4.9 Hydrology and Water Quality

This section summarizes the potential for the project alternatives to adversely affect hydrologic and water resources. The section includes measures to avoid, minimize, and mitigate effects to such resources. The analysis is based on review of preliminary project design documents, publicly available regional hydrologic resources from federal, state, and local sources, and policy documents, such as the City of San Francisco *Better Streets Plan* (2011).

The pink area in the above map denotes the San Francisco Francisco Bay Area groundwater basin

4.9.1 | Regulatory Setting

4.9.1.1 | FEDERAL REGULATIONS

4.9.1.1.1 CLEAN WATER ACT [33 U.S.C. SECTION 1251 ET SEQ.]

The major federal legislation governing water quality is the Clean Water Act (CWA). The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters" (CWA, Section 101(a)). The CWA prohibits point discharges of pollutants to waters of the United States, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The U.S. Environmental Protection Agency (US EPA) has granted the State of California primacy in administering and enforcing the provisions of the CWA and the NPDES Permit Program. The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards issue both general and individual NPDES permits for certain activities that may result in discharges of pollutants to surface waters (discussed in more detail below).

Sections 303 and 304 of the CWA require states to promulgate water quality standards, criteria, and guidelines. Section 303(d) specifically regulates impaired water bodies and requires each state to identify waters that will fail to achieve water quality standards even after maintaining effluent standards, and to enact improvement plans. Each state must develop load-based (rather than concentration based) limits called total maximum daily loads (TMDL) for each water body and pollutant for which water quality is considered impaired.

Section 404 of the CWA limits the amount of dredged or fill material that can be placed into waters of the United States, including wetlands. Section 401 of the CWA stipulates that any action that requires a federal license or permit and that may result in a discharge of pollutants into waters of the United States also requires a water quality certification.

4.9.1.1.2 EXECUTIVE ORDER 11988: FLOODPLAIN MANAGEMENT

Executive Order 11988, as amended, was issued in 1977 and requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Executive Order 13690 had amended Executive Order 11988, but was revoked by a subsequent Executive Order in August 2017. Executive Order 11988 remains in place as of January 2018.

4.9.1.2 | STATE REGULATIONS

4.9.1.2.1 PORTER-COLOGNE WATER QUALITY CONTROL ACT [CALIFORNIA WATER CODE SECTION 13000 ET SEQ.]

The Porter-Cologne Water Quality Control Act established the SWRCB and divided the state into nine regional basins, each with a water board. The SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, while the regional boards are responsible for developing and enforcing water quality objectives and implementation plans.

4.9.1.3 | LOCAL REGULATIONS

4.9.1.3.1 REGIONAL WATER QUALITY CONTROL BOARD

The Geary corridor lies within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (Water Board), which has adopted the *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan) to implement plans, policies, and provisions for water quality management. The Water Board is responsible for protecting the beneficial uses of water resources within the San Francisco Bay Region using planning, permitting, and enforcement authorities to meet this responsibility. The Water Board adopted its Basin Plan in 1995 and most recently amended it in December 2011.

The Water Board is also responsible for administration and enforcement of NPDES permits for San Francisco. These include the Construction General Permit (Order 2009-0009-DWQ) which covers development that disturbs one or more acre and the permits governing City sewer discharges to both oceanside (Order R2-2009-0062) and bayside (Order R2-2008-0007) waters, as well as Waste Discharge Requirements for the City's wastewater treatment facilities (Order R2-2002-0073).

4.9.1.3.2 SAN FRANCISCO LAWS, REGULATIONS, AND POLICIES

The San Francisco Public Utilities Commission (SFPUC) is responsible for managing water and wastewater services within San Francisco. SFPUC has developed the *Sewer System Master Plan*, which describes and implements an Integrated Urban Watershed Management approach for managing wastewater, stormwater, and biosolid collection and treatment. SFPUC has also developed *Stormwater Design Guidelines*, which apply to development within San Francisco. These guidelines encourage the use of low-impact design (LID) to comply with stormwater management requirements. LID measures are designed to reduce and delay the volumes and peak flows of stormwater reaching the San Francisco sewer system, thereby reducing combined sewer discharges, preventing flooding, and improving water quality.

Regulations included in the San Francisco Green Building Ordinance (enacted as part of the San Francisco Building Code) address stormwater management by seeking to reduce impervious cover, promote infiltration, and capture and treat 90 percent of the runoff from an average annual rainfall event using acceptable Best Management Practices (BMPs). These regulations require that projects implemented on previously developed sites reduce runoff from existing levels. These requirements apply to any project that disturbs more than 5,000 square feet of impervious surface, but do not apply to surface pavement maintenance activities or utility repair work.

RESOURCES

For more information on the Clean Water Act, visit:
http://www2.epa.gov/laws-regulations/summary-clean-water-act

To learn more about California Water Boards, visit:
www.waterboards.ca.gov

To learn more about the Better Streets Plan, visit:
http://www.sf-planning.org/ftp/BetterStreets/index.htm

Tree Basin – an example of LID that allows stormwater runoff to infiltrate into the soil, thereby reducing runoff volume and peak flows.

Any of the build alternatives would be expected to disturb at least 5,000 square feet of impervious surface area and would likely be required to adhere to the San Francisco Green Building Ordinance.

Article 2.4 of the San Francisco Public Works Code contains detailed requirements for excavation within the public right-of-way. These include requiring that transit projects within the public right-of-way incorporate LID stormwater facilities consistent with SFPUC *Stormwater Design Guidelines* to the maximum extent practicable and feasible (Article 2, Section 2.4.13(7)).

