3 Project Description

This chapter provides a detailed description of the Proposed Santa Cruz Water Rights Project (Proposed Project) and includes information about project location and setting, project background, project objectives, and project characteristics.

3.1 Project Location and Setting

3.1.1 Project Location

The Proposed Project involves the water system and areas served by the City of Santa Cruz (City);[1] the water service areas of San Lorenzo Valley Water District (SLVWD), Scotts Valley Water District (SVWD), Soquel Creek Water District (SqCWD), and Central Water District (CWD); and the remainder of the Santa Cruz Mid-County Groundwater Basin and the Santa Margarita Groundwater Basin. The Proposed Project is located within Santa Cruz County and is generally bounded by the unincorporated communities of Aptos and Le Selva Beach on the east, Bonny Doon Road on the west, Boulder Creek on the north, and the Pacific Ocean on the south (see Figure 3-1). Additional information about the project location and setting is presented below.

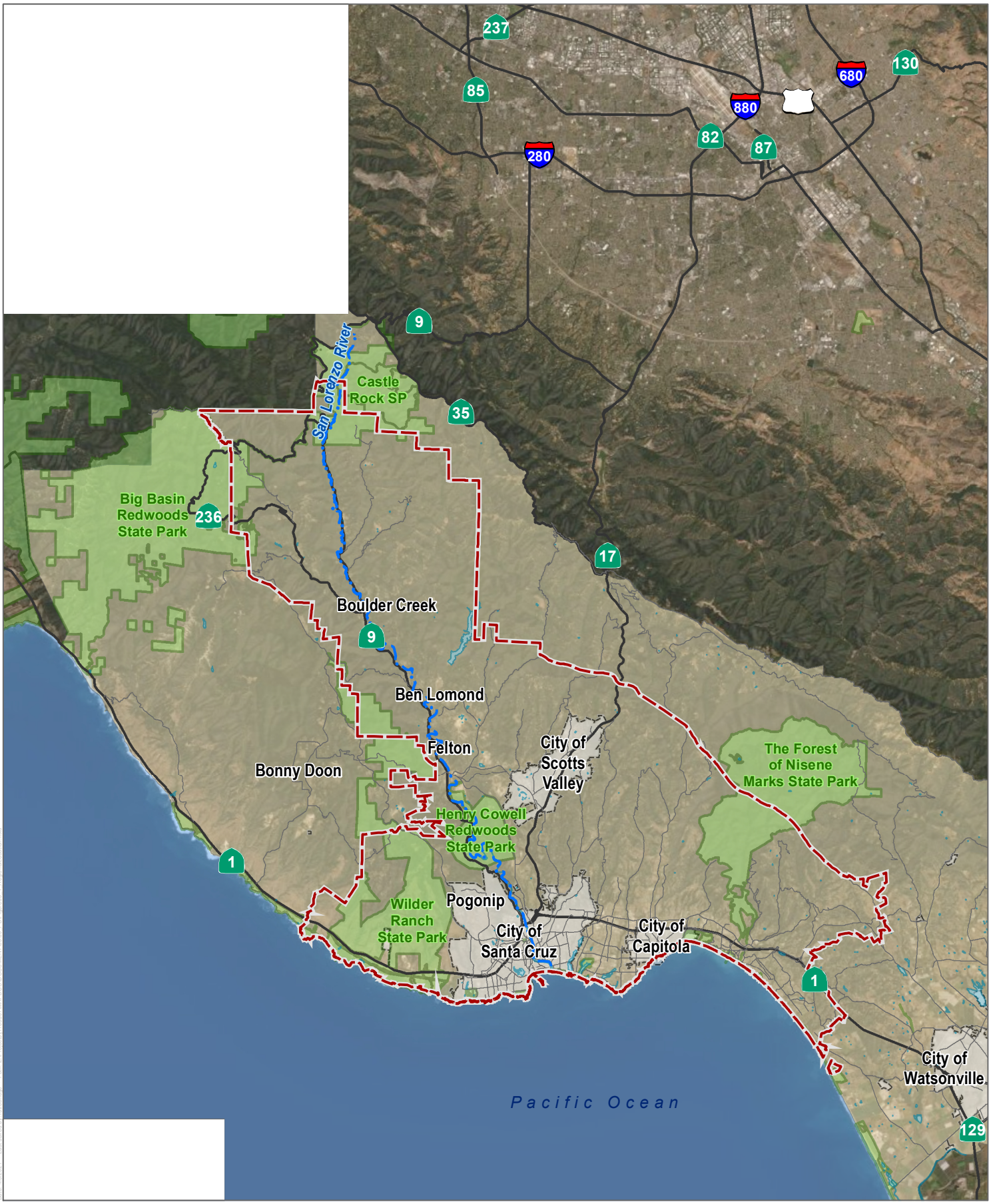
3.1.2 Existing Water Supply Systems

3.1.2.1 City of Santa Cruz

The City of Santa Cruz Water Department (City) provides drinking water from a variety of sources to residents of the City and surrounding areas. The areas served by the City include the City of Santa Cruz, a portion of the City of Capitola, and portions of unincorporated Santa Cruz County in Live Oak, Soquel, and along Graham Hill Road. The City also has an area it serves with limited service only along the coast north of the City, primarily along State Highway 1 up towards Bonny Doon Road. Figure 3-2 shows the City's existing water supply facilities. The City's service on the coast north of the City consists of limited numbers of connections that primarily derive from the City's agreements with landowners along its water pipelines.

The City's water supply system draws water from surface water sources, including two diversions on the San Lorenzo River (the Felton Diversion in Felton and the Tait Diversion in the City) and four diversions on local North Coast streams (Laguna Creek, Reggiardo Creek, Liddell Spring, and Majors Creek), which make up approximately 95% of the annual supply. That amount is supplemented, primarily during the dry season, by limited production from groundwater wells in the Santa Cruz Mid-County Groundwater Basin in unincorporated Santa Cruz County (see Section 3.2.1, Water Supply Planning Background, for additional information on the Santa Cruz Mid-County Groundwater Basin). The City stores water in Loch Lomond Reservoir in Ben Lomond, which is formed by Newell Creek Dam (also referred to as Newell Creek Diversion) to help meet dry-season water demand and provide back-up supply during winter storms that make river diversions problematic due to turbidity issues. The City, like other water suppliers in Santa Cruz County, has no imported water supply from outside the region. Due to limited water supply and storage, the City faces inadequate water supply during dry years and critical shortages during drought years. See Section 3.2.1 for additional information about the City's water supply planning processes.

