the Kings Beach area. Therefore, the potential effects of the Alternative 3 pier rebuild project on surface and groundwater water quality would be a **less-than-significant** impact.

Alternative 4: Western Pier Alternative

General Plan Revision

The potential water quality effects of Alternative 4 would be the same as those discussed for Alternative 2 above. For the same reasons, future construction and operation of the facilities implemented through the Alternative 4 General Plan revision would have a **less-than-significant** impact on water quality.

Pier Rebuild Project

The Alternative 4 pier rebuild project is similar in nature to Alternative 2, however the floating dock section of Alternative 4 would require 6 additional piles when compared to Alternative 2. This would result in a slight increase in the amount of lakebed disturbance and the volume of sediments resuspended during construction activities. As with Alternative 2, the potential water quality impacts of pier construction would be minimized through implementation of marine construction BMPs incorporated into project design and enforced through the 401 certification process. Operation of the proposed pier would involve a continuation of uses at the existing pier and boat ramp and would not alter water quality in the Kings Beach area. Therefore, the potential effects of the Alternative 4 pier rebuild project on surface and groundwater water quality would be a **less-than-significant** impact.

Mitigation Measures

No mitigation measures are required.

Impact 5.3.7-2: Alteration of lake currents and littoral processes from rebuilding and expanding the existing pier

With the exception of the pier rebuild project, which is evaluated separately, the General Plan revision alternatives do not include components lakeward of the Lake Tahoe high water line. Therefore, this impact analysis discussion addresses only the impacts of the pier rebuild project alternatives. Changes to structures in the shore zone can affect lake currents and wave energy, which can ultimately lead to shoreline erosion or creation of new sandbars. As required by the TRPA Code, a comprehensive littoral effects analysis was completed for the project. This analysis found that because the Kings Beach area experiences very little littoral drift and because the rebuilt pier in Alternative 2, 3, and 4 would reduce wave energy by less than 10 percent, the proposed project would have only minor effects on the lake currents and sediment transport along the Lake Tahoe shoreline. Therefore, the pier rebuild project in Alternatives 2, 3, and 4 would have a **less-than-significant** impact on lake currents and littoral processes. Alternative 1 is the no-action alternative and would have **no impact** on lake currents and littoral processes.

This impact analysis is limited to evaluation of the pier rebuild project alternatives.

Wind, waves, and lake currents all act together to continuously rearrange sands and sediment in Lake Tahoe. Wind produces currents and waves, but also picks up and moves sediment on beaches. Wave action stirs up sediment from the lake bottom and deposits it on beaches or in offshore sandbars. Waves approaching a beach at an angle and returning perpendicular or at a slight down shore angle create zigzag motion which drives currents parallel to the shoreline (longshore currents). Littoral drift refers to the movement of sand grains in the direction of the longshore current. Changes to any of

these factors can result in changes to shoreline accretion or erosion patterns such as the creation of new sandbars or loss of beach area. Loss of beach area is important from a water quality standpoint because beaches provide a dissipation area for wave energy and protect adjacent bluffs from erosion.

Alternative 1: No Project

Pier Rebuild Project

Alternative 1 would not include relocation and expansion of the Kings Beach Pier. The existing pier would remain in place and no changes in water currents or littoral processes would occur. Therefore, Alternative 1 would have **no impact** on lake currents, water movement, or other littoral processes.

Alternative 2: Eastern Pier Alternative (Proposed Project)

Pier Rebuild Project

TRPA Code Subsection 84.5.2 sets the design standards for piers relevant to littoral processes. These standards were adopted to reflect the results of studies that establish criteria to avoid significant littoral drift impacts. However, TRPA Code Subsection 84.9.4 allows deviation from the standards for multiple-use facilities. The proposed pier is a multiple-use facility and deviates from some of the design standards specified in Subsection 84.5.2, where allowable.

The existing pier is approximately 207 feet long and 10 feet wide. It has wood decking supported by 26 paired, outer-edge steel pilings. The pier is functional for boat access only when the water surface elevation is above 6,227 feet. At lake levels of 6,223 feet and lower the pier is entirely out of the water. The total area of the deck is approximately 3,151 square feet.

As part of Alternative 2, the existing pier would be removed and rebuilt at a location approximately 500 feet to the east (Exhibits 4.6-5 through 4.6-8). The proposed multiple-use pier would not be for commercial use. No sewage, boat lift, or refueling facilities are proposed in conjunction with the pier. The proposed pier would extend approximately 488 feet into the lake from the high-water line (natural rim; elevation 6229.1 feet Lake Tahoe Datum), approximately 281 feet longer than the existing pier and would include a 215-foot floating pier section. The average deck width would be 12 feet however the floating section of the pier would include a 53-foot-long section with a low-freeboard dock for total width of 24 feet (see Exhibit 4.6-6), and would end with a platform approximately 56 feet long by 36 feet wide. The proposed pier would include an estimated 27 steel pilings for the fixed and floating sections with a single piling in the center of each 20 to 24-foot section. The proposed pilings would be 16 inches in diameter. The proposed pier would extend beyond the TRPA-designated pierhead line (elevation 6219.0 feet Lake Tahoe Datum). The total area of the deck is proposed to be 8,121 square feet.