The *Better Streets Plan* was developed to provide a unified set of standards, guidelines, and implementation strategies for San Francisco's pedestrian environment, the portion of the streetscape outside of vehicle lanes. Section 6.2 describes a number of stormwater control elements that may be incorporated into development projects. These include permeable paving, bioretention facilities, swales, channels and runnels, infiltration trenches, infiltration boardwalks, vegetated gutters, and vegetated buffer strips. By incorporating these elements early in project design, such features may become integral, aesthetic parts of the streetscape, in addition to serving their stormwater management role.

Standard streetscape improvements outlined in the *Better Streets Plan*

4.9.2 | Affected Environment

4.9.2.1 | HYDROLOGIC SETTING

As shown in Figure 4.9-1, the western part of the Geary corridor is located in the Sunset and Richmond watersheds; the eastern part is in the Channel and North Shore watersheds. There are no natural surface water bodies, wetlands, or streams in the Geary corridor. The Geary corridor is almost entirely covered with impervious surfaces, with the exception of landscaped center medians and some street trees and landscaping on sidewalks. There are no waters of the United States in the Geary corridor or that would be affected by modifications to the Geary corridor. Therefore, neither a Section 404 permit nor a Section 401 water quality certification would be required for any of the project alternatives.

In general, stormwater runoff in the City is captured by the network of 23,000 catch basins within the City's combined sewer system. From there, water is transported via transport/storage structures to City water treatment plants (Figure 4.9-2). The Oceanside and Southeast treatment plants operate year-round, while the North Point Wet Weather facility operates only when heavy rains occur. These plants provide full secondary treatment of dry-weather flows and the equivalent of primary treatment prior to discharge to the Pacific Ocean or San Francisco Bay, which are the receiving waters for runoff from the Geary corridor (Figure 4.9-2).

Central and South San Francisco Bay has been designated as an impaired water body under Section 303(d) of the CWA. TDMLs have been established for mercury and are being developed for other contaminants. Table 4.9-1 illustrates pollutant stressors identified in Central and South San Francisco Bay.

DEFINITIONS

WATERSHED: An area of land where all of the water that is under it – or rains off of it – goes into the same outlet

IMPAIRED WATER BODY: A waterbody (i.e., stream reaches, lakes, waterbody segments) with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality criteria

Table 4.9-1 Federal 303(d) List of Impairments for Central and South San Francisco

POLLUTANT STRESSOR	POTENTIAL SOURCE	CURRENT STATUS
Chlordane	Nonpoint source	TMDL required
DDT	Nonpoint source	TMDL required
Dieldrin	Nonpoint source	TMDL required
Dioxin Compounds	Atmospheric deposition	TMDL required
Exotic species	Ballast water	TMDL required
Furan compounds	Atmospheric deposition	TMDL required
Mercury	Atmospheric deposition, industrial point sources, municipal point sources, natural sources, nonpoint source, resource extraction	Being addressed by EPA-approved TMDLS
PCBs	Unknown nonpoint source	TMDL required
Selenium	Agriculture, exotic species, industrial point sources, and natural sources	TMDL required

TMDL – total maximum daily load; PCBs – polychlorinated biphenyls

4.9.2.2 | FLOODPLAINS

Per Figure 4.9-3, the Geary corridor is not within any mapped flood hazard zone, nor is it in an area that would be inundated by the failure of a dam or reservoir.

The Geary corridor is not located within any mapped flood hazard zones nor is it located in an area that would be inundated by the failure of a dam or reservoir

It is anticipated that coastal flooding hazards will increase in the future as a result of sea level rise generated by global climate change. However, the Geary corridor is not in an area projected to be affected by the 16-inch sea level rise anticipated by 2050, or the 55-inch sea level rise anticipated by 2100.[1] These future modeling years are beyond the scope of analysis for purposes of this Draft EIS/EIR.

4.9.2.3 | GROUNDWATER SETTING

As shown on Figure 4.9-4, the western portion of the Geary corridor is located within the Lobos and Westside groundwater basins, while the eastern portion is located in the Downtown San Francisco basin. The Basin Plan states that groundwater from these basins has existing beneficial uses for municipal, domestic, and agricultural water supply and potential beneficial uses for industrial process and service water supply.

A review of California Geologic Survey (CGS) data indicates that depth to groundwater is typically about 50 feet below ground surface (bgs) in the western portion of the Geary corridor, rising to about 10 to 30 feet bgs in the eastern portion. Groundwater may be encountered at shallower depths, particularly during seasonal variations and other variations related to localized groundwater use.

At the Geary Boulevard underpass of Fillmore Street, an underground pump station extracts groundwater to keep the underpass from flooding. This creates a localized depression in groundwater levels. Depth of groundwater at this location is naturally

[1] San Francisco Bay Conservation and Development Commission. *San Francisco Bay Scenarios for sea level rise*. Available at: http://www.bcdc.ca.gov/planning/climate_change/index_map.shtml.

about 14 feet bgs, but pumping draws it down to about 30 feet bgs. Based on available data, this groundwater depression appears to extend approximately 40 to 50 feet north and south of Geary Boulevard, but may extend further.

Groundwater flow direction would be expected to vary with topography. In general, groundwater in the Lobos and Westside basins would be expected to flow to the west-northwest, toward the Pacific Ocean, while groundwater in the Downtown basin would be expected to flow to the east, toward San Francisco Bay.

4.9.3 | Methodology

The alternatives were evaluated for potential effects related to hydrology and water quality within the broader hydrological landscape of the region, as previously described. The alternatives have the potential to result in construction period and/or operational period effects as noted below.

Construction-Related Effects

- Change in impervious surface area
- Soil disturbance/excavation
- Change in groundwater elevation

Operational-Related Effects

- Changes in quantity/quality of stormwater runoff

Potential effects related to the hydrologic systems and activities listed above were evaluated in terms of changes to the impervious surface areas, stormwater runoff modification and requirements, quantities of soil disturbance and excavation, and changes to groundwater elevations and any groundwater demand.

