management plans. Amendments to SB 318 have focused on ensuring that the urban water management plan emphasizes and addresses drought contingency planning, water demand management, reclamation, desalination and groundwater resources.

California Safe Drinking Water Act

The California Safe Drinking Water Act (Health and Safety Code Sections 4010–4039.6) authorizes the California Department of Public Health to establish maximum contaminant levels that are at least as stringent as those required by USEPA under the federal Safe Drinking Water Act (as discussed in Section 3.10.3, *Regulatory Setting*, in Section 3.10, *Hazards and Hazardous Materials*). The California Department of Public Health has established maximum contaminant levels for contaminants that may occur in public water systems, including all substances for which federal maximum contaminant levels exist, and may have adverse health effects. Operators of public water systems in California must meet federal and state drinking water standards.

California Surface Water Treatment Rule

The California Surface Water Treatment Rule satisfies three specific requirements of the Safe Drinking Water Act for surface waters by:

- Establishing criteria for determining when filtration is required.
- Defining minimum disinfection levels.
- Addressing certain bacteria, viruses, turbidity, and heterotrophic plate count by setting a treatment technique.

The Surface Water Treatment Rule applies to all drinking water supply activities in California. The California Department of Public Health oversees implementation of this rule.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) established the State Water Board and divided the state into nine regions, each overseen by a Regional Board. The nine Regional Boards have primary responsibility for the coordination and control of water quality within their respective jurisdictional boundaries. Under the Porter-Cologne Act, water quality objectives are limits or levels of water quality constituents or characteristics established for the protection of beneficial uses.

The Porter-Cologne Act requires the Regional Boards to establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Designated beneficial uses, together with the corresponding water quality objectives, and an antidegradation policy also constitute water quality standards under the federal Clean Water Act. The water quality objectives provide requirements for water quality control.

If USACE determines that only non-federal waters are present in the restoration project area, then no federal CWA permit would be required. Regardless of federal jurisdiction, however, the project will require a permit, or waste discharge requirements (WDRs), for impacts to any waters of the state. The WDRs would be issued by the appropriate Regional Board or, for statewide or multi-regional projects, by the State Water Board.

Under the Porter-Cologne Act, discharges to all waters of the state, including all wetlands and other waters of the state (including but not limited to isolated wetlands), are subject to state regulation.

A discharger whose project disturbs one or more acres of soil, or disturbs less than 1 acre but is part of a larger common plan of development that in total disturbs 1 or more acres, must obtain coverage under the General Permit for Storm Water Discharges Associated with Construction Activities, Construction General Permit Order No. 2009-009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, and disturbances to the ground such as stockpiling or excavation; however, it does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a storm water pollution prevention plan (SWPPP).

Water Quality Control Plans

Under the Porter-Cologne Act, waters of the state fall under jurisdiction of the State Water Board and the nine Regional Boards. “Waters of the state” means any surface water or groundwater, including saline waters, within the boundaries of the state (Water Code Section 13050[e]). The State Water Board and Regional Boards have been delegated federal authority to implement the requirements of the federal CWA in California, including issuing NPDES permits, under the Porter-Cologne Act. However, the requirements of the Porter-Cologne Act are even broader than those of the CWA. The Porter-Cologne Act requires the Regional Boards to prepare and periodically update water quality control plans, also known as basin plans. Each basin plan establishes water quality objectives sufficient to ensure that the designated beneficial uses of surface water and groundwater are reasonably protected, and actions to control nonpoint and point sources of pollution.

Any person who discharges or proposes to discharge any waste that could affect the quality of the waters of the state must file a “report of waste discharge” with the appropriate Regional Board. “Waste” includes any and all waste substances associated with human habitation, of human or animal origin, or from any producing, manufacturing, or processing operation (Water Code Section 13050[d]). Upon receipt of a report of waste discharge, the Regional Board may issue “waste discharge requirements” designed to ensure compliance with applicable water quality objectives and other requirements of the basin plan.

A public review process is conducted every 3 years to identify and prioritize the actions needed to address water quality concerns and maintain the effectiveness of the basin plan. Amendments to basin plans may include site-specific water quality objectives for a single constituent, basin-wide control programs for a suite of potential pollutants, and/or policy recommendations and strategies for addressing emerging contaminants and/or climate change.

State Water Resources Control Board Statement of Policy with Respect to Maintaining High Quality of Waters in California

In 1968, the State Water Board adopted a policy (Resolution No. 68-16, frequently referred to as the "Anti-degradation Policy") that if water quality is better than the

adopted water quality requirements of the State Water Board, the higher water quality shall be maintained until it is demonstrated that the change in water quality will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial uses, and will not result in water quality less than prescribed in adopted policies. The policy also stated that any activity that discharges or proposes to discharge wastes to waters with higher water quality than specified in adopted policies must implement best practicable treatment or must provide that a pollution or nuisance will not occur and that the highest water quality consistent with the maximum benefit to the people of the state will be maintained.