Because the rebuilt pier would qualify as a multiple-use pier, it would be eligible for deviation from the Design and Construction Standards listed in TRPA Code Subsection 84.5.2, Subparagraph (A). Specifically, the multiple-use pier could deviate from the 10-foot pier width standard specified in Code Subsection 84.5.2(A) to allow for a wider catwalk and the 36-foot-wide end portion of the floating segment. Construction staging for the pier removal and rebuilding would be provided by a barge on the lake. In accordance with standard pier construction BMPs, a turbidity curtain or caisson would be used during piling removal or drilling activities.

The TRPA shorezone partial permitting program requires an analysis of potential project impacts on littoral drift. Prior studies assumed that if the floating section of a pier is less than $\frac{1}{2}$ the wave length, effects were minor. Also, the 2004 TRPA Shorezone EIS concluded that a reduction of wave transmission of 30 percent or more would be adverse (Cardno 2016). A technical analysis of the

effects of the conceptual design on wind, wave, and littoral drift patterns was completed in 2016 (Cardno 2016). In this analysis, coastal engineers provided literature review, technical calculations, and wave modeling for the project at the conceptual design level, addressing the Eastern and Central pier locations. Additional analysis was completed for the Western pier location in 2017 (Cardno 2017). The littoral analysis considered recent empirical data for wind and waves, and modeling of Lake Tahoe general circulation and nearshore circulation and processes. In addition, geology, beach/foreshore geomorphology, sediments sources and delivery, wave action, and nearshore and backshore conditions were considered.

Kings Beach is exposed to a long wind fetch (the area of lake surface that the wind blows over in a constant direction) and diverse wind fields. The beach is in a bay that has a large, roughly triangular shaped shallow shelf. This shelf and beach configuration prevents immediate loss of beach sediments by preventing most deep-water waves from reaching the shoreline. Additionally, the contours of the lake bottom tend to bend the waves so their approach is nearly perpendicular to the shore. Because of this, a relatively low volume of sediment is transported laterally along the beach (Cardno 2016).

Wave Attenuation

Cardno estimated the potential reduction in wave height and energy (wave attenuation) using two separate numerical formulas (the Macagno and Weigel formulas). These formulas conservatively estimate that the proposed pier would have a wave attenuation range between 7 and 18 percent, with stronger attenuation in shallow water where the pier draft would be larger (Cardno 2016). These formulas are conservative because they do not consider the effect of waves diffracting around the end of the pier and the actual wave attenuation would be less than calculated. To better account for wave diffraction, Cardno also performed numerical modeling using the Simulating Waves Nearshore (SWAN) model developed by the Delft University of Technology in the Netherlands. This model includes wave refraction, shoaling, non-linear wave to wave interaction, a full directional spectral description of wave propagation, bed friction, white capping, currents, and wave breaking. The SWAN model is used extensively for shallow water wave modeling in nearshore environments (CSDMS 2017).

Under existing conditions, the SWAN model indicates that wave attenuation of roughly 10 percent occurs in a narrow area along the shoreline east of the pier and near the Coon Street boat ramp, for a total of approximately 0.52 acre. Exhibit 5.3.7-1 shows the modeling results for wave attenuation under existing conditions.

For the Alternative 2 pier rebuild component, the simulated wave height attenuation is also approximately 10 percent, however the projected area of attenuation totals 1.11 acre. The attenuation area is directly under the pier and between the pier and the shoreline to the north (see Exhibit 5.3.7-2).

The Alternative 2 pier rebuild project would roughly double the area of wave attenuation when compared to the existing pier. However, both the existing pier and the proposed Alternative 2 pier rebuild project would reduce wave energy in these areas by less than ten percent. In fact, point data modeling for the area of wave attenuation created by the Alternative 2 pier rebuild project indicates that, when compared to the existing pier, the maximum reduction in wave height would be 4.2 percent and the maximum change in wave direction relative to true north would be 0.2 percent (Cardno 2016). This potential wave attenuation would be much lower than the 30 percent reduction needed to create a significant impact as proposed by previous TRPA studies (Cardno 2016).