The analysis considered the hydrologic environment existing in the Geary corridor and its surrounding hydrologic area.

4.9.4 | Environmental Consequences

The following section evaluates the potential for adverse hydrology and water quality effects to occur from the alternatives and determines whether any of the alternatives would result in an adverse effect related to hydrology and water quality. The analysis compares each build alternative relative to the No Build Alternative.

As set forth in Section 4.9.4.1, the modifications to the Hybrid Alternative/LPA since publication of the Draft EIS/EIR do not change the conclusions regarding hydrology impacts in the Draft EIS/EIR.

4.9.4.1 | HYBRID ALTERNATIVE/LPA MODIFICATIONS: POTENTIAL ADDITIVE EFFECTS SINCE PUBLICATION OF THE DRAFT EIS/EIR

As discussed in Section 2.2.7.6, the Hybrid Alternative/LPA now includes the following six minor modifications added since the publication of the Draft EIS/EIR:

1) Retention of the Webster Street pedestrian bridge;
2) Removal of proposed BRT stops between Spruce and Cook streets (existing stops would remain and provide local and express services);

3) Addition of more pedestrian crossing and safety improvements;
4) Addition of BRT stops at Laguna Street;
5) Retention of existing local and express stops at Collins Street; and
6) Relocation of the westbound center- to side-running bus lane transition to the block between 27th and 28th avenues.

This section presents analysis of whether these six modifications could result in any any new or more severe hydrology effects during construction or operation. As documented below, the Hybrid Alternative/LPA as modified would not result in any new or more severe effects to hydrology and water quality relative to what was disclosed in the Draft EIS/EIR.

Retention of the Webster Street Pedestrian Bridge

Construction: Because the retention of the existing Webster Street bridge would reduce the level of construction (i.e., demolition) in this location, the potential for adverse effects to water quality, such as construction-period runoff, would be reduced. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during construction.

Operation: The modification to retain the Webster Street bridge would not increase the amount of impervious surfaces relative to what was described in the Draft EIS/EIR, the existing bridge would not be demolished. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during operation.

Removal of Proposed BRT Stops between Spruce and Cook Streets

Construction: Because the retention of the existing bus stops between Spruce and Cook streets would reduce the level of construction in this location, the potential for adverse effects to water quality, such as construction-period runoff, would be reduced. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during construction.

Operation: The modification to no longer add BRT stops between Spruce and Cook streets would not increase the amount of impervious surfaces relative to what was described in the Draft EIS/EIR, as the existing local/express bus stops would remain in place. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during operation.

Addition of More Pedestrian Crossing and Safety Improvements

Construction: The installation of additional pedestrian improvements would require additional locations throughout the corridor for excavation (approximately 1.5 feet in depth), but adherence to standard construction practices and best management practices would limit the potential for substantial additional quantities of construction-period runoff. The expected maximum depth of excavation (1.5 feet) would not be expected to affect any below-ground water resources, as such resources are typically found at much greater depths. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during construction.

Operation: Operation of additional pedestrian enhancements would not increase the amount of impervious surfaces relative to what was described in the Draft EIS/EIR, as pedestrian enhancements would be located on paved areas within the

existing transportation right of way. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during operation.

Addition of BRT Stops at Laguna Street

Construction: The addition of BRT stops at Laguna Street would entail the removal of existing bus shelter structures on the sidewalks and construction of new transit islands. Construction activities would be similar to those which would occur for construction of other BRT stops along the Geary corridor. Adherence to the SWPPP, best management practices, and minimization measures identified in Section 4.9.5 would limit the potential for substantial additional quantities of construction-period runoff at Laguna Street. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during construction.

Operation: Operation of BRT stops at Laguna Street would not increase the amount of impervious surfaces relative to what was described in the Draft EIS/EIR, as the transit islands would be located on paved areas within the existing transportation right-of-way. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during operation.

Retention of Existing Local and Express Stops at Collins Street

Construction: Because the retention of the existing bus stops at Collins Street would reduce the level of construction in this location, the potential for worsened effects to water quality, such as construction-period runoff, would be reduced. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during construction.

Operation: The modification to retain the existing local/express bus stops at Collins Street would not increase the amount of impervious surfaces relative to what was described in the Draft EIS/EIR, as the existing local/express bus stops would remain in place. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during operation.

Relocation of the Westbound Center- to Side-Running Bus Lane Transition

Construction: Relocation of the westbound bus lane transition at 27th Avenue would not alter the total level of construction activities but would simply shift about half of it one block to the west. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during construction.

Operation: The relocation of the westbound bus lane transition would not increase the amount of impervious surfaces relative to what was described in the Draft EIS/EIR, as the modification would occur on the existing paved roadway surface. Therefore, this modification would not result in any new or more severe impacts to hydrology and water quality during operation.

4.9.4.2 | CONSTRUCTION EFFECTS

4.9.4.2.1 NO BUILD ALTERNATIVE - CONSTRUCTION EFFECTS

Improvements associated with the No Build Alternative are comprised of physical infrastructure and transit service changes associated with other City projects that are either planned or programmed to be implemented in the Geary corridor by the year 2020.

Excavation presents the greatest potential for adverse hydrologic effects during construction. None of the No Build improvements would require extensive excavation, so no adverse effects to hydrology/water quality would be anticipated.

4.9.4.2.2 BUILD ALTERNATIVES HYDROLOGIC EFFECTS - CONSTRUCTION EFFECTS

The Geary corridor is almost entirely covered with impervious surfaces, with the exception of existing landscaped center medians and tree and landscape plantings along sidewalks. Table 4.9-2 shows the estimated areas of disturbed soil during construction and the changes in impervious surface area that would result from implementation of each of the build alternatives. Disturbed soil area includes only those areas where native soil or fill material would be exposed during construction and does not include areas where construction activities would not penetrate the pavement.