In July 1990, the State Water Board issued an administrative procedures update to the Regional Boards, describing procedures for findings that would allow degradation of water quality if balanced against the benefit to the public of the activity that caused the water quality degradation. The administrative procedures update stated that the findings should indicate the pollutants that will lower water quality, the socioeconomic and public benefit of the action, and the beneficial uses affected.

Water Quality Criteria for Toxics

The *Policy for Implementing Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* is referred to as the State Implementation Policy. This state policy for water quality control was adopted by the State Water Board on March 2, 2000 and became effective by May 22, 2000. The policy applies to discharges of toxic pollutants into the inland surface waters, enclosed bays, and estuaries of California subject to regulation under the state Porter-Cologne Act (Division 7 of the Water Code) and the federal Clean Water Act. Such regulation may occur by issuing National Pollutant Discharge Elimination System permits, or through other relevant regulatory approaches. This policy establishes:

- Provisions for implementing priority pollutant criteria promulgated by EPA through the National Toxics Rule (40 CFR 131.36) (promulgated December 22, 1992 and amended May 4, 1995) and through the California Toxics Rule (40 CFR 131.38) (promulgated May 18, 2000, and amended February 13, 2001), and for priority pollutant objectives established by Regional Water Quality Control Boards in their water quality control plans.
- Monitoring requirements for 2,3,7,8-TCDD equivalents.
- Chronic toxicity control provisions.

In addition, the policy includes special provisions for certain types of discharges and factors that could affect the application of other provisions in the policy.

The California Toxics Rule is applicable to all state waters, as are the EPA advisory National Recommended Water Quality Criteria.

State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State

The State Water Board adopted the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (Discharge Procedures),

for inclusion in the forthcoming *Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California,* effective May 28, 2020. The Discharge Procedures consist of four major elements: (1) a wetland definition; (2) a framework for determining whether a feature that meets the wetland definition is a water of the state; (3) wetland delineation procedures; and (4) procedures for the submittal, review, and approval of applications for water quality certifications and waste discharge requirements for dredged or fill activities.

The Discharge Procedures, formerly known as the *Wetland Riparian Area Protection Policy,* have been renamed to communicate that the procedures apply to discharges of dredged or fill material to all waters of the state, not just wetlands.

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) was enacted in September 2014. The SGMA establishes a new structure for locally managing California's groundwater in addition to the existing groundwater management provisions established by Assembly Bill (AB) 3030 (1992), SB 1938 (2002), and AB 359 (2011), as well as SBX7 6 (2009). The SGMA includes the following key elements:

- Provides for the establishment of a groundwater sustainability agency (GSA) by one or more local agencies overlying a designated groundwater basin or sub-basin identified in DWR Bulletin 118-03
- Requires all DWR Bulletin 118 groundwater basins found to be of "high" or "medium" priorities to prepare groundwater sustainability plans (GSPs)
- Provides for the proposed revisions, by local agencies, to the boundaries of a DWR Bulletin 118 basin, including the establishment of new sub-basins
- Authorizes DWR to adopt regulations for the development of GSPs and review the GSPs for compliance every 5 years
- Requires DWR to establish best management practices and technical measures for GSAs to develop and implement GSPs
- Provides regulatory authority to the State Water Board for developing and implementing interim GSPs under certain circumstances (such as lack of compliance with development of GSPs by GSAs)

The SGMA defines sustainable groundwater management as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results." Undesirable results are defined as any of the following effects:

- Chronic lowering of groundwater levels
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion

- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Based on the basin priority definitions included in DWR's California Statewide Groundwater Elevation Monitoring program in June 2014 and confirmed in January 2015, the SGMA required that GSPs be formed by 2020 or 2022. GSPs were required by 2020 for medium- and high-priority basins identified as subject to critical overdraft conditions. GSPs must be completed for all other high- and medium-priority basins by 2022. Sustainable groundwater operations must be achieved within 20 years after completion of the GSPs.

Assembly Bill 3030: Groundwater Management Act (2002)

The Groundwater Management Act (Water Code Sections 10750–10756; AB 3030) provides a systematic procedure for an existing local agency to develop a groundwater management plan. This law provides agencies with the powers of a water replenishment district to raise revenue to pay for facilities to manage the basin (extraction, recharge, conveyance, quality).

Many agencies have adopted groundwater management plans in accordance with AB 3030. AB 3030 allows certain defined existing local agencies to develop a groundwater management plan for groundwater basins.