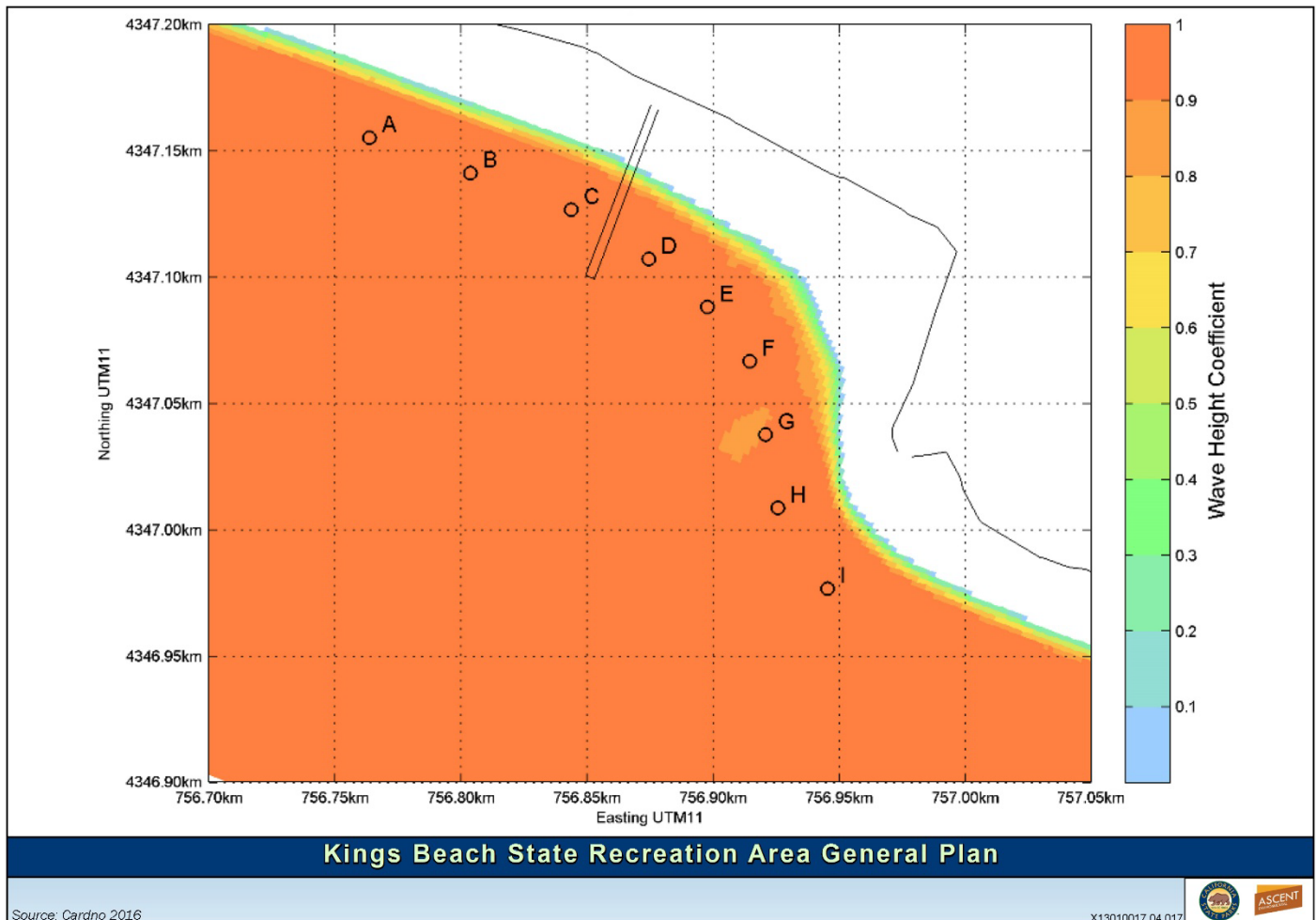


Exhibit 5.3.7-1 Wave Height Attenuation at KBSRA under Existing Conditions

Commonly, the implementation of piers and floating structures are expected to create changes to the shoreline over time. Because waves lose some energy as they move through the pier, sediment drops out sooner and is deposited on the leeward (shoreward facing) side of the structure with a corresponding decrease in sediment deposition (or a beach recession area) in the region down-drift. In the case of the proposed pier, both the magnitude of the areas littoral drift and the potential wave attenuation created by the pier are minor. Because of this, changes to the Lake Tahoe shoreline are expected to be minimal.

Impact Summary

Shorezone projects in the Lake Tahoe Basin are required to consider their potential effect on lake currents and littoral processes. In the past, projects assumed that a floating structure that is more than one half the wave length and which results in wave attenuation of more than 30 percent would create