Table 4.9-2 Disturbed Soil and Impervious Surface Areas Under Project Alternatives[a]

PROJECT SEGMENT	DISTURBED SOIL AREA (ACRES)[b]			IMPERVIOUS SURFACE AREA (ACRES)			
					CHANGES IN IMPERVIOUS SURFACE AREA		
	ALTERNATIVE 2	ALTERNATIVE 3 OR 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA	EXISTING IMPERVIOUS SURFACES (ACRES)	ALTERNATIVE 2	ALTERNATIVE 3 OR 3-CONSOLIDATED	HYBRID ALTERNATIVE /LPA
48th Ave - 33rd Ave	0.0	0.0	0.0	15.3	0.0	0.0	0.0
33rd Ave - 27th Ave	0.2	0.1	0.2	5.9	0.0	-0.1	-0.1
27th Ave - Jordan Ave	0.5	6.8	6.5	24.6	0.0	-0.4	-0.3
Palm Ave - Baker St/Broderick St	0.5	3.6	0.7	13.1	-0.1	-0.1	-0.1
Baker St/Broderick St - Scott St/Pierce St	0.2	1.5	0.2	4.2	0.0	0.1	0.0
Scott St/Pierce - Laguna St	0.4	3.6	0.4	7.9	0.0	-0.3	0.0
Laguna St - Cleary Ct/Gough St	0.0	0.2	0.0	1.3	0.0	0.0	0.0
Cleary Ct/Gough St - Van Ness Ave	0.0	0.0	0	5.1	0.0	0.0	0.0
Van Ness Ave - Market St	1.0	1.2	1.0	17.0	0.0	0.0	0.0
Market St-Transbay Terminal	0.0	0.0	0.0	5.6	0.0	0.0	0.0
TOTAL	2.8	17.0	9.0	100	-0.1	-0.9	-0.5

a Areas are approximate and may change as project design progresses. Totals may not match the sum of the segments due to rounding.
b Disturbed soil area includes all planned areas of construction that will disturb native soil and fill within the study area.
Source: C. Subrizi, personal communication, October, 2013

As shown in Table 4.9-2, Alternative 2 (Side-Lane BRT) would require a relatively small area of soil disturbance (about 3 acres).

In comparison, Alternatives 3 (Center-Lane BRT with Dual Medians and Passing Lanes) and 3-Consolidated (Center-Lane BRT with Dual Medians and Consolidated Bus Service) would disturb the greatest soil area (about 17 acres) due to removal of existing landscape medians and construction of new dual medians, which have a combined width greater than the existing single median.

The Hybrid Alternative/LPA would disturb about 9 acres of soil, less than Alternatives 3 and 3-Consolidated, but more than Alternative 2.

4.9.4.2.3 BUILD ALTERNATIVES WATER QUALITY EFFECTS– CONSTRUCTION EFFECTS

The greatest potential for adverse effects to water quality would be during construction, when soils are exposed and may be entrained in runoff, resulting in sediment in the combined sewer system as well as erosion within the study area. Each of the build alternatives would require excavation, though Alternatives 3 and 3-Consolidated would require the most extensive earthmoving activities due to the filling of the Fillmore underpass. Implementation of a Storm Water Pollution Prevention Plan (SWPPP) that identifies construction site BMPs required under the Construction General NPDES Permit would minimize potential effects for each of the build alternatives.

4.9.4.2.4 BUILD ALTERNATIVES GROUNDWATER EFFECTS – CONSTRUCTION EFFECTS

With a few exceptions relative to Alternatives 3, 3-Consolidated and the Hybrid Alternative/LPA, as described below, generally shallow excavations (approximately 5 to 10 feet deep) would be required for the installation of physical project features of all of the build alternatives. Such features include bus stop amenities, landscaping features, and related equipment. Based on the groundwater depths presented in Section 4.9.2.3, excavation to these relatively shallow depths would be highly unlikely to encounter groundwater. Groundwater elevation may fluctuate from existing conditions as a result of any low-impact development improvements (rain gardens, etc.) that may be implemented as part of any build alternative. Should groundwater be encountered during excavation activities, consistent with all applicable federal and state regulations, the water would be pumped from the excavated area, contained and treated before being discharged, most likely to the existing local (combined) sewer system. SFPUC requires a batch discharge permit prior to commencement of discharge to the combined sewer system.