State Water Board Comprehensive Response to Climate Change

On March 7, 2017, the State Water Board adopted Resolution No. 2017-0012, Comprehensive Response to Climate Change. This resolution identified the potential for the use of recycled water to reduce greenhouse gas emissions if the recycled water replaces existing or future, higher carbon water supplies. Where feasible, recycled water should be treated to meet appropriate water safety standards for the intended use to meet local water supply needs. Resolution No. 2017-0012 directed staff to coordinate with the Regional Boards to make annual reporting of recycled water data a requirement of waste discharge permits and water reclamation requirements, and to work with the State Water Board's Division of Information Technology to develop an online data entry system to track the use of recycled water.

Regional and Local

The study area encompasses multiple counties and cities throughout California. Each county and city has local regulations and a general plan with policies related to hydrology and water quality. These may include goals and policies related to water service, water resources, stormwater, and groundwater. Local entities may also have mapped flood hazard areas, in addition to those mapped by FEMA, and local ordinances may regulate activities in those areas.

3.11.4 Impacts and Mitigation Measures

Methods of Analysis

Hydrology and water quality impacts from the types of restoration projects permitted under the Order are evaluated in terms of how typical construction and operation of project components could impact existing hydrology and water quality. However, the precise locations and detailed characteristics of potential future individual restoration projects are yet to be determined. Therefore, this hydrology and water quality analysis focuses on reasonably foreseeable changes from implementation of the types of projects and actions that might be taken in the future consistent with the level of detail appropriate for a program-level analysis.

Permanent impacts are considered those that would continue through the life of a project as a result of the environmental conditions caused by restoration projects permitted under the Order (e.g., removal of a small dam that could change existing water flows). Temporary impacts are considered those that would be temporary in nature (e.g., construction-related activities).

The approach to assessing hydrology and water quality impacts was to identify and review existing environmental studies, data, model results, and other information for projects that are consistent with those identified in Section 2.6, *Categories of Restoration Projects in the Order*, and Section 2.7, *Typical Construction, Operation, and Maintenance Activities and Methods*.

Thresholds of Significance

In accordance with Appendix G of the State CEQA Guidelines, an impact related to hydrology and water quality is considered significant if activities permitted by the Order would do any of the following:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
  - Result in substantial on- or off-site erosion or siltation;
  - Substantially increase the rate or amount of surface runoff in a manner which would result in on or off-site flooding;
  - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
  - Impede or redirect flood flows

- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

Impacts and Mitigation Measures

Table 3.11-1 summarizes the impact conclusions presented in this section for easy reference.

Table 3.11-1
Summary of Impact Conclusions—Hydrology and Water Quality

Impact Statement	Construction Activities	Constructed Facilities and Operations and Maintenance
3.11-1: Implementing restoration projects permitted under the Order could result in the release of pollutants into surface water and/or groundwater that could violate water quality standards or waste discharge requirements, substantially degrade water quality, or obstruct implementation of a water quality control plan.	LTSG	LTSG
3.11-2: Implementing restoration projects permitted under the Order could substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that a project may impede sustainable groundwater management of the basin or obstruct implementation of a sustainable groundwater management plan.	LTS	LTS
3.11-3: Implementing restoration projects permitted under the Order could substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces in a manner that could substantially increase the rate of runoff; create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems; or impede or redirect flood flows.	LTS	LTS

SOURCE: Data compiled by Environmental Science Associates in 2019 and 2020
NOTES: LTS = less than significant; LTSG = less than significant with implementation of general protection measures

As part of the State Water Board or Regional Board's issuance of a NOA for a restoration project under the Order, compliance with the general protection measures

and mitigation measures listed below would be required when applicable to a given project. Not all general protection measures and mitigation measures would apply to all restoration projects. The applicability of the general protection measures and mitigation measures would depend on the individual restoration activities, project location, and the potentially significant impacts of the individual restoration project. Implementation of the mitigation measures would be the responsibility of the project proponent(s) under the jurisdiction of the State Water Board, appropriate Regional Board, or other authorizing regulatory agency.

Impact 3.11-1: Implementing restoration projects permitted under the Order could result in the release of pollutants into surface water and/or groundwater that could violate water quality standards or waste discharge requirements, substantially degrade water quality, or obstruct implementation of a water quality control plan.

Effects of Project Construction Activities

Construction of restoration projects permitted under the Order (e.g., culverts, bridges, fish screens, ladders, and pilings; removal of small dams, tide gates, flood gates, and legacy structures; placement of bioengineered stabilization materials; grading and excavation to reconnect, set back, or breach levees, reconnect stream and river channels, or create depressions, berms, and drainage features; installation of cofferdams during construction) could require the movement of earth and other materials and the use of heavy equipment. In-channel disturbance for the placement or removal of structures could cause temporary changes to water quality in several different ways. For example, this work could temporarily disturb streambed sediments and cause the resuspension of sediment-associated pollutants (e.g., trace metals, heavy metals, pesticides) associated with legacy (e.g., gold mining) or contemporary (e.g., watershed urbanization) activities.