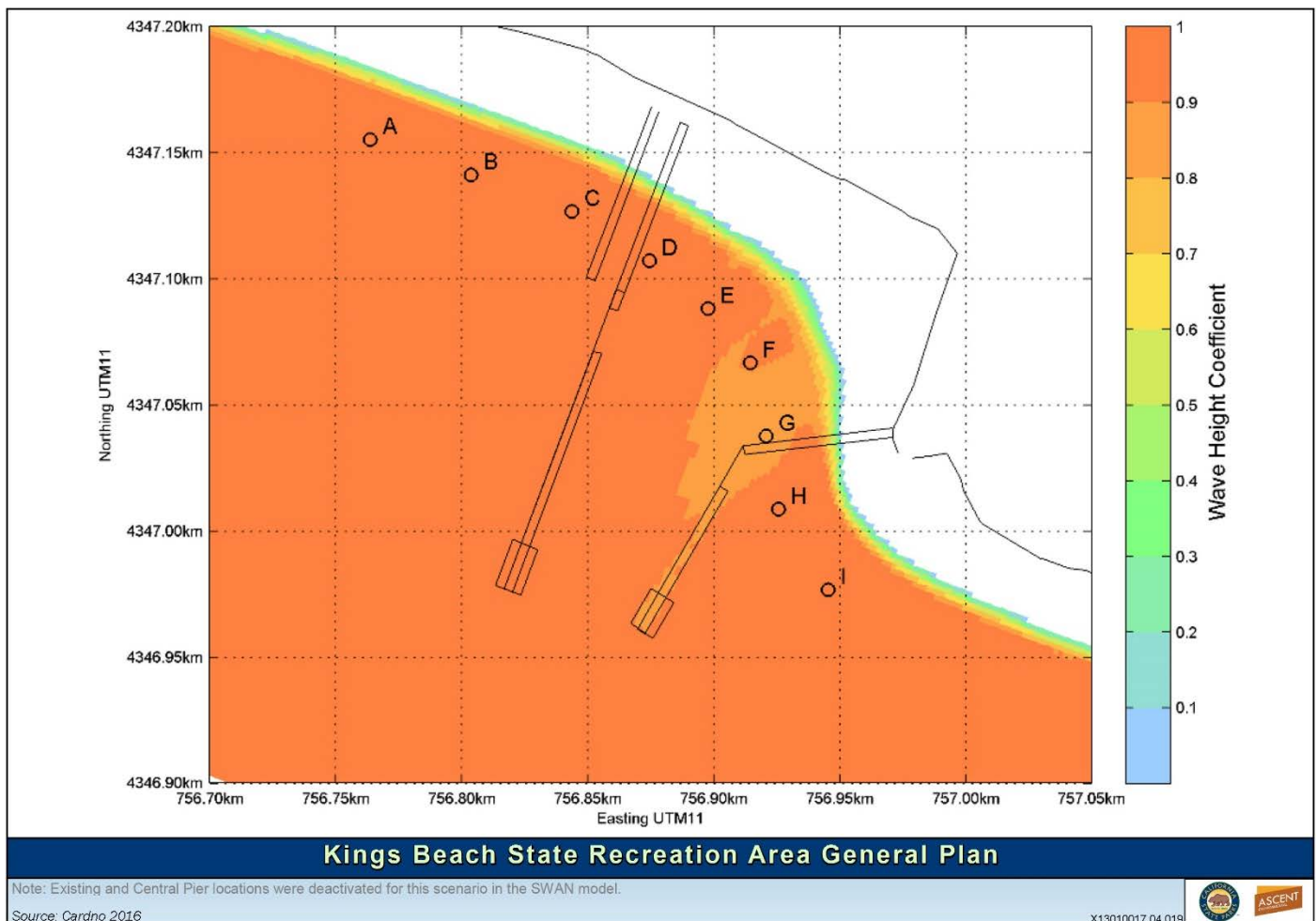


Exhibit 5.3.7-2 Wave Height Attenuation at KBSRA under Alternative 2 (Eastern) Pier

a significant impact. For the pier rebuild project a comprehensive analysis of effects to littoral process analysis was completed which considered empirical data for wind and waves, modeling of Lake Tahoe general circulation and nearshore circulation and processes, geology, beach/foreshore geomorphology, sediment sources and delivery, wave action, and nearshore and backshore conditions. These parameters were used in technical calculations and wave modeling to evaluate the potential for the proposed pier to alter the existing wave dissipation and sediment transport characteristics of the site. This analysis found that because the Kings Beach area experiences very little littoral drift and because the proposed pier would reduce wave energy by less than 10 percent, the proposed project would have only minor effects on the Lake Tahoe shoreline. Therefore, Alternative 2 would have a **less-than-significant** impact on lake currents and littoral processes.

Alternative 3: Central Pier Alternative

Pier Rebuild Project

The Alternative 3 pier rebuild project would be similar to Alternative 2, however the Alternative 3 pier would be rebuilt in the same location as the existing pier, would have a floating section 114 feet longer than the Alternative 2 floating section and a total length of 601 feet, and would have a total surface area of 9,904 square feet (1,783 square feet larger than Alternative 2 and 6,753 square feet larger than the existing pier).

As discussed for Alternative 2, a comprehensive analysis of effects to littoral process analysis was completed for the project. This analysis found that the pier would create wave attenuation on the order to 10 percent in a 1.06-acre area directly under the pier and between the pier and the shoreline as shown in Exhibit 5.3.7-3. The area of attenuation would be 0.05 acre less than the area projected for Alternative 2 and 0.54 acre larger than the area created by the existing pier. When compared to the existing pier, the maximum reduction in wave height would be 9.1 percent, which is 4.9 percent more than the reduction modeled for Alternative 2. Also, the maximum change in wave direction relative to true north would be 0.3 percent, which is 0.1 percent more than Alternative 2 (Cardno 2016).