[1] The City owns and operates a water system that diverts and serves water both within the City limits and outside of those limits. References to the City's water system, rights and supplies therefore refer to areas both inside and outside of the City limits.



SOURCE: ESRI 2020, City of Santa Cruz 2020

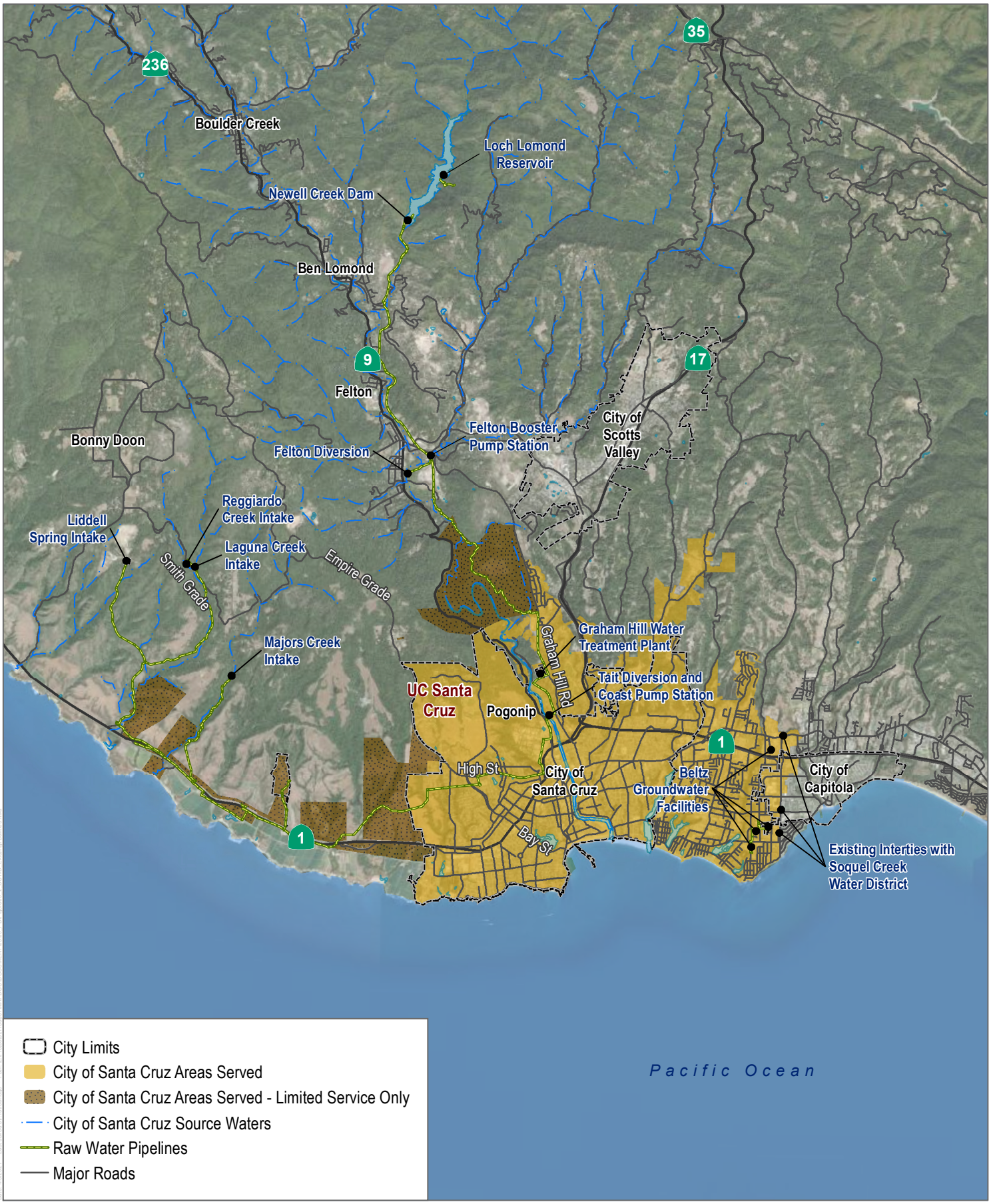
DUDEK

0 10,500 21,000 Feet

FIGURE 3-1

Project Location

Santa Cruz Water Rights Project



SOURCE: ESRI 2020, City of Santa Cruz 2020

DUDEK

0 1 2 Miles

FIGURE 3-2

Existing City of Santa Cruz Water System Facilities

Santa Cruz Water Rights Project

3.1.2.2 San Lorenzo Valley Water District

SLVWD serves several communities within the 136-square-mile San Lorenzo Watershed, shown on Figure 3-3. SLVWD owns, operates, and maintains three water systems that supply separate service areas from separate water sources, referred to as the North Service Area, the South Service Area, and the Felton Service Area. The North Service Area includes the unincorporated communities of Boulder Creek, Brookdale, and Ben Lomond and is served by the North System. The South Service Area encompasses portions of the City of Scotts Valley and adjacent unincorporated neighborhoods and is served by the South System. The Felton Service Area includes the unincorporated town of Felton and adjacent unincorporated areas and is served by the Felton System (WSC 2016a). The SLVWD's currently active water supplies consist of nine active stream diversions, eight active groundwater wells, and one active spring.[2] The SLVWD's groundwater wells draw from the overdrafted Santa Margarita Groundwater Basin. The SLVWD also has entitlement to a portion of the surface water storage in Loch Lomond Reservoir that has not been used since 1977.[3] Based on the water supply and demand analysis provided in SLVWD's Urban Water Management Plan (UWMP), and with continued proactive management of its water resources, SLVWD's water supply is adequate to meet both current and future water demands during average, single-dry-year, and multiple-dry-year conditions (WSC 2016a). The UWMP's finding that supplies would be adequate during multiple-dry-year conditions is based, however, on the assumption that continued local groundwater overdraft in the Santa Margarita Groundwater Basin is sustainable and that water can be supplied to the South System from the North System sources through the systems' existing interconnection (WSC 2016a).