Construction work could also introduce pollutants through equipment (e.g., oils, lubricants, hydraulic fluids) and materials (e.g., soil and cover materials, concrete) into affected waterways, or into flood hazard, tsunami, or seiche zones, where inundation could release the pollutants. For example, excavation and grading for a large wetland restoration project could expose and release contaminated sediments, resulting in water quality impacts on receiving waters.

Localized degradation of groundwater quality could result from temporary, short-term construction activities such as building access roads and temporary facilities, or from O&M activities such as vegetation control. If hazardous materials were to be discharged to the land surface or surface waters during this work, they could travel to underlying aquifers. If the discharge volume were large enough, the hazardous materials could degrade local groundwater quality to a sufficient degree to impair its continued use. (Section 3.10, *Hazards and Hazardous Materials*, includes more information regarding hazardous materials.)

In addition, construction activities for some restoration projects could include temporary dewatering. Groundwater extracted during dewatering operations may contain elevated

levels of suspended sediment, turbidity, or other constituents (e.g., metals, construction materials) that could degrade water quality when discharged into surface waters.

The time to construct restoration projects could be as short as a few days, in the case of minor projects, or as long as several years during only certain months of the year for major projects. Therefore, the projects could result in effects on water quality that would persist throughout project construction.

As described in Section 3.1, *Approach to the Environmental Analysis*, the analysis assumes that project proponents would comply with applicable federal, state, and local regulations and ordinances. The federal Clean Water Act prohibits any stormwater discharge from a construction project unless the discharge is in compliance with an NPDES permit. The State Water Board and Regional Boards are the NPDES permitting authorities in California.

The State Water Board has adopted a Statewide General Permit for Stormwater Discharges Associated with Construction Activity (Construction General Permit, Order 2009-0009-DWQ) for construction sites where 1 or more acres of soil would be disturbed. The Construction General Permit requires, among other actions, the implementation of mandatory best management practices, including pollution/sediment/spill control plans, training, sampling, and monitoring for non-visible pollutants.

In addition, the Regional Boards may require projects to obtain an NPDES permit or waste discharge requirements before they discharge clean or relatively pollutant-free wastewaters that pose little or no threat to the quality of the receiving water (e.g., to discharge groundwater pumped during dewatering into surface waters). The NPDES discharge permit may require that groundwater removed during construction be treated before it is discharged to surface waters. Adherence to regulations may be enough to reduce impacts on water quality to less than significant in some cases.

Estuarine salinity levels, including those in the Delta and other estuaries throughout the State, are important to various water users, including municipal, industrial, and agricultural, and fish and wildlife. Salinity extends further into the estuaries during drier seasons and years since low freshwater inflows into the estuaries are diminished and less freshwater is available to offset salinity intrusion.

Restoration projects proposed for coverage under the Order could involve breaching and lowering existing levees and excavating a tidal channel network, thereby re-introducing daily tidal flows to a project site. Restored tidal exchange would also change flow patterns in the connected channels outboard of a project site. Because these tidal flows also distribute salinity within estuaries, these alterations in flow patterns could affect salinity levels in an estuary. Salinity increases are a concern to various municipalities, industries, agricultural interests, and resources agencies that depend on the availability of freshwater to maintain existing beneficial uses.

While these types of potential effects are possible, they would be expected to be rare and small, and only associated with large projects that have the potential to change tidal prism. For example, a model-based analysis of a 3,000-acre tidal marsh restoration project in the north Delta concluded that the project’s salinity effects would be less than

significant because the project resulted in negligible or small changes (under worst-case conditions) in salinities that were still in compliance with water quality standards that are protective of beneficial uses (ESA 2019).

As described in Order Section VII, "*project proponents (seeking coverage under the Order) will identify the receiving waters and beneficial uses of waters of the state to be impacted by a proposed project, as listed in the applicable Regional Board water quality control plan*." This information is required in the Notice of Intent (NOI; Order Attachment B), which must be completed by a project proponent to apply for authorization under this Order.

Further, as described under Order Section XIII, "*The Water Boards will independently review any project proposed for authorization under this Order to analyze impacts to water quality and designated beneficial uses within the applicable watershed(s). If the eligibility requirements set forth in this Order including Attachment A are not met, Water Boards will not authorize the proposed project under this Order and instead require the project proponent to apply for an individual certification or certification under another Order. Specifically, the approving Water Board may only authorize the proposed project under this Order if it determines that the following requirements are met: 1) the project meets the definition of a restoration project (as defined in Section V of the Order); 2) the project adopts and implements all appropriate GPMs and CEQA mitigation measures to protect water quality and beneficial uses; 3) the project proponent fulfills all approving Water Board requirements for project information and reporting; and 4) the project is designed to protect water quality and beneficial uses in accordance with regional or statewide water quality control plans."*

Any potential restoration projects seeking coverage under the Order would be required to undergo pre-application consultation with the approving Water Board and analyze impacts to water quality and designated beneficial uses within the applicable watershed(s) through its own environmental review pursuant to CEQA; and the project would be required to be designed to protect water quality and beneficial uses in accordance with regional or statewide water quality control plans.