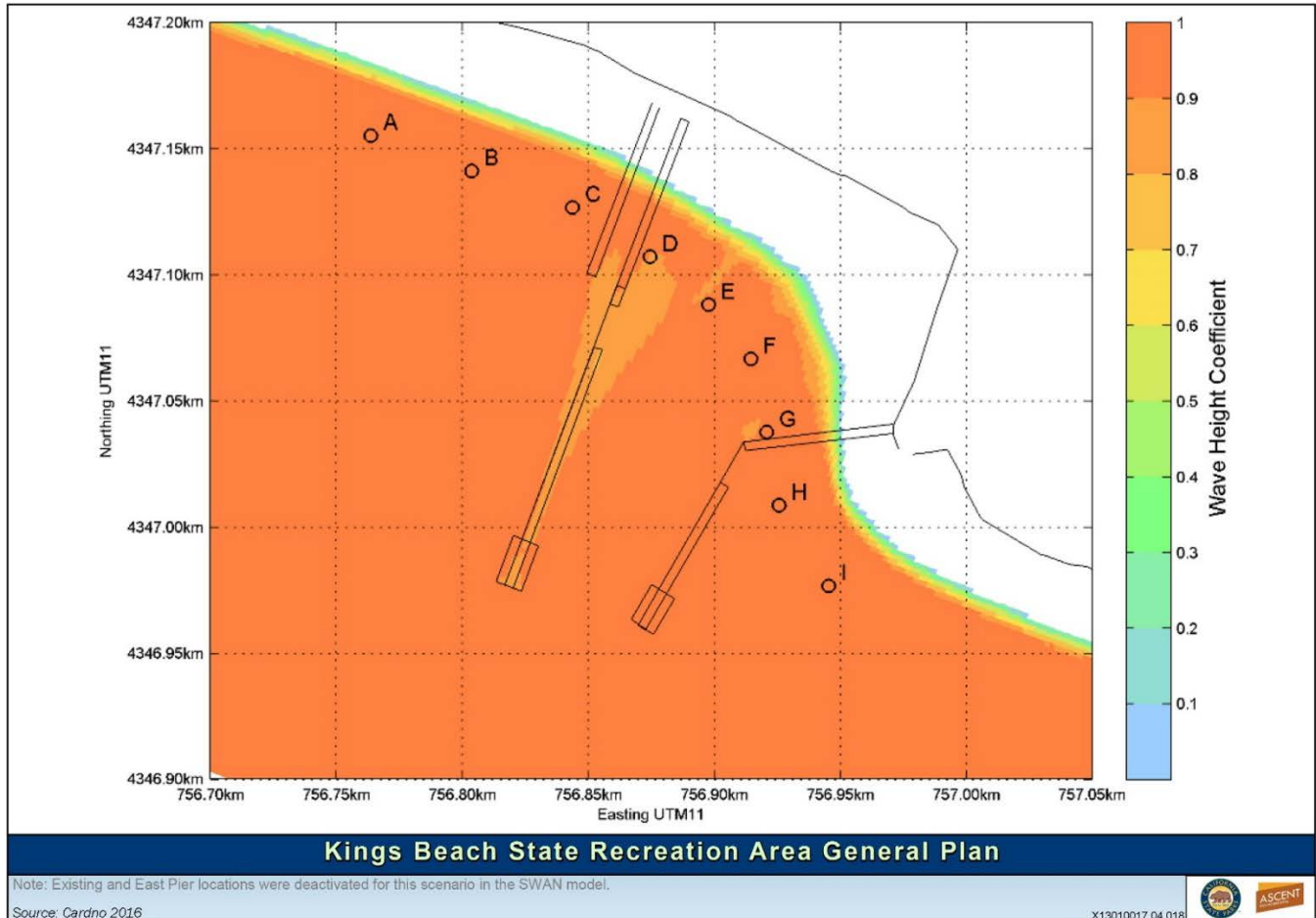


Exhibit 5.3.7-3 Wave Height Attenuation at KBSRA under Alternative 3 Pier

The Alternative 3 pier would create a slightly larger reduction in wave height, but would have a slightly smaller area of wave attenuation when compared to Alternative 2. As discussed above, the littoral effects analysis found that because the Kings Beach area experiences very little littoral drift and because the Alternative 3 pier would reduce wave energy by less than 10 percent, the project would have only minor effects on the Lake Tahoe shoreline. Therefore, Alternative 3 would have a **less-than-significant** impact on lake currents and littoral processes.

Alternative 4: Western Pier Alternative

Pier Rebuild Project

The Alternative 4 pier rebuild project would be similar to Alternative 2, however the Alternative 4 pier would be rebuilt approximately 800 feet to the west of the existing pier, would have a floating section 114 feet longer than the Alternative 2 floating section and a total length of 704 feet, and would

have a total surface area of 11,220 square feet (3,099 square feet larger than Alternative 2 and 8,069 square feet larger than the existing pier).

As discussed for Alternative 2, a comprehensive analysis of effects to littoral process analysis was completed for the project. This analysis found that the pier would expand an existing area of wave attenuation in the roughly 2-acre area directly under the pier and approximately 175 feet on either side (see Exhibit 5.3.7-4). Approximately 1 acre of this area currently experiences wave attenuation on the order of 10 percent. Alternative 4 would add roughly 1 acre of new 10 percent wave attenuation and would increase the existing wave attenuation at the lakeward end of the proposed pier from 10 percent to approximately 20 percent (Cardno 2017). Despite this reduction in wave energy near the end of the pier, modeled effects at eight shoreline locations are minor (generally less than 3 percent) due to wave diffraction around the piers. The maximum change in wave direction relative to true north would be 0.3 percent, which is 0.1 percent more than Alternative 2 (Cardno 2017).