Figure 4.9-1 Watershed Map

Figure 4.9-1: Watershed Map

Figure 4.9-2 City Combined Sewer System

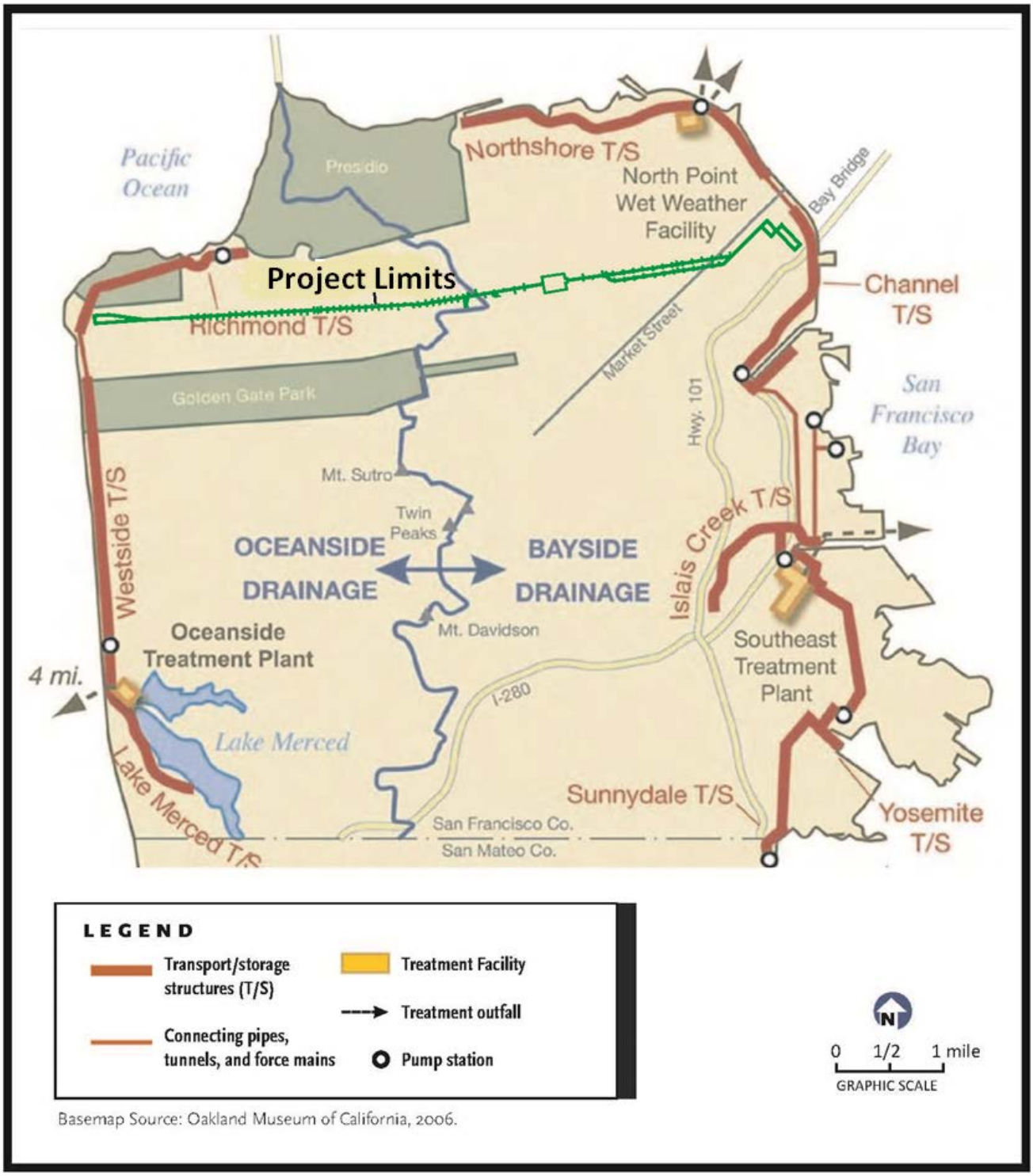


Figure 4.9-3 Flood Hazard Areas

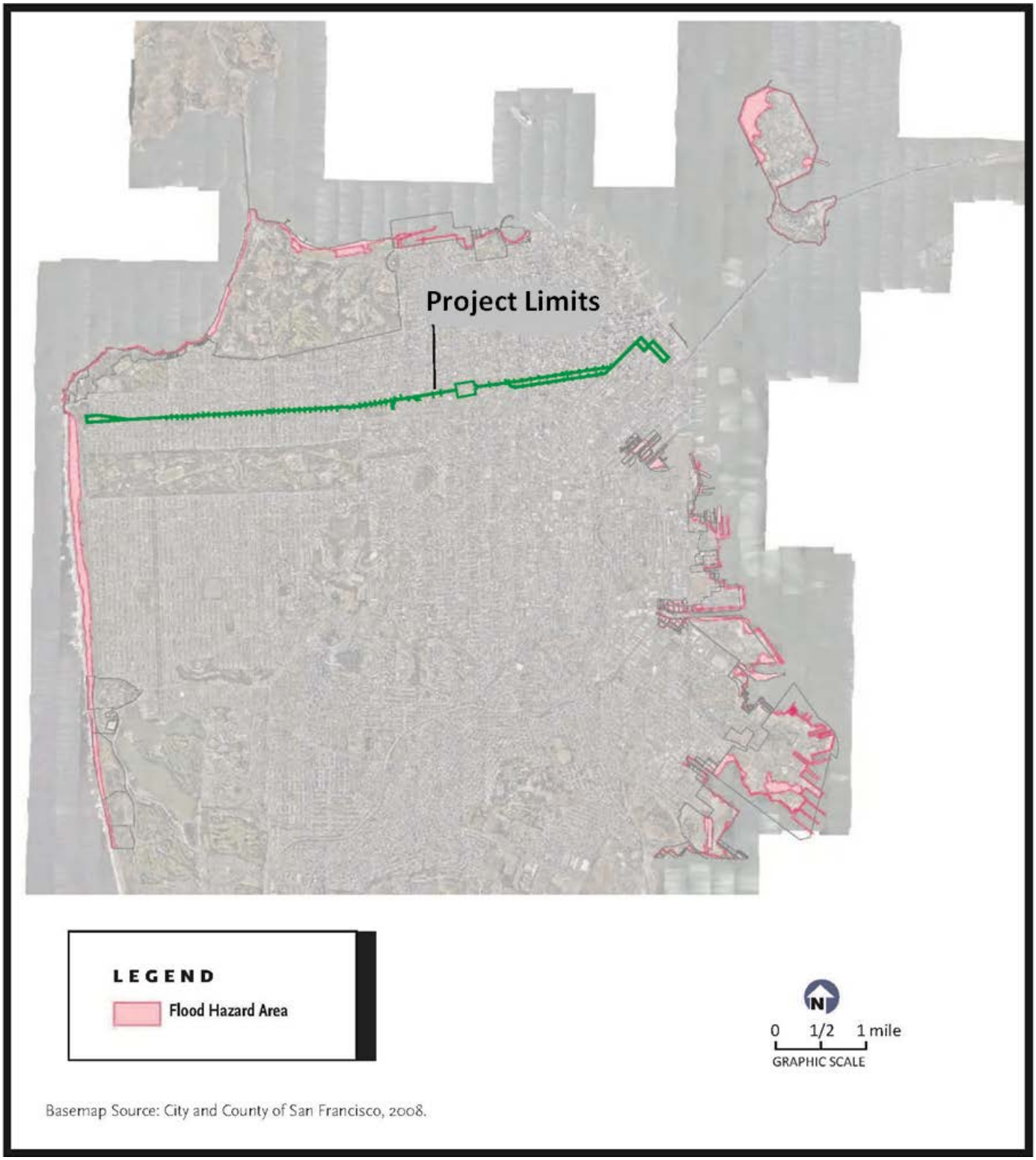
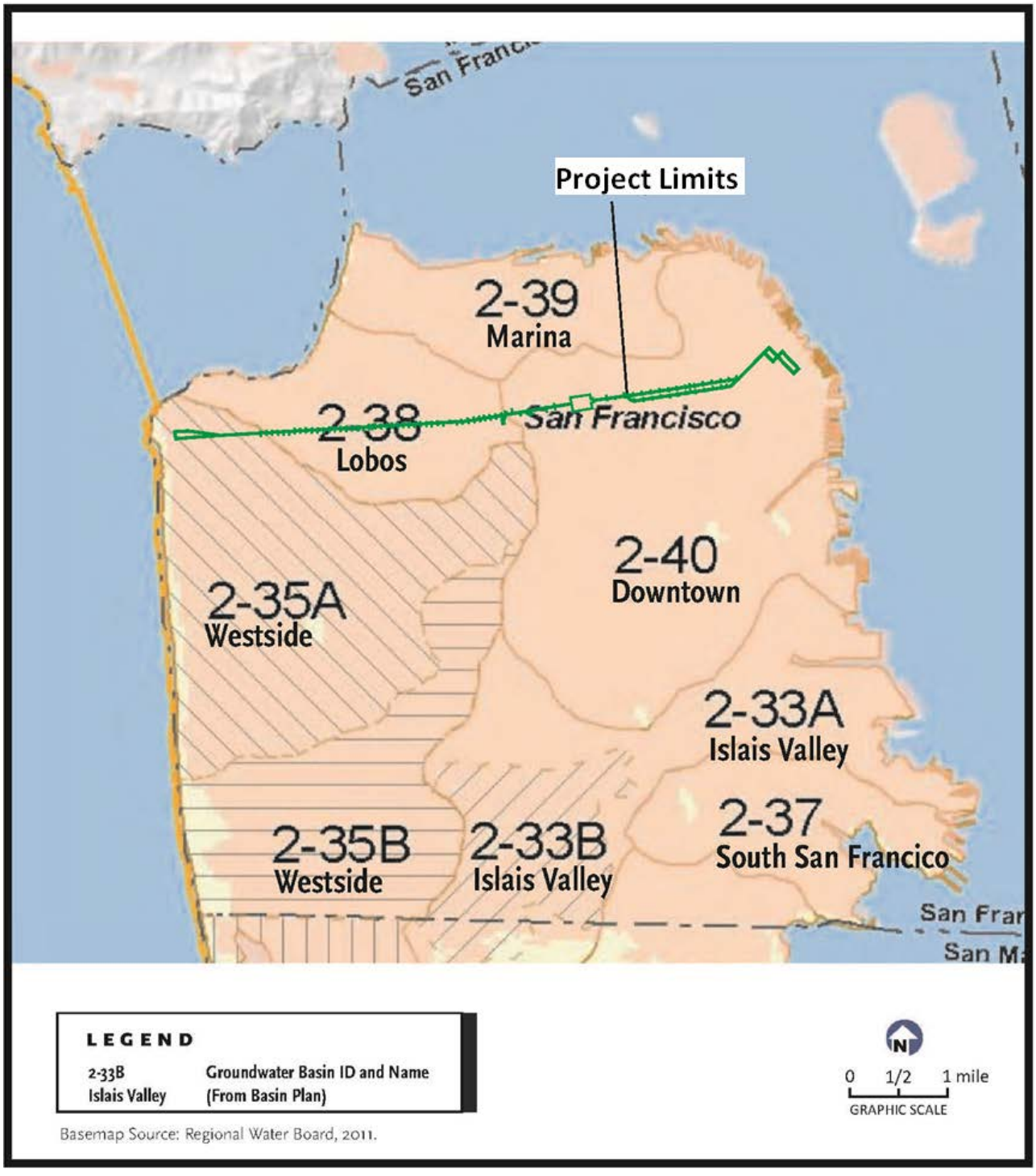


Figure 4.9-4 Groundwater Basins



It is assumed Alternatives 3, 3-Consolidated, and the Hybrid Alternative/LPA would also require two sewer line relocations in the western part of the Geary corridor. As described in Section 2.3.4.2, the sewer infrastructure in this location is at a relatively shallow depth. However, in this area, depth to groundwater is approximately 50 feet below ground surface, far deeper than the sewer infrastructure. As noted in Section 4.6.3.2.5, some other utility relocations may be necessary where conflicts with new bus facilities might result. However, such relocations would be lateral - utilities would be relocated to nearby sites. Therefore, no adverse groundwater effects would be anticipated from sewer or utility relocation.

Alternatives 3 and 3-Consolidated would involve filling the underpass at Fillmore Street and decommissioning the existing pump station north of Geary Boulevard. These actions would allow groundwater in the immediate vicinity of the pump station to return to its natural elevation. This would result in a beneficial effect to groundwater resources, as the amount of groundwater available for beneficial uses in the study area would increase. However, allowing the groundwater elevation in this area to rise from its current level (approximately 30 feet bgs) to its natural elevation (14 feet bgs), has the potential to adversely affect underground structures (at depths greater than 14 feet bgs) located within two blocks of the pump station. Such structures include building basements and utility trenches. A groundwater rise in this area could lead to adverse effects including but not limited to water intrusion and related building and property damage. Groundwater elevation may rise further as a result of any LID improvements that may be implemented as a part of the project.