SLVWD and the County of Santa Cruz are developing a Conjunctive Use Plan for the San Lorenzo River Watershed to increase stream baseflow for fish and increase reliability of surface and groundwater supplies for the SLVWD. This project would interconnect SLVWD's three independent water systems to allow for increased reliability and allow the distribution systems to utilize surplus surface water from each other, providing in-lieu recharge to the groundwater aquifers through conjunctive use. Project components identified to date that would allow for conjunctive use within the SLVWD's service areas, and in cooperation with the SVWD, include water rights changes, use of existing interties to move water between service areas, use of SLVWD's Loch Lomond Reservoir water rights, and injection of excess surface water during wet periods and extraction of groundwater during dry periods in the Olympia well area.[4]

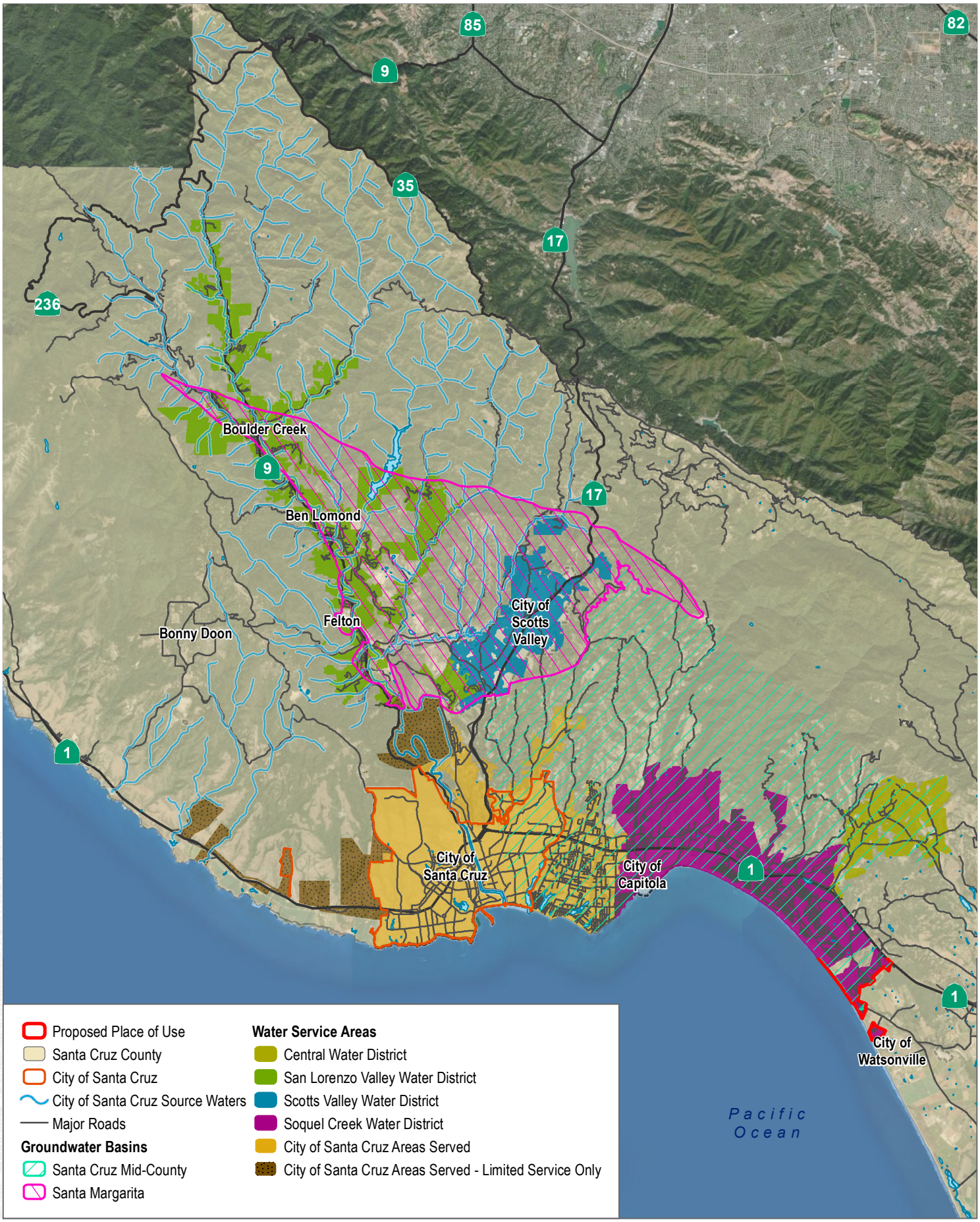
3.1.2.3 Scotts Valley Water District

SVWD provides potable and recycled water and serves most of the City of Scotts Valley and some unincorporated areas north of the City of Scotts Valley (see Figure 3-3). The SVWD lies in the Santa Cruz Mountains, 5 miles inland from Monterey Bay. Its service area is approximately 5 miles north to south and 1 mile east to west with an approximate area of 5.5 square miles. The only source of potable water for the SVWD is groundwater from the overdrafted Santa Margarita Groundwater Basin. SVWD shares the basin with neighboring SLVWD and Mount Hermon Association, other small water systems, and over 1,100 private well users. The recharge of the basin depends only on rainfall.

[2] SLVWD's diversions under its water-right Permit No. 20123 are contingent on the existence of certain minimum streamflows existing below the City's Felton Diversion Dam through the September-May period.

[3] SLVWD is entitled by agreement to purchase up to 313 acre-feet per year (102 million gallons per year) of Loch Lomond Reservoir water.

[4] The Olympia groundwater area is a hillslope area of partially exposed Santa Margarita Sandstone between the communities of Mount Hermon, Zayante, and Scotts Valley (WSC 2016a).