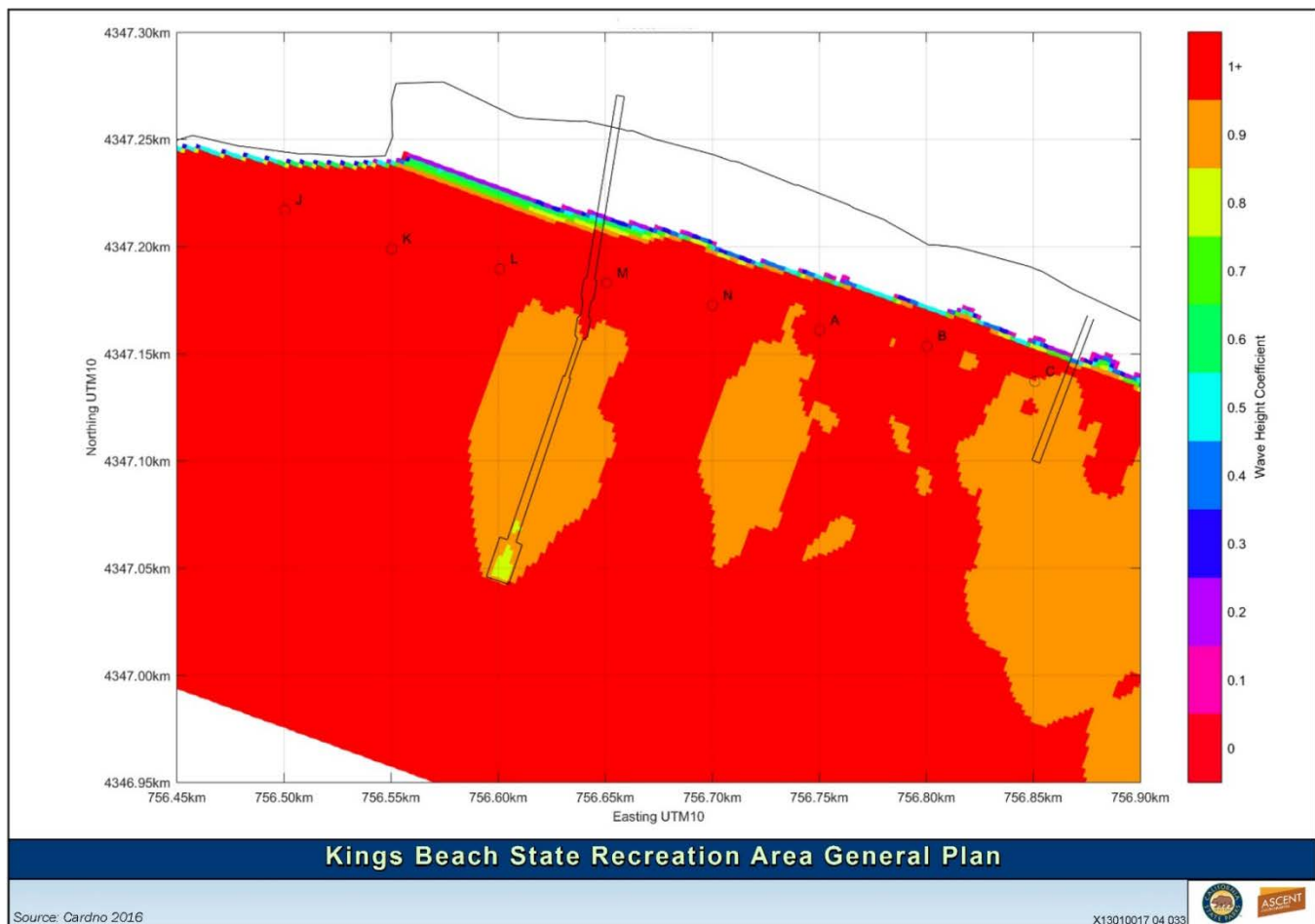


Exhibit 5.3.7-4 Wave Height Attenuation at KBSRA under Alternative 4 Pier

The Alternative 4 pier would create a slightly larger reduction in wave height and a larger area of wave attenuation when compared to Alternative 2. As discussed above, the littoral effects analysis found that because the Kings Beach area experiences very little littoral drift, because the Alternative 4 pier would reduce wave energy by approximately 10 percent, and because waves are allowed to diffract around the proposed pier, the project would have only minor effects on the Lake Tahoe shoreline. Therefore, Alternative 4 would have a **less-than-significant** impact on lake currents and littoral processes.

Mitigation Measures

No mitigation measures are required.

Impact 5.3.7-3: Potential for increase in stormwater runoff, impacts to existing drainage systems, or alteration of drainage patterns

Implementation of General Plan revision associated with Alternatives 2, 3, and 4 would result in an overall decrease in impervious surfaces within the park. In addition, all future redevelopment projects would be required to meet TRPA stormwater infiltration requirements (TRPA Code Section 60.4.6) and conduct project-level analysis of effects to drainage patterns and drainage systems. Therefore, implementation of Alternatives 2, 3, and 4 would have a **less-than-significant** impact.

The pier rebuild component of Alternatives 2, 3, and 4 is located within Lake Tahoe and on the shore immediately adjacent and would have **no impact** on stormwater runoff volumes entering Lake Tahoe or existing drainage systems. Alternative 1 is the no project alternative and as such would have **no impact** on runoff volumes or drainage patterns.

Alternative 1: No Project

General Plan Revision

Alternative 1 would be a continuation of the existing KBSRA General Development Plan and would not result in redevelopment projects within KBSRA or result in an increase in construction activities within the park. For this reason, Alternative 1 would have **no impact** on water quality resulting from construction activities.

Pier Rebuild Project

Alternative 1 would not modify or move the existing Kings Beach Pier and would therefore have **no impact** on stormwater runoff, drainage systems, or drainage patterns.

Alternative 2: Eastern Pier Alternative (Proposed Project)

General Plan Revision

The peak flow and volume of stormwater runoff generated from an area is affected by development through conversion of vegetated and otherwise pervious surfaces to impervious surfaces (e.g., roads, roofs, driveways, walkways) and by the development of drainage systems that connect these impervious surfaces to streams or other water bodies. In this way, development can increase the rate and volume of runoff and eliminate storage and infiltration that would naturally occur along drainage paths.