The Order does not promote the construction or implementation of individual restoration projects, nor does it describe the specific size, location, implementation timing, or exact configuration of such projects. These are all factors necessary to identify the water quality impacts of constructing restoration projects permitted under the Order. Because the potential exists for adverse impacts on water quality as a result of the construction of restoration projects permitted under the Order, this impact would be **potentially significant**.

Projects implementing applicable general protection measures (Appendix E) included in the Order would further reduce impacts to hydrology and water quality. The following general protection measures may apply to hydrology and water quality:

- GPM-10: Equipment Maintenance and Materials Storage
- GPM-11: Material Disposal
- GPM-12: Fugitive Dust Reduction
- WQHM-1: Staging Areas and Stockpiling of Materials and Equipment

- WQHM-2: Storm Water Pollution Prevention Plan
- WQHM-3: Erosion Control Plans
- WQHM-4: Hazardous Materials Management and Spill Response Plan
- WQHM-5: In-Water Concrete Use
- WQHM-6: Accidental Discharge of Hazardous Materials
- IWW-1: Appropriate In-Water Materials
- IWW-2: In-Water Vehicle Selection and Work Access
- IWW-3: In-Water Placement of Materials, Structures, and Operation of Equipment
- IWW-4: In-Water Staging Areas and Use of Barges
- IWW-6: Dewatering/Diversion
- IWW-10: In-Water Pile Driving Methods
- IWW-11: Sediment Containment during In-Water Pile Driving
- IWW-12: Pile-driving Monitoring
- IWW-13: Dredging Operations and Dredging Materials Reuse Plan
- VHDR-2: Native and Invasive Vegetation Removal Materials and Methods
- VHDR-3: Revegetation Materials and Methods
- VHDR-4: Revegetation Erosion Control Materials and Methods
- VHDR-6: Herbicide Use
- VHDR-7: Herbicide Application Planning
- VHDR-8: Herbicide Application Reporting.

Integration of applicable general protection measures into project designs and plans would reduce impacts from construction activities on the water quality of the study area to a **less-than-significant** level.

Effects of Constructed Facilities (Natural or Artificial Infrastructure) and Operations and Maintenance of those Facilities

Long-term effects on water quality from restoration projects permitted under the Order are expected to be beneficial or sometimes neutral (in the case of fish screens or ladders), because the specific purpose of these projects would be to correct existing conditions that contribute to resource degradation. For example, projects implementing bioengineered bank stabilization would reduce the input of fine sediment, which would improve water quality. Other restoration projects, such as those to remove pilings and other in-water structures, would improve water quality by removing potential contaminant sources and hazards such as untreated and chemically treated wood pilings, piers, and vessels. In addition, restoration projects permitted under the Order could establish, restore, and enhance tidal, subtidal, and freshwater wetlands. For example, living shorelines provide a natural alternative to “hard” shoreline stabilization methods like stone sills or bulkheads, and provide numerous ecological benefits including water quality improvements; floodplain restoration would also improve water quality because floodplains, when inundated with water, act as natural filters by removing excess sediment and nutrients.

In regard to potential impacts associated with cyanoHABs, predicting whether these will either 1) develop, or 2) increase in frequency, severity, and/or duration, relative to a baseline, in a given location due to incremental changes in environmental factors is difficult. At a minimum, it requires knowledge of the factors for triggering (water

temperature) and sustaining (high irradiance and high nutrient availability) growth and blooms in any particular location, together with data on how these factors are predicted to change. It is important to keep in mind that all three factors have to occur simultaneously for cyanoHABs to develop. Change in one factor alone will most likely not lead to a change in bloom status. For example, increase in nutrient concentration in a location with a well-mixed water column may not lead to a bloom of cyanoHAB species such as *Microcystis* as continued mixing of *colonies* to the bottom will prevent them from increasing their growth rate sufficiently to become dominant. Increase in residence time has been shown to increase cyanoHAB occurrences when it results in stratification of the water column (Carey et al. 2021). Stratification allows the surface layer to become isolated from the rest of the water column. This may increase the water temperature, water clarity, and decrease the mixing of cyanoHAB cells and colonies from the surface to the bottom allowing them to be continually exposed to high irradiance, and therefore, maintain maximum growth rates (Visser et al. 2005, Carey et al. 2012). If an increase in residence time does not lead to water column stratification, then the water may not warm sufficiently to trigger growth of cyanoHABs, or the mixing rate may not decrease sufficiently to maintain cyanoHAB species at the surface, effectively preventing the formation of colonies and accumulation of biomass. In addition, a decrease in residence time has to be sufficient that the growth rate of the cyanoHAB species exceeds the flushing rate of the water in order for colonies and biomass to accumulate in the area. If residence time is increased and stratification occurs, but the surface layer is depleted of nutrients, then cyanoHABs may not be able to develop due to nutrient limitation.