SOURCE: ESRI 2020, County of Santa Cruz 2020, City of Santa Cruz 2020

DUDEK

0 1.5 3 Miles

FIGURE 3-3

Potential Regional Partnering Water Districts

Santa Cruz Water Rights Project

Cooperation between SVWD and the City of Scotts Valley resulted in the development of a recycled water treatment and delivery system. The City of Scotts Valley is responsible for the collection and safe disposal of wastewater generated in the SVWD service area; a portion of the wastewater generated is treated at the Scotts Valley Water Reclamation Facility to Title 22 standards for tertiary disinfected recycled water, suitable for unrestricted non-potable use. SVWD is the recycled water purveyor and is responsible for the storage and delivery of recycled water to customers within its service area. Groundwater production has declined from 2002 through 2015 due to drought conditions, use of recycled water, and implementation of conservation programs (Kennedy/Jenks Consultants 2016). SVWD has adequate supplies available to meet projected demands should a multiple-dry-year period occur; however, overdraft of the Santa Margarita Groundwater Basin, especially in a time of drought, presents a concern for reliability over extended periods of time (Kennedy/Jenks Consultants 2016).

The decline of groundwater levels in many parts of the Santa Margarita Groundwater Basin occurred during 1985-2004, representing a loss in groundwater storage in the basin by an estimated 28,000 acre-feet. SVWD began actively managing groundwater in the area in the early 1980s, developed the Water Resources Management Plan in 1983 to monitor and manage water resources, and adopted a Groundwater Management Plan in 1994. Along with SLVWD and other agencies, SVWD also participated in the Santa Margarita Groundwater Basin Advisory Committee that was actively involved in the cooperative groundwater management of the basin until its dissolution and substitution with Santa Margarita Groundwater Agency (SMGWA) in 2017. With conservation and other management efforts by local water agencies, the total pumping from the basin has decreased by 45% since 1997 (SVWD 2021). See Section 3.2.1, Water Supply Planning Background, for additional information on the Santa Margarita Groundwater Basin.

3.1.2.4 Soquel Creek Water District

SqCWD is a nonprofit, local government agency that provides potable water service and groundwater resource management. SqCWD provides water service within portions of the City of Capitola and unincorporated Santa Cruz County, including the communities of Aptos, La Selva Beach, Opal Cliffs, Rio Del Mar, Seascape, Seacliff Beach, and Soquel (see Figure 3-3). SqCWD relies entirely on the overdrafted groundwater aquifers in the Santa Cruz Mid-County Groundwater Basin. (See Section 3.2.1 for additional information on the Santa Cruz Mid-County Groundwater Basin.) These aquifers are located within two geologic formations. The Purisima Formation (Purisima) provides approximately 64% of SqCWD's annual production for Capitola, Soquel, Seacliff Beach, and Aptos, and the Aromas Red Sands (Aromas) aquifer typically provides the remaining supply (approximately 36%) for the communities of Seascape, Rio Del Mar, and La Selva Beach (WSC 2016b). The SqCWD water supply system consists of 18 production wells (15 of which are currently active), approximately 166 miles of pipeline, and 18 water storage tanks (ESA 2018).

SqCWD actively manages water resources using a combination of management tools that were first established in the 1996 Soquel-Aptos Area Groundwater Management Plan, which was updated and expanded in 2007 (WSC 2016b). As a result of SqCWD's ongoing groundwater monitoring program, signs of coastal overdraft were detected early, leading to development of SqCWD's first Integrated Resources Plan (IRP) in 2006. The IRP was updated in 2012 and ultimately replaced with the development of the Community Water Plan (CWP) in 2015 (WSC 2016b).

The CWP is based on the SqCWD's UWMP and community input and is the SqCWD's roadmap for meeting the goal of a sustainable groundwater basin by 2040 (SqCWD 2015). Components of the CWP include promoting water conservation and water neutral development to reduce groundwater extractions; being proactive with the groundwater management program to protect aquifers; and seeking supplemental water supplies to meet water

needs. The groundwater management program includes a monitoring well network with over 80 monitoring wells to track water quality and water levels, implementation of the Well Master Plan to redistribute groundwater pumping away from the coast to slow down seawater intrusion, development of a computer model to better understand the basin and determine sustainable yield, and other activities. The pursuit of supplemental supplies includes the Pure Water Soquel: Groundwater Replenishment and Seawater Intrusion Prevention Project (Pure Water Soquel) and surface water transfers, as the primary supplemental supplies being pursued. The SqCWD Board of Directors certified the EIR and approved the Pure Water Soquel Project in December 2018; that project is now under construction (SqCWD 2021).

In terms of surface water transfers, the City and SqCWD have been investigating the feasibility of transferring excess City surface water to SqCWD for the purpose of passively recharging the groundwater basin, also referred to as in lieu groundwater recharge. To this end, the City and SqCWD entered into a pilot agreement in 2016 to sell excess winter water supply from the City's Graham Hill Water Treatment Plant (GHWTP) (City of Santa Cruz and SqCWD 2016). Pilot transfers were provided to a limited portion of the SqCWD service area during the 2018/2019 and 2019/2020 winter and spring wet season. During this time, active water quality monitoring and operational constraints analyses were conducted to inform feasibility for future expanded water transfers and exchanges.[5] The pilot agreement expired at the end of 2020, but in February and March 2021, the City and SqCWD, respectively, approved extension of the program for another five-year term through the wet seasons of water years 2022 (October 1, 2021) through water year 2026 (May 1, 2026) and increased the price of the transferred water. No other modifications to the agreement were made.

3.1.2.5 Central Water District

CWD covers a service area of approximately 5 square miles within the foothills of the Santa Cruz Mountains east of Aptos, between the SqCWD and City of Watsonville (see Figure 3-3). The water supply source is also drawn exclusively from the same two groundwater aquifers in the overdrafted Santa Cruz Mid-County Groundwater Basin, the Purisima and the Aromas. The CWD has monitored groundwater resources and is currently designated to manage the groundwater resources within its boundaries. The CWD distribution system consists of approximately 23.2 miles of 2- to 10-inch-diameter pipe. The distribution system is separated into five pressure zones, each supplied by pressure-reducing valves or by a combination of booster pumps and storage tanks. There are three wells that provide CWD's water supply and an additional three wells that are currently inactive (CWD 2020). Total production and associated groundwater pumping have declined since 2008 (CWD 2020).

3.1.3 Existing City Water Rights

There are generally two types of surface water appropriative water rights[6] recognized in California: pre-1914 and post-1914. The City currently holds both pre-1914 and post-1914 water rights. The year 1914 is significant because, effective December 9, 1914, the California Legislature enacted a requirement that a state agency

[5] Water transfers are reallocations of water between users through willing sellers and willing buyers; excess water available on a temporary basis when Agreed Flows and City demands are met would be sold by the City and purchased by a neighboring agency. Water exchanges are also reallocation of water between users through willing sellers and willing buyers; excess water would be provided or sold to a neighboring agency with agreement that water would be provided back to the City during drought or time of need. Water exchanges could occur either through future well extractions and/or through direct delivery via interties between neighboring agencies.