The Alternative 2 General Plan revision would support redevelopment of park amenities as described in Chapter 4, The Plan. This redevelopment would reduce overall impervious surfaces by 7,572 square feet and would have a corresponding decrease in the volume of stormwater generated on the site. Additionally, all future projects approved under the proposed General Plan revision would be required to meet existing BMP standards (Section 60.4.6 of the TRPA Code) to control potential increases in stormwater runoff and pollutant loading.

Implementation of the proposed General Plan revision would result in an overall decrease in impervious surfaces within the park, in addition all future redevelopment projects would be required to meet TRPA stormwater infiltration requirements (TRPA Code Section 60.4.6) and conduct project level analysis of effects to drainage patterns and drainage systems. Therefore, implementation of Alternative 2 would have a **less-than-significant** impact.

Pier Rebuild Project

The existing and proposed pier sites are located within and on the shore of Lake Tahoe. Rain falling on the existing or proposed pier would move directly into the lake or into highly permeable beach sands. As such, the proposed pier rebuild project would not increase stormwater runoff volume or contribute to downstream flooding. Additionally, the project would not modify existing drainage systems or drainage pathways. Therefore, the Alternative 2 pier rebuild project would have **no impact** on stormwater runoff, drainage systems, or drainage patterns.

Alternative 3: Central Pier Alternative

General Plan Revision

Alternative 3 would increase the overall area of impervious surfaces within KBSRA by 4,705 square feet (an increase of 12, 277 square feet when compared to Alternative 2). This increase would be accompanied by a corresponding increase in stormwater runoff volume. However, all future projects stemming from the Alternative 3 General Plan revision would be required to meet existing BMP standards (Section 60.4.6 of the TRPA Code) to control potential increases in stormwater runoff and pollutant loading. This would include the use of stormwater infiltration BMPs where appropriate and source control (stabilization and protection of potential sediment sources) in other areas.

Implementation of the proposed General Plan revision would result in an overall increase in impervious surfaces within the park, however, all future redevelopment projects would be required to meet TRPA stormwater infiltration requirements (TRPA Code Section 60.4.6) and conduct project level analysis of effects to drainage patterns and drainage systems. Therefore, implementation of Alternative 3 would have a **less-than-significant** impact.

Pier Rebuild Project

The potential effects of the Alternative 3 pier rebuild project are the same as those discussed above for Alternative 2. For the same reasons, the Alternative 3 pier rebuild project would have **no impact** on stormwater runoff, drainage systems, or drainage patterns.

Alternative 4: Western Pier Alternative

General Plan Revision

The Alternative 4 effects to stormwater runoff would be similar to those discussed for Alternative 2 above. Alternative 4 would reduce overall impervious surfaces by 3,839 square feet (3,733 square feet less than Alternative 2) and would have a corresponding decrease in the volume of stormwater generated on the site. For the same reasons, future construction activities resulting from the implementation of Alternative 4 would have a **less-than-significant** impact on water quality.

Pier Rebuild Project

The potential effects of the Alternative 4 pier rebuild project are the same as those discussed above for Alternative 2. For the same reasons, the Alternative 4 pier rebuild project would have **no impact** on stormwater runoff, drainage systems, or drainage patterns.

Mitigation Measures

No mitigation measures are required.

Impact 5.3.7-4: Exposure to flood hazards

Portions of KBSRA area within the FEMA-designated 100-year flood zone. However, project-level analysis of all future development projects within the Area Plan would ensure that any future development or redevelopment projects do not result in exposure of people or property to flood hazards. Analysis is also required for 100-year floodplain impacts of non-FEMA designated drainageways during future development project environmental review. The Placer County Flood Damage Prevention Ordinance requirements would apply to projects on parcels within the 100-year flood zone or floodway, other than those on state lands. Although TRPA Code Section 35.4.2 prohibits additional development, grading or filling of lands within the 100-year floodplain, exceptions are provided for outdoor recreation facilities. The potential for these projects to expose people or property to flood risk would be minimized through implementation the CSP Special Project Requirements (Section 4.7) and Guideline RES 7.3, which states, “Evaluate future facility designs to ensure that facility improvements do not aggravate or cause flooding problems on an adjacent property, create risks to visitors, and/or cause an increase in the 100-year flood elevation.” Therefore, implementation of the Alternatives 2, 3, and 4 General Plan revision would have a **less-than-significant** impact. Alternative 1 is the no-action alternative. Because it would not alter the development plan for KBSRA, Alternative 1 would have **no impact** relative to flood hazards. The pier rebuild project would increase the volume of pier materials located below the ordinary high-water level of Lake Tahoe, however this increase would have **no impact** on the high-water level of Lake Tahoe, therefore pier rebuild component of Alternatives 1, 2, 3, and 4 would have no impact relative to flood hazards.

Alternative 1: No Project

General Plan Revision

Alternative 1 would be a continuation of the existing KBSRA General Plan. Relative to the existing KBSRA General Plan, there would be no changes in the types or placement of structures or recreational activities that take place within flood hazard areas. For this reason, Alternative 1 would have **no impact** on exposure of people or structures to flood hazards.

Pier Rebuild Project

Alternative 1 would not include changes to the existing King Beach Pier. Therefore, this alternative would have **no impact** on exposure of people or structure to flood hazards due to the rebuilding of the pier.