As is evident from the above discussion, changes in environmental factors and hydrology in a given location may or may not lead to changes in cyanoHABs depending on the thresholds of bloom development in that location and changes in environmental factors relative to those thresholds. However, restoration projects permitted under the Order would result in a number of improved ecological processes that would counteract these risks. For example, restoration projects have the potential to decrease water temperatures associated with the creation of shade through the restoration and enhancement of vegetation communities (e.g., riparian, emergent marsh). Restoration projects would also have the potential to improve tidal flushing, resulting in a well-mixed water column. The establishment of seagrasses, emergent marsh, and riparian vegetation would also result in increased uptake and removal of nutrients from the water. All of these beneficial ecological processes would counteract risks associated with environmental factors that contribute to increases in cyanoHABs. Finally, all projects must meet the definition of a restoration project, be consistent with categories of restoration projects described in the Order, and adhere to programmatic sideboards, including adopting applicable protection measures and design guidelines, and undergo pre-application consultation with the Water Board staff.

Routine O&M activities for restoration projects permitted under the Order could consist of periodic and routine work such as removing sediment within or near the facilities (e.g., culverts, fish screens and ladders), removing vegetation (e.g., invasive species in aquatic or riparian areas), and inspecting and maintaining facilities and natural features (e.g., replanting trees and shrubs, repairing biotechnical and other features). Routine

O&M activities would be similar to those described for construction; however, the level of activity would be less intense during the O&M phase than during construction, so the degree of temporary changes to water quality would be much less.

As described above, the Order does not promote the construction or implementation of individual restoration projects, nor does it describe the specific size, location, implementation timing, or exact configuration of such projects. Because the potential exists for adverse impacts on water quality as a result of the maintenance of restoration projects permitted under the Order, this impact would be **potentially significant**.

However, restoration projects would incorporate general protection measures (listed above under *Effects of Project Construction Activities)* that would reduce impacts from O&M activities on water quality.

Implementing these general protection measures would reduce impacts from O&M activities on water quality to a **less-than-significant** level. Further, many of the long-term effects of these projects on water quality are expected to be beneficial or neutral, because the specific purpose of these projects would be to correct existing conditions that contribute to resource degradation and/or counteract risks associated with environmental factors that contribute to water quality degradation.

Impact 3.11-2: Implementing restoration projects permitted under the Order could substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that a project may impede sustainable groundwater management of the basin or obstruct implementation of a sustainable groundwater management plan.

Effects of Project Construction Activities

Construction activities for restoration projects permitted under the Order could include temporary dewatering to facilitate equipment access, excavation or placement of materials, and repair or removal of infrastructure. These activities could result in a localized, temporary reduction in groundwater levels near the construction area, which would be expected to return to preconstruction levels after dewatering activities cease (or possibly better levels, if the aquifer were depleted, or in the case of a multi-benefit restoration project). Land grading, placement of dredged or other in-water material removed (e.g., legacy structures) on land before disposal, construction of structures (e.g., fish screens, earthen embankments), and stockpiling of construction materials could change drainage patterns during construction, which typically would result in changes in groundwater recharge. Actual alterations of groundwater recharge would depend on the type of construction activity and hydrologic and hydraulic factors.

In addition, although many construction-related impacts on groundwater would be temporary, it is reasonable to expect that construction for an infrastructure restoration project (e.g., setback levee) could occur over two or more years, which could result in recurring, localized changes. However, groundwater levels would be expected to return to preconstruction levels (or better) after dewatering activities cease.

In conclusion, construction of restoration projects permitted under the Order could reduce groundwater levels and alter groundwater recharge. However, these reductions would be localized and temporary, and preconstruction conditions would be expected to resume, or be improved, after construction. Project construction would not be anticipated to obstruct with implementation of a sustainable groundwater management plan. Therefore, this impact would be **less than significant**.

Projects implementing applicable general protection measures (Appendix E) included in the Order would further reduce impacts to hydrology and water quality. The following general protection measures may apply to hydrology and water quality:

- IWW-6: Dewatering/Diversion

Implementing this general protection measure would further reduce the **less-than-significant** impact from construction activities on localized groundwater supplies and groundwater recharge.