[6] Appropriative water rights are water rights that allow surface water to be diverted at one point and used (appropriated) at another point off the property encompassing the diversion. Appropriative water rights also can authorize storage from season to season and year to year.

authorize new appropriations of water from surface water sources in California. Before 1914, public agencies and private individuals and entities were able to initiate appropriative water rights through their own actions, which in some cases were provided by posting notices adjacent to diversions. Changes to post-1914 water rights now involve a more formalized approval process through the California State Water Resources Control Board (SWRCB), potentially including analysis under the California Environmental Quality Act (CEQA) and opportunities for public involvement. Changes to the City's pre-1914 water rights, provided the changes do not injure other legal users of water, can be made by City Council's adoption of a resolution amending those rights and generally are subject to CEQA review and therefore public comment.

3.1.3.1 Pre-1914 Water Rights

The City's pre-1914 water rights authorize diversions from several streams located north of the City, including Laguna Creek, Reggiardo Creek (a first order tributary to Laguna Creek), Liddell Spring (located within the East Branch Liddell Creek watershed), and Majors Creek (all collectively referred to as North Coast streams). These appropriations are reflected in the City's Statements of Water Diversion and Use Nos. S002042, S002043, S002044, and S008610, on file with the SWRCB. Table 3-1 summarizes the City's existing pre-1914 water rights.

Table 3-1. Pre-1914 Water Rights Summary

Liddell Spring: Statement of Water Diversion and Use S002043	1913	Liddell Spring (East Branch Liddell Creek watershed)	Liddell Spring Diversion	Municipal	Year-round	None
Laguna Creek: Statement of Water Diversion and Use S002042	1890	Laguna Creek	Laguna Creek Diversion	Municipal	Year-round	None
Majors Creek: Statement of Water Diversion and Use S002044	1881	Majors Creek	Majors Creek Diversion	Municipal	Year-round	None
Reggiardo Creek: Statement of Water Diversion and Use S008610	1912	Reggiardo Creek	Reggiardo Creek Diversion	Municipal	Year-round	None

Notes:

1 Since 2007, diversions by the City have been voluntarily subject to a series of interim bypass flow requirements established by ongoing agreements with the California Department of Fish and Wildlife. Those agreements' terms are not part of the water rights and not reflected in this column.

3.1.3.2 Post-1914 Water Rights

The City holds post-1914 appropriative water rights for Newell Creek and the San Lorenzo River under existing water-right licenses and permits,[7] respectively, issued by the SWRCB and predecessor state permitting agencies. Table 3-2 summarizes the City's existing post-1914 water rights).

[7] A water-right permit is an authorization to develop a water diversion and use project. Ultimately, the water right is based on beneficial use of water under a permit. If water is used beneficially in conformance with the permit, the SWRCB will confirm the water right by issuing a license, which is a vested right that confirms the actual use. The license will only confirm a water right that reflects the reasonable and beneficial use under the permit (SWRCB 2019).

Table 3-2. Post-1914 Water Rights Summary

Location	Priority	Source	Place of Use	Method of Diversion	Points of Diversion	Purpose of Use	Annual Diversion Limit	Maximum Diversion Rate	Season of Diversion	Bypass Requirement[1]
Tait: License 1553 (A004017)	06/09/1924	San Lorenzo River	See City of Santa Cruz Areas Served in Figure 3-2 and more detailed map with water rights petitions (Appendix B)	Direct Diversion	Tait Diversion	Municipal, Domestic	4,492 afy[2]	6.2 cfs[2]	1/1 – 12/31	None
Tait: License 7200 (A005215)	09/20/1926						4,347 afy[2]	6 cfs[2]		
Felton: Permit 16123[3] (A022313)	10/20/1965	San Lorenzo River	See City of Santa Cruz Areas Served in Figure 3-2 and more detailed map with water rights petitions (Appendix B)	Diversion to Storage	Felton Diversion Facility	Municipal	3,000 afy (combined maximum diversion under both permits)	9/1 – 9/30: 7.8 cfs (under Permit 16123 only) 10/1 – 5/31: 20 cfs (combined under both permits)	9/1 – 6/1	9/1 – 9/30: 10 cfs 10/1 – 10/31: 25 cfs 11/1 – 5/31: 20 cfs
Felton: Permit 16601[3] (A023710)	3/1/1971								10/1 – 6/1	
Newell Creek: License 9847 (A017913)	12/12/1957	Newell Creek	See City of Santa Cruz Areas Served in Figure 3-2 and more detailed map with water rights petitions (Appendix B)	Diversion to Storage[4]	Newell Creek Dam	Municipal, Domestic, Industrial, Recreational, Fire Protection	5,600 afy diversion to storage Maximum storage in Loch Lomond Reservoir 8,624 afy Maximum withdrawal not to exceed 3,200 afy	none	9/1 – 7/1	9/1 – 7/1: 1 cfs[5]

Notes: afy= acre-feet per year; cfs= cubic feet per second; gpm= gallons per minute.

Table 3-2. Post-1914 Water Rights Summary (continued)

Notes (continued):

1 Since 2007, diversions by the City have been voluntarily subject to a series of interim bypass flow requirements established by ongoing agreements with the California Department of Fish and Wildlife. Those agreements' terms are not part of the water rights and not reflected in this column.

2 The two Tait Licenses (Licenses 1553 and 7200) are operated jointly and, based on their combined maximum diversion rates of 12.2 cfs, have a total combined maximum use of 8,838 afy. These limits are not specified in the Tait Licenses. The maximum amounts were calculated using the maximum diversion rates and diversion seasons.

3 The two Felton Permits (Permit 16123 and Permit 16601) function together. The total quantity of water diverted under these two permits combined shall not exceed 3,000 afy. The combined maximum rate of diversion to storage shall not exceed 20 cfs.

4 While direct diversion is not explicitly authorized, that appears to be an oversight. City has determined that diversions authorized by the license could not occur without the ability to take water by direct diversion.