Alternative 2: Eastern Pier Alternative (Proposed Project)

General Plan Revision

The General Plan revision in Alternative 2 would include changes to facilities in the portions of KBSRA that are within flood hazard areas (refer to Hydrology and Water Quality under Section 2.2.1, Physical Resources). These facilities include the proposed waterfront promenade, the access ramp from the promenade to the beach, and the pedestrian western entry point. Although TRPA Code Section 35.4.2 prohibits additional development, grading or filling of lands within the 100-year floodplain, exceptions are provided for outdoor recreation facilities. The potential for these projects to expose people or property to flood risk would be minimized through implementation of CSP Special Project Requirements (see Section 4.7) and Guideline RES 7.3, which states, “Evaluate future facility designs to ensure that facility improvements do not aggravate or cause flooding problems on an adjacent property, create risks to visitors, and/or cause an increase in the 100-year flood elevation.”

Although Alternative 2 would propose development changes in areas that may be within the 100-year flood zone, implementation of CSP Special Project Requirements and Guideline RES 7.3 (Section 4.7) would ensure that specific facility improvement projects do not result in exposure of people or property to flood hazards. Therefore, implementation of Alternative 2 would have a **less-than-significant** impact relative to flooding.

Pier Rebuild Project

Portions of the proposed pier (such as the pilings and the floating pier section) would, by their very nature, be located below the ordinary high-water mark or Lake Tahoe. However, due to the volume of the pier components relative to the volume of Lake Tahoe and because the upper limit of Lake Tahoe is controlled by the Tahoe City dam, the extension of the pier and the additional piling would have **no impact** on the Lake Tahoe 100-year floodplain. The potential effects of the proposed pier rebuild project on lake currents and sediment transport are discussed in Impact 5.3.7-2.

Alternative 3: Central Pier Alternative

General Plan Revision

The potential for the Alternative 3 General Plan revision to expose people or property to flood hazards would be the same as those discussed for Alternative 2 above. Although Alternative 3 would propose development changes in areas that may be within the 100-year flood zone, implementation of CSP Special Project Requirements and Guideline RES 7.3 would ensure that specific facility improvement projects do not result in exposure of people or property to flood hazards. Therefore, implementation of Alternative 3 would have a **less-than-significant** impact relative to flooding.

Pier Rebuild Project

As discussed for Alternative 2, portions of the Alternative 3 pier rebuild project would be located below the ordinary high-water mark or Lake Tahoe. However, due to the volume of the pier components relative to the volume of Lake Tahoe and dam controls and Tahoe City, the extension of the pier would have **no impact** on the Lake Tahoe 100-year floodplain. The potential effects of the Alternative 3 Pier on lake currents and sediment transport are discussed in Impact 5.3.7-2.

Alternative 4: Western Pier Alternative

General Plan Revision

The potential water quality effects of Alternative 4 resulting from future construction activities would be the same as those discussed for Alternative 2 above. For the same reasons, future construction activities resulting from the implementation of Alternative 4 would have a **less-than-significant** impact on water quality.

Pier Rebuild Project

As discussed for Alternative 2, portions of the Alternative 4 pier rebuild project would be located below the ordinary high-water mark or Lake Tahoe. However, due to the volume of the pier components relative to the volume of Lake Tahoe and dam controls at Tahoe City, the extension of the pier would have **no impact** on the Lake Tahoe 100-year floodplain. The potential effects of the Alternative 4 pier rebuild project on lake currents and sediment transport are discussed in Impact 5.3.7-2.

Mitigation Measures

No mitigation measures are required.

Cumulative Impacts

Cumulative impacts to hydrology and water quality are considered in the context of the Lake Tahoe Basin watershed and the adjacent shorezone. Historic activities such as logging, milling, mining, and grazing within the Tahoe Basin Watershed combined with runoff from urban and recreational developments, have degraded the water quality of the tributaries to Lake Tahoe and the Truckee River, resulting in an existing cumulative adverse condition. The Lake Tahoe total maximum daily load was developed to address sediment levels and Placer County has developed a stormwater management program. Additionally, numerous publicly and privately funded projects have been implemented to restore disturbed areas of the watershed and reduce this adverse condition.

As described above, development and construction activities that could result in erosion, release of pollutants, or encroachment within floodplain or sensitive habitats are highly regulated by TRPA and Lahontan RWQCB. The cumulative projects and the proposed General Plan revision and pier rebuild project would be required to comply with Lahontan RWQCB National Pollutant Discharge Elimination System permit conditions that include preparation of a SWPPP and a Hazardous Materials Spill Response Plan. In addition, projects within the Lake Tahoe Basin would be required to meet TRPA's construction site BMP standards. All projects must demonstrate protection of existing storm drain systems and flow volumes. Additionally, the potential for future cumulative projects to expose people or properties to flood risks would be minimized through compliance with the Placer County Flood Damage Prevention Regulations (Section 15.52, Placer County Code). Finally, any future structures below the high-water line of Lake Tahoe (including the proposed pier rebuild project, the Coast Guard Pier Expansion, and the North Tahoe Marina Expansion) would be required to conduct an analysis of the project's impacts on littoral drift and lake currents (TRPA Code Section 80.4).

Because the Proposed Project and all other projects within the Lake Tahoe Watershed would be required to comply with applicable protective regulations, the potential for the proposed General Plan revision and pier rebuild project to adversely affect water quality conditions **would not be cumulatively considerable**.