In November 2013, such potentially affected underground buildings and structures were identified by a site reconnaissance and review of available City records. Potentially affected structures were considered to be those constructed after 1961, when the underpass was opened, and with subterranean levels deeper than 15 or 20 feet bgs. Only buildings within two blocks of the pump station were considered, as the groundwater elevation beyond that distance is not affected by the pump station and thus would not be affected by removal of the pump station.

The site reconnaissance and review determined that utilities were not deeper than ten feet, and therefore would not be affected by a rise in groundwater level to around 14 feet bgs. Seven buildings within two blocks of the pump station and constructed after 1961 were determined to have subterranean levels, all of which are used for vehicle parking. Subterranean levels at one of those buildings, 1811 Post Street, did not extend below 10 feet bgs, and therefore would not be affected.

The remaining six buildings listed below could potentially be affected by a rise in groundwater elevation as a result of the discontinuation of pumping. An avoidance measure and a minimization measure have been identified below to address potential adverse effects to these buildings.

- 1489 and 1610 Webster Street
- 1510 Eddy Street
- 1475 Fillmore Street
- 1410 Steiner Street
- 1730 O'Farrell Street

4.9.4.3 | OPERATIONAL EFFECTS

4.9.4.3.1 NO BUILD ALTERNATIVE- OPERATIONAL EFFECTS

Improvements associated with the No Build Alternative are comprised of physical infrastructure and transit service changes associated with other City projects that are either planned or programmed to be implemented in the Geary corridor by the year 2020. Under the No Build Alternative, stormwater would continue to flow from impervious surfaces into existing catch basins. Operation of the various components of the No Build Alternative would not require water use, nor would they increase impervious areas; therefore, there would be no adverse effect to hydrology or water quality.

Under the No Build and all build alternatives, stormwater would continue to flow from existing impervious surfaces into existing catch basins. Some catch basins would be relocated to accommodate bus bulbs and other improvements

4.9.4.3.2 BUILD ALTERNATIVES HYDROLOGIC EFFECTS - OPERATIONAL EFFECTS

Under all build alternatives, stormwater would continue to flow from impervious surfaces into existing catch basins, although some catch basins would be relocated to accommodate bus bulbs and other improvements. Additional catch basins would need to be constructed in medians at the downstream ends of the blocks in areas with center-running buses to prevent point flows across the travel lanes.

As shown in Table 4.9-2, Alternative 2 would result in slightly less impervious surface area than existing conditions. Opportunities to implement stormwater management elements would be limited to areas of replacement pavement along the edge of the roadway. Pervious paving and infiltration planters may be constructed in these areas to capture runoff, which could result in a slight beneficial effect to stormwater runoff quality.

Because they would disturb the greatest soil area Alternatives 3 and 3-Consolidated would therefore have the greatest opportunity to incorporate stormwater control elements. Like Alternative 2, these alternatives would reduce impervious surface area by about 0.7 acre (about 30,000 square feet). As these alternatives would incorporate new landscaped medians along new center running bus lanes, each would offer opportunities to incorporate rain gardens and biotreatment swales in addition to pervious paving and infiltration planters.

The Hybrid Alternative/LPA would reduce impervious surface area by about half an acre (about 17,500 square feet) from current conditions.

Implementation of stormwater retention and treatment features required under City ordinances and the *Better Streets Plan* would be possible under all build alternatives and would result in slight, but beneficial effects to storm drainage in the Geary corridor, as there would be a net decrease in impervious surface area and no substantial localized increases that might increase flow to a specific area of the City combined sewer system.

The Geary corridor is not located within a mapped flood hazard zone, and would not be subject to flooding hazards due to reservoir failure, tsunamis, or projected sea level rise. Therefore, neither the No Build Alternative nor any of the build alternatives would result in any adverse flood-related effects.

DEFINITIONS

RAIN GARDENS: Landscaped detention or bioretention features in a street designed to provide initial treatment of stormwater runoff

BIOTREATMENT SWALES: Long, narrow landscaped depressions primarily used to collect and convey stormwater and improve water quality

PERVIOUS PAVING: An alternative to standard paving to help reduce stormwater runoff volumes by reducing impervious surface and providing temporary storage and/or groundwater recharge through infiltration

INFILTRATION PLANTERS: Stormwater facilities that double as landscape features but are designed to combine stormwater runoff control and treatment with aesthetic landscaping and architectural detail

4.9.4.3.3 BUILD ALTERNATIVES WATER QUALITY EFFECTS – OPERATIONAL EFFECTS

Project landscaping would be incorporated into stormwater control, as described above. Although the use of fertilizers, herbicides, and pesticides on that landscaping has the potential to affect runoff quality, adherence to existing City policies and the avoidance and minimization measures in Section 4.9.5 would lessen these potential effects. Each of the build alternatives would require the pruning and removal of existing street trees located on sidewalks. Alternatives 3, 3-Consolidated, and the Hybrid Alternative/LPA would also affect trees in the Geary Boulevard median, in locations where BRT would be located in center lanes. Mature trees provide water quality benefits as they capture and retain stormwater in their canopies, transfer water to the atmosphere via evapotranspiration, and their extensive root systems promote stormwater infiltration. There may be a period of reduced water quality between when mature trees are removed and when replacement tree plantings grow to maturity. However, this effect would not be adverse due to overall landscaping improvements with these alternatives, and would subside over time as replacement trees mature.

Stormwater runoff generated by the build alternatives would be required to be retained and treated under existing City laws and policies, as described in Section 4.9.3.1. In addition, because that runoff would be conveyed to City treatment facilities and treated in accordance with existing permits and Waste Discharge Requirements, no water quality standards or Waste Discharge Requirements would be exceeded due to project runoff.