5 Between July 2 and August 31, 1 cfs or the natural flow is bypassed, whichever is higher.

Under California Water Code Sections 1701 through 1705, these permits and licenses can be modified with SWRCB approval if such modifications would not increase the appropriation's amount and season authorized under those permits and licenses and would not cause injury to other legal users of the water involved. The City is currently authorized to divert water from the San Lorenzo River at the Tait Diversion under Licenses 1553 and 7200 (Applications A004017 and A005215, respectively), which allow for the direct diversion of up to 4,347 acre-feet per year (afy) and 4,492 afy (the theoretical maximum), respectively, between January 1 and December 31.[8] Operationally, the two licenses function together. The City is also currently authorized to divert water from the San Lorenzo River at the Felton Diversion under Permits 16123 and 16601 (Applications A022313 and A023710, respectively). The Felton Permits allow for a combined maximum diversion of 3,000 afy between September 1 and June 1 (Permit 16123) and between October 1 and June 1 (Permit 16601). Operationally, the two permits function together.

Water diverted at Felton is transported by a large-diameter pipeline and a series of pump stations to Loch Lomond Reservoir for storage. The City also holds License 9847 (Application A017913) that allows for a maximum of 5,600 afy of water to be diverted from Newell Creek to storage in Loch Lomond Reservoir between September 1 and July 1. License 9847 states that the maximum storage capacity of Loch Lomond Reservoir is limited to 8,624 acre-feet. The maximum amount of withdrawal of water from storage in the Loch Lomond Reservoir under License 9847 is limited to 3,200 afy.

The City's Newell Creek License and Felton Permits involve the storage of water. The Newell Creek License authorizes the City to use up to 5,600 afy from Newell Creek "to be collected from September 1 of each year to July 1 of the succeeding year" and states that the "maximum withdrawal in any one year shall not exceed 3,200 acre-feet." That license also states that the City "shall have the right to hold in storage 8,624 acre-feet in Loch Lomond Reservoir." The City has determined that the amount of water use authorized by the Newell Creek License is only possible via both storage and direct diversion of water. Because a water-right license confirms prior usage of water, that license therefore implicitly incorporates direct diversions. The City's Felton Permits state that the amount appropriated under them from the San Lorenzo River collectively "shall not exceed 3,000 acre-feet per annum by storage" to be collected in Loch Lomond Reservoir. Felton Permit No. 16123 authorizes diversions to storage between "September 1 of each year to about June 1 of the succeeding year." Felton Permit No. 16601 authorizes diversions to storage between "October 1 of each year to June 1 of the succeeding year." See Section 3.4.2, Water Rights Modifications, for a description of the proposed change to the Newell Creek License to explicitly recognize direct diversions and changes to the Felton Permits to authorize direct diversions as part of the Proposed Project.

8 The Tait Licenses' total annual limits are calculated from their maximum instantaneous diversion rates because the licenses themselves do not state total annual limits.

The City's permits to divert water at Felton (as amended by earlier requests for time extensions in the mid-1980s and again in the mid-1990s) required the City to put all of its entitlement to full beneficial use by December 2006. While the City has been diligently using water from the Felton Diversion for beneficial use, to date, the City has used just over half the permitted amount on an annual basis, due largely to extensive water conservation efforts within the City. In the future, the City expects to need the full entitlement and, therefore, filed Petitions for Extension of Time for Permits 16123 and 16601 in 2006 with the SWRCB to request additional time in which to put the full 3,000 afy to beneficial use. The need for such time extensions is typical for municipal water rights, the use of which increases over time.

3.2 Project Background

3.2.1 Water Supply Planning Background

3.2.1.1 City of Santa Cruz

Integrated Water Plan

The City has been pursuing possible new water supplies for the past several decades. In 1997, the City initiated an integrated water planning approach to consider all practical options for balancing its water supply by decreasing demand and increasing supply. The City Council adopted the City's Integrated Water Plan (IWP) in November 2005 (Gary Fiske and Associates 2003). The City's IWP objectives were to (1) reduce near-term drought shortages and (2) provide a reliable supply that meets long-term needs while ensuring protection of public health and safety. The IWP components identified to meet these objectives included water conservation, curtailment of water deliveries during drought, and a new supplemental water supply. Water supply alternatives considered in the IWP and related background studies included, but were not limited to, seawater desalination, reclamation/recycled water, various groundwater options, water transfers and exchanges with SqCWD, maximizing storage in Loch Lomond Reservoir, and reservoir storage in the Olympia Quarry (Gary Fiske and Associates 2003).

Based on the outcome of the IWP and related background studies, seawater desalination was initially determined to be the most feasible and reliable alternative for a supplemental supply of drinking water. A cooperative operational scenario that involved partnering with SqCWD and constructing a 2.5-million-gallon-per-day (mgd) seawater desalination plant and related facilities (with the ability to expand the plant up to a maximum of 4.5 mgd to meet future needs through 2030) was selected by the City Council as the preferred alternative. The IWP Program Environmental Impact Report (EIR), certified in 2005, provided a programmatic analysis of a 2.5-mgd desalination facility and incremental expansions up to 4.5 mgd (City of Santa Cruz 2005a, 2005b). The results of the IWP process were incorporated into the City's 2010 UWMP (City of Santa Cruz 2011).

The City and SqCWD partnered to undertake environmental review for the proposed scwd^2 Desalination Program,[9] which involved the construction and operation of a seawater reverse osmosis desalination plant and related facilities to provide up to 2.5 mgd of potable water. Between 2007 and 2013, desalination background studies were conducted to support the development of the scwd^2 Regional Seawater Desalination Project Draft EIR (scwd^2 DEIR) (URS 2013a).

[9] The City of Santa Cruz and the SqCWD formed the scwd^2 Desalination Program to oversee technical studies, permitting, environmental review, and design of a previously proposed desalination facility.

The scwd2 DEIR was released for public review and comment in May 2013. The City chose to suspend the pursuit of seawater desalination in late 2013 to allow for a broader public discussion on the topic of water supply for the City.