Effects of Constructed Facilities (Natural or Artificial Infrastructure) and Operations and Maintenance of those Facilities

Some of the long-term effects of restoration projects permitted under the Order on groundwater recharge are expected to be beneficial (e.g., stream, floodplain, and riparian projects typically would improve groundwater recharge) or neutral. For example:

- Restoring off-channel/side channel habitat and/or floodplains would allow for greater inundation, which would lead to increased groundwater recharge.
- Installing beaver dam analogues would allow for greater groundwater recharge because as they trap sediment, the streambed rebuilds and forces water onto the floodplain, recharging groundwater.
- Removing legacy structures and other in-water structures would reduce the amount of impervious surfaces in the project area, which would allow for improved groundwater recharge.
- Restoration projects involving returning flows to a marsh could increase flows across the floodplain, which would enhance opportunities for groundwater recharge.

Restoration projects permitted under the Order could affect groundwater supplies and recharge. Construction work could include compaction of soil and other activities that would temporarily increase impervious land surfaces (e.g., concrete foundations for fish screens and fishways); however, these changes in land surfaces would be expected to be very small and would not be expected to result in decreases in groundwater recharge at these locations. As a result, alterations of, or interference with, groundwater recharge as a result of constructed facilities in the study area would likely be negligible. Most projects would not include large-scale impervious surfaces, and the constructed facilities, such as fish screens, or trails associated with multi-benefit projects would be relatively very small compared to the overall recharge area of a given watershed or sub-watershed. Therefore, there would be little or no likelihood for constructed facilities to affect groundwater recharge. Groundwater recharge could still occur around these

facilities, and projects would not obstruct implementation of a sustainable groundwater management plan.

Slurry cutoff walls may be installed in setback levees, which could restrict water flow and affect groundwater levels. A slurry cutoff wall is a civil engineering technique used to build reinforced concrete walls in areas of soft earth close to open water, or with a high groundwater table. Slurry cutoff walls create barriers to groundwater inflow or subsurface contaminants. The potential consequences are anticipated to be localized changes in well water levels and/or high groundwater levels near the setback levees and near the locations where slurry cutoff walls are installed. However, such changes would not be expected to substantially affect groundwater resources.

Restoration projects permitted under the Order would establish, restore, and enhance stream and riparian areas and may include activity in upslope watershed sites (e.g., outside of the State and Regional Water Boards' jurisdiction). Specific project features such as small wood structures or beaver dam analogues would increase ponding and reconnect floodplains. By increasing the rate, duration, and inundation of floodplain surfaces, these features would elevate the water table during both low- and high-flow conditions, increasing groundwater recharge. Floodplain restoration would also allow for groundwater recharge because floodplains, when inundated with water, allow floodwaters to infiltrate the ground.

Therefore, operation of restoration projects permitted under the Order would not reduce groundwater supplies or impair groundwater recharge. The goal of many projects would be to improve groundwater recharge, resulting in a beneficial effect. Therefore, this impact would be **less than significant**.

The Order does not include any general protection measures applicable to this impact.

Impact 3.11-3: Implementing restoration projects permitted under the Order could substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces in a manner that could substantially increase the rate of runoff; create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems; or impede or redirect flood flows.

Effects of Project Construction Activities

Construction activities for restoration projects permitted under the Order could temporarily change drainage patterns. This change could increase the rate and amount of surface runoff in a manner that would exceed the capacity of existing or planned stormwater drainage systems, result in flooding, or impede or redirect flood flows.

Project construction could require grading; levee setbacks; construction, repair, or removal of instream structures; and stockpiling of construction materials that could create physical barriers to surface runoff. The actual alterations of drainage patterns would depend on the type of construction activity (e.g., floodplain restoration; removal of

small dams, tide gates, flood gates, and legacy structures) and hydrologic and hydraulic factors (e.g., changing of runoff amounts or rates).

Land grading, placement of dredged or other in-water material removed (e.g., small dams) on land before disposal, construction of structures (e.g., fish screens), and stockpiling of construction materials could change drainage patterns during construction. These barriers could redirect surface runoff and/or result in an increase in water surface elevations on and adjacent to the construction site.

Construction activities such as compacting soils could increase their imperviousness (inability to be penetrated by water), which would reduce infiltration rates and cause an associated increase in the amount and rate of surface runoff. In addition, grading activities could change the slope of the land across which drainage flows, which could change the direction, rate, and amount of surface runoff from a construction site. Many factors affect the rate and amount of surface runoff, including topography, the amount and intensity of precipitation, the amount of evaporation, roughness and permeability of the substrate, and the amount of precipitation and imported water that infiltrates into groundwater. A construction-related change in the amount or rate of surface runoff would likely only have relatively localized effects on-site and immediately downstream, or downslope, of the site. In addition, although many construction-related impacts on surface runoff would be temporary, it is reasonable to expect that construction activities for restoration projects could occur over several years, which could result in changes to surface runoff that would persist throughout project construction.