4.9.4.3.4 BUILD ALTERNATIVES GROUNDWATER EFFECTS – OPERATIONAL EFFECTS

Groundwater use is anticipated to be low for the operation of any of the build alternatives. Once operational, the various project components and new BRT service will have little to no effect on groundwater as these improvements do not require water.

4.9.4.4 | COMPARATIVE EFFECTS OF ALTERNATIVES

As demonstrated in the preceding subsections, the No Build Alternative and Alternative 2 would have the least potential to affect water quality during construction, followed by the Hybrid Alternative/LPA. Similarly, Alternatives 3 and 3-Consolidated would have the greatest increase in impervious surface area and reduced water quality once operational.

4.9.5 | Avoidance, Minimization, and/or Mitigation Measures

4.9.5.1 | CONSTRUCTION MEASURES

With implementation of the avoidance and minimization measures, no adverse effects related to water quality would result from any of the build alternatives

BMPs required to be implemented during construction under the Construction General Permit would apply to all build alternatives and would include measures to prevent soil erosion and entrainment of sediment in stormwater runoff.

In compliance with the City Integrated Pest Management Policy (City Municipal Code Section 300), prevention and non-chemical control methods shall be employed in maintaining landscaping in the study area, including monitoring for pests before treating, and using the least-hazardous chemical pesticides, herbicides, and fertilizers possible and only as a last resort.

Preparation and implementation of a SWPPP during project construction will minimize or avoid adverse effects to water quality. Completion of an SWPPP for the National Pollutant Discharge Elimination System (NPDES) General Permit will be required for construction of each build alternative and for earthwork activities under the No Build Alternative, if applicable. The SWPPP will address adverse water quality effects associated with construction activities, including identification of all drainage facilities onsite, placement of appropriate stormwater and non-stormwater pollution controls and BMPs, erosion and sediment control, spill response and containment plans, inspection scheduling, maintenance, and training of all construction personnel onsite.

The SWPPP will specify how construction-related adverse stormwater effects would be mitigated throughout the project site through:

- The appropriate treatment of overflow stormwater during construction, including inlet protection devices, temporary silt fencing, soil stabilization measures, street sweeping, stabilized construction entrances, and temporary check dams;
- Lining storage areas; and
- Proper and expeditious disposal of items to be removed, such as landscaping, curb bulb waste, existing bus stop shelters, and demolished streetlights and signal poles.

Assuming adherence to these and other federal, state, and local regulations, the following additional measures have been identified to avoid, minimize, or mitigate for adverse effects to hydrology and water quality.

MIN-HY-C1. Any construction work that adversely affects the combined sewer system will require coordination with SFPUC, and construction-related activities shall be consistent with the SFPUC's *Keep it on Site, Pollution Prevention Guide for the Construction Industry*.[2]

MIN-HY-C2[3]. Should Alternatives 3 or 3-Consolidated be selected, either would result in a potentially adverse structural effect to nearby buildings from the raising of the groundwater levels in the vicinity of the Fillmore Street pump station during construction. One of two measures would be implemented to address the adverse effect:

A-HY-C3a. To avoid the effect, maintain existing pumping regime by maintaining the existing pump station north of Geary or similar pump to keep groundwater in the vicinity of the Fillmore Street area at current (unchanged) elevations.

-or-

[2] San Francisco Public Utilities Commission. *Keep it on Site, Pollution Prevention Guide for the Construction Industry*. Available at: http://sfwater.org/modules/showdocument.aspx?documentid=4622.

[3] As noted in Chapter 2, the lead agency has selected the Hybrid Alternative/LPA as the preferred alternative. Measures MIN-HY-C2, A-HY-C3a, and MM-HY-C3b would have been applicable only to Alternatives 3 and 3-Consolidated. None of these three measures therefore appear in the Mitigation Monitoring and Reporting Program (Appendix M).

MM-HY-C3b. To mitigate the effect, prior to the cessation of pumping at the existing pump station, a detailed groundwater study shall be performed by a qualified professional to determine the effects of groundwater rise on potentially affected structures and utilities. The study shall take into account the potential implementation of any project-related LID improvements in the vicinity. If the projected rise in groundwater levels may bring these structures or utilities into contact with groundwater, an evaluation of those structures or utilities shall be performed by a licensed structural engineer. Remedial measures determined to be necessary by the structural engineer, which may include waterproofing of foundations and subterranean walls and/or additional enhancements and performance standards such as underslab drainage or other features to resist increased hydrostatic pressure as a result of the elevated groundwater level, shall be implemented prior to the cessation of pumping to minimize structural affects to surrounding buildings.

4.9.5.2 | OPERATIONAL MEASURES

Existing City laws and policies require the use of LID to reduce the quantity of stormwater runoff, to less than existing conditions, and treat the runoff to remove urban pollutants, to the extent practicable and feasible. Based on preliminary design, it is anticipated that permeable paving, infiltration planters, swales, and rain gardens may be practicable and feasible.

Stormwater management tools set forth in the San Francisco *Better Streets Plan* and SFPUC *Stormwater Design Guidelines* shall be incorporated into the project design to the maximum extent practicable and feasible. Major considerations for specific elements shall be streetscape geometry, topography, soil type and compaction, groundwater depth, subsurface utility locations, building laterals, maintenance costs, and pedestrian safety. Based on preliminary design, permeable paving, infiltration planters, swales, and rain gardens may be practicable and feasible for the study area; however, incorporation of such features is unknown at this time and thus there is no certainty whether any beneficial effects would occur.

Implementation of the following measure under each build alternative would reduce and minimize the project's effects to stormwater quality and facilities:

MIN-HY-1. Landscape areas shall be designed to minimize and reduce total runoff. Any irrigation and fertilizers shall be used to the minimum extent practicable and feasible.