Water Supply Advisory Committee Final Report and Urban Water Management Plan

After the pursuit of seawater desalination was suspended in 2013, the City Council approved formation and membership of the Water Supply Advisory Committee (WSAC) in 2014. The WSAC's charge was to "explore, through an iterative, fact-based process, the City's water profile, including supply, demand and future risks; analyze potential solutions to deliver a safe, adequate, reliable, affordable and environmentally sustainable water supply; and, to develop recommendations for City Council consideration" (WSAC 2015). The WSAC developed the WSAC Final Report on Agreements and Recommendations (October 2015), which was accepted by the City Council in November 2015. The WSAC Final Report was incorporated by reference into the 2015 UWMP, and the guiding recommendations were presented as the future water supply management strategy for the City (City of Santa Cruz 2016). The WSAC recommendations are designed to address the "Problem Statement" included in the WSAC Final report:

> "Santa Cruz's water supply reliability issue is the result of having only a marginally adequate amount of storage to serve demand during dry and critically dry years when the system's reservoir doesn't fill completely. Both expected requirements for fish flow releases and anticipated impacts of climate change will turn a marginally adequate situation into a seriously inadequate one in the coming years. Santa Cruz's lack of storage makes it particularly vulnerable to multi-year droughts. The key management strategy currently available for dealing with this vulnerability is to very conservatively manage available storage. This strategy typically results in regular calls for annual curtailments of demand that may lead to modest, significant, or even critical requirements for reduction. In addition, the Santa Cruz supply lacks diversity, thereby further increasing the system's vulnerability to drought conditions and other risks…" (WSAC 2015)

The overarching goal of the WSAC recommendations is to provide significant improvement in the sufficiency and reliability of the City water supply by 2025. The recommendations in the WSAC Final Report reflect consensus among WSAC members on how best to address an agreed-upon worst-year gap of 1.2 billion gallons per year during modeled worst-year conditions with implementation of the solutions by 2025.[10] As presented in the 2015 UWMP, the Water Supply Augmentation Strategy portfolio elements include the following (WSAC 2015):

- **Element 0: Additional water conservation** with a goal of achieving an additional 200 to 250 million gallons per year (mgy) of demand reduction by 2035 by expanding water conservation programs.
- **Element 1: Passive recharge of regional aquifers** by working to develop agreements for delivering surface water to the SqCWD and/or the SVWD[11] so they can rest their groundwater wells, help the aquifers recover, and potentially store water for use by the City in dry periods.
- **Element 2: Active recharge of regional aquifers** by using existing infrastructure and potential new infrastructure in the Purisima aquifer in the Soquel-Aptos Basin (now referred to as the Santa Cruz Mid-County Groundwater Basin), in the Santa Margarita/Lompico/Butano aquifers (now referred to as the Santa Margarita Groundwater Basin) in the Scotts Valley area, or in both to store water that can be available for use by the City in dry periods.

10 Since 2015, the City has approved a stepwise implementation of the WSAC Water Supply Augmentation Strategy that may result in final implementation beyond 2025.

11 While WSAC recommendations considered only delivering surface water to SqCWD and SVWD, current conceptual-level planning considers delivering surface water to SLVWD and CWD as well.

- **Element 3: A potable water supply using advanced-treated recycled water** as its source as a supplemental or replacement supply in the event the groundwater storage strategies described above prove insufficient to meet the goals of cost-effectiveness, timeliness, or yield. In the event advanced-treated recycled water does not meet the City's needs, desalination would become Element 3.

Implementation of the Proposed Project would support Elements 1 and 2 above.

3.2.1.2 Cooperative Groundwater Management Agreement

In 2015, the City and SqCWD entered into a cooperative monitoring/adaptive groundwater management agreement (cooperative groundwater management agreement). This agreement was developed to ensure the following groundwater management objectives are met: (1) protect the Santa Cruz Mid-County Groundwater Basin from seawater intrusion; (2) allow for redistribution of groundwater pumping inland; (3) maintain inland and coastal groundwater levels to abate seawater intrusion; and (4) provide both agencies flexibility to respond to changing conditions. The agreement also includes groundwater pumping goals, which are defined as maximum annual limits. The agreement addresses groundwater pumping activities of the City and SqCWD, but does not explicitly address the operation of potential aquifer storage and recovery (ASR) facilities or Pure Water Soquel, as WSAC and Pure Water Soquel planning efforts were not far enough along at the time the agreement was executed. While ASR could be designed to achieve the four groundwater management objectives of the agreement (see above), there are some elements of the agreement that do not apply to ASR, such as the groundwater pumping goals. Since the development of this agreement, the Santa Cruz Mid-County Groundwater Agency has developed a groundwater sustainability plan for the basin that does contemplate ASR, Pure Water Soquel, and water transfers among other management actions to restore the Mid-County Groundwater Basin (see Section 3.2.1.3, Santa Cruz Mid-County Groundwater Sustainability Plan). The City and SqCWD are currently exploring options to revise, amend, replace, or abolish the cooperative groundwater management agreement to provide both agencies flexibility to pursue projects and operate within the basin consistent with the groundwater sustainability plan, as well as with the groundwater management objectives of the cooperative groundwater management agreement.

3.2.1.3 Santa Cruz Mid-County Groundwater Sustainability Plan

The City has joined with SqCWD, CWD, the County of Santa Cruz, and private well representatives to form the Santa Cruz Mid-County Groundwater Agency, the local groundwater sustainability agency created pursuant to the requirements of California's Sustainable Groundwater Management Act (SGMA), enacted in September 2014. The Santa Cruz Mid-County Groundwater Agency has overseen the preparation of a cooperative groundwater sustainability plan (GSP) for the now redefined Santa Cruz Mid-County Groundwater Basin, which covers the mid-Santa Cruz County region and is generally bounded by Branciforte Creek on the west, the unincorporated communities of Aptos and La Selva Beach on the east, the Zayante fault (somewhat below Summit Road) on the north, and the Pacific Ocean on the south (see Figure 3-3). The Santa Cruz Mid-County Groundwater Basin includes the former Soquel Valley Basin and portions of three adjacent basins—the West Santa Cruz Terrace Basin, the former Santa Cruz Purisima Formation Basin, and the original Pajaro Valley Basin. The Soquel Valley Basin was identified by the state as a groundwater basin subject to critical conditions of overdraft. Over-pumping in the Santa Cruz Mid-County Groundwater Basin resulted in a groundwater overdraft condition and seawater intrusion along the coast. The City pumps from a portion of the Purisima Formation in the Mid-County Groundwater Basin, which local officials have recognized as threatened by potential over-pumping with an ongoing risk of seawater intrusion that could jeopardize the future production of the City's groundwater sources (City of Santa Cruz 2016).

The Santa Cruz Mid-County Groundwater Basin GSP was released for public review in July 2019. The GSP was completed and adopted by the Santa Cruz Mid-County Groundwater Agency in November 2019 and submitted to the Department of Water Resources on January 30, 2020 (MGA 2020). DWR approved the GSP on June 3, 2021 as being found to satisfy the requirements of SGMA (DWR 2021). The GSP sets sustainability management criteria for each of the five sustainability indicators applicable to the Santa Cruz Mid-County Groundwater Basin and identifies projects and management actions to achieve and maintain basin sustainability. Baseline projects and management actions (Group 1), in conjunction with other projects and management actions planned to reach sustainability (Group 2), include water conservation and demand management, installation and redistribution of municipal groundwater pumping, Pure Water Soquel, ASR in the Beltz system (Beltz ASR) and elsewhere, water transfers/in lieu groundwater recharge and distributed stormwater managed aquifer recharge. Additional potential future projects and management actions may be evaluated in the future (Group 3). The GSP will guide ongoing management of the groundwater basin with a goal to achieve and maintain the basin's sustainability goal within 20 years and over a 50-year planning and implementation horizon (MGA 2019). Additional information about Beltz ASR and water transfers/in lieu groundwater recharge from the GSP is provided below.

Beltz Aquifer Storage and Recovery

Consistent with the WSAC Final Report, the Santa Cruz Mid-County Groundwater Basin GSP indicates that ASR would inject excess surface water, treated to drinking water standards, into the natural structure of Basin aquifers for use as an underground storage reservoir. The ASR project modeled for the GSP optimizes existing City infrastructure as a more efficient use of available resources to inject excess drinking water into Basin aquifers. The GSP acknowledges, however, that eventual implementation of the ASR project may include new infrastructure. Drinking water stored in the Basin from an ASR project would provide a drought supply for the areas served by the City. The GSP further indicates that information generated by pilot test evaluations will help inform the degree to which ASR can fulfill the City's strategy to improve the reliability of its water supply, along with helping to evaluate whether an ASR project can be developed and operated in a manner that will achieve both supply reliability and groundwater sustainability benefits.

According to the GSP, Basin groundwater elevations are expected to increase with ASR's injection of excess surface water, treated to drinking water standards, and continued basin management. ASR withdrawals would be managed to ensure they do not impact the attainment of or ongoing Basin sustainability. Benefits would be evaluated using the existing groundwater monitoring well network and data management systems to compare groundwater levels over time. Potential impacts of recovering water from the Basin through ASR would be monitored to ensure ongoing groundwater sustainability is maintained. Specifically, operation of an ASR system would be conducted in such a way that it avoids negative impacts on protective groundwater elevations and chloride concentrations at coastal monitoring wells. See Section 3.4.3, Water Supply Augmentation, for a description of the ASR component of the Proposed Project.

Water Transfers/In Lieu Groundwater Recharge

The Santa Cruz Mid-County Groundwater Basin GSP indicates that water transfers/in lieu groundwater recharge would deliver excess City treated surface water, treated to drinking water standards, to SqCWD to reduce groundwater pumping and allow an increase in groundwater storage. Water transfers have the potential to reduce the threat of seawater intrusion and possibly increase groundwater storage if adequate amounts of treated surface water are consistently and reliably available when SqCWD customers have the demand needed to use City excess surface water. If water transfers benefit groundwater levels, and are sustainable over time, and the Basin's performance consistently reaches sustainability targets, then the GSP indicates that the City potentially could recover some of the increase in groundwater in storage as a supplemental supply during droughts. The GSP also

acknowledges the pilot water transfer program between the City and SqCWD described in Section 3.1.2.4, Soquel Creek Water District. See Section 3.4.3, Water Supply Augmentation, for a description of the water transfers and exchanges component of the Proposed Project.

3.2.1.4 Santa Margarita Groundwater Sustainability Plan

Santa Margarita Groundwater Agency (SMGWA) is a groundwater sustainability agency that was formed as a Joint Powers Authority. It has three member agencies—SVWD, SLVWD, and the County of Santa Cruz—and is governed by a Board of Directors comprising two representatives from each member agency, one representative from the City of Scotts Valley, one from the City of Santa Cruz, one from Mount Hermon Association, and two private well owner representatives. The Santa Margarita Groundwater Basin is generally bounded by the City of Scotts Valley and State Highway 17 on the east; the unincorporated communities of Felton, Mount Hermon, Ben Lomond, Brookdale, and Boulder Creek and State Highway 9 on the west; and the unincorporated communities of Lompico and Zayante on the north (see Figure 3-3). The major water administrators that rely on the supply from the Santa Margarita Groundwater Basin are SVWD, SLVWD, and Mount Hermon Association. Since the early 1980s, SVWD has actively managed groundwater resources. In 1994, the agency formally adopted a Groundwater Management Plan in accordance with Assembly Bill 3030, also known as the Groundwater Management Act under California Water Code Section 10750 (SMGWA 2020). The main goal of the Groundwater Management Plan is to better manage the aquifers providing the community's drinking water through the management of quantity and quality of the groundwater supply.

The SMGWA has drafted three key basin management goals: (1) ensure water supply reliability for current and future beneficial uses, (2) maintain water quality to meet current and future beneficial uses, and (3) prevent adverse environmental impacts. These goals will be re-evaluated as the SMGWA develops its GSP, which must be completed and submitted to the Department of Water Resources by 2022 (SMGWA 2020).

3.2.2 Anadromous Salmonid Habitat Conservation Plan Development

3.2.2.1 Overview

Since 2001, City staff have been developing an Anadromous Salmonid Habitat Conservation Plan (ASHCP)[12] with the California Department of Fish and Wildlife (CDFW) and the National Marine Fisheries Service (NMFS) staff for California Endangered Species Act (CESA) and federal Endangered Species Act (ESA) compliance for City water-system operation and maintenance activities that may adversely affect special-status anadromous salmonids (City of Santa Cruz 2021). The anadromous salmonids covered by the ASHCP include Central California Coast coho