Construction of restoration projects permitted under the Order could temporarily change drainage patterns; however, these changes would not be expected to change surface runoff in a manner that could exceed existing or planned stormwater drainage systems and/or create or increase on- or off-site flooding. Any changes would likely have relatively localized effects on-site and immediately downstream (or downslope) of the site; floodplain restoration improvements would not be expected to increase surface elevations or the chance of flooding in adjacent floodplains. Therefore, restoration projects permitted under the Order would not increase the rate or amount of surface runoff in a manner that would increase the risk of flooding on- or off-site. This impact would be **less than significant**.

To further reduce the impact of project construction on the rate or amount of surface runoff in a manner that would increase the risk of flooding on- or off-site, the Order includes the following general protection measures (Appendix E):

- WQHM-1 Staging Areas and Stockpiling of Materials and Equipment
- WQHM-2: Storm Water Pollution Prevention Plan

Implementing these general protection measures would further reduce the **less-than-significant** impact from construction activities on the rate or amount of surface runoff in a manner that would increase the risk of flooding on- or off-site.

Effects of Constructed Facilities (Natural or Artificial Infrastructure) and Operations and Maintenance of those Facilities

Restoration projects permitted under the Order could result in a permanent alteration of drainage patterns. Many of the long-term effects of these projects on drainage patterns and flood flows are expected to be beneficial or neutral, because the specific purpose of these projects would be to correct existing conditions that contribute to resource degradation such as groundwater overdraft, and poor water quality and flood management. For example:

- Bioengineered bank stabilization projects integrate living woody and herbaceous materials with earthwork and recontouring of streambanks, which provides for increased bank stability.
- Placing organic and inorganic materials to stabilize and increase the structure of the soil where site constraints limit opportunities for natural channel meander reduces soil erosion.
- Restoration and enhancement of off-channel/side-channel habitat features typically creates an improved hydrologic connection between floodplains and main channels.

Floodplain restoration, including setback, breaching, and removal of levees, berms, and dikes, and hydraulic reconnection and revegetation would improve the diversity and complexity of aquatic and riparian habitat by increasing floodway capacity and inundation frequency.

Floodplain and levee restoration improvements may cause the existing course of a stream or river to change or the hydraulic roughness to increase (e.g., from plantings that increase instream vegetation density). However, such improvements would not be expected to substantially increase surface elevations, increase the chance of flooding outside of restored floodplains or decrease the channel's flow carrying capacity as floodplain and levee restoration improvements would need to meet design standards and permitting requirements. Similarly, small dams would be removed only when dams are less than 25 feet in height from the natural bed of the stream or watercourse at the downstream toe of the barrier, and the dams would be removed to restore natural stream geomorphology. Therefore, removing small dams would not be expected to substantially increase surface water elevations or the chance of flooding in adjacent or downstream floodplains. For example, the potential for setback levees to redirect flood impacts to other areas is expected to be negligible because setback levees decrease flood stages by increasing channel widths. In addition, setback levees would need to meet design standards and permitting requirements.

Floodplain restoration or other restoration projects permitted under the Order would not be expected to result in operational changes to upstream reservoirs. Upstream reservoirs that are operated for flood management must maintain certain amounts of flood control space and operate under flood control rules established in the reservoir's operation manual. Hence it is not likely that restoration would require operational changes, and if they did, there should be no impact on flood risk. In addition, large-scale

floodplain restoration projects may provide for containment of reservoir releases in preparation for large storm events, which would be beneficial.

Projects such as fishways and offstream storage tanks could cause the imperviousness of the soils to increase, which would reduce infiltration rates and result in an associated increase in the amount and rate of surface runoff. The actual alterations of drainage patterns would depend on the facilities and hydrologic and hydraulic factors. The changes in drainage patterns could persist after construction, depending on project designs. For example, there could be permanent changes in land cover as a result of construction, such as increases in concrete or compacted surfaces (e.g., for fish screens) or vegetation removal.

The rate and amount of surface runoff are determined by multiple factors: topography, amount and intensity of precipitation, amount of evaporation in the watershed, and amount of precipitation and imported water that infiltrates into groundwater. However, these projects would not be expected to appreciably impede or redirect flood flows, or to negatively affect levee integrity or the potential for overtopping, once construction is complete. Projects would be designed consistent with existing regulatory requirements.

Restoration projects permitted under the Order could permanently alter drainage patterns. Many of the long-term effects of these projects on drainage patterns and flood flows are expected to be beneficial or neutral, because the specific purpose of these projects would be to correct existing conditions that contribute to resource degradation. Restoration projects could alter runoff rates and timing, as local drainage patterns could change during project construction. However, these projects would likely have relatively localized effects on-site and immediately downstream (or downslope) of the floodplain restoration improvements and would not increase surface water elevations or the chance of flooding in adjacent floodplains. Therefore, this impact would be **less than significant**.

The Order does not include any general protection measures applicable to this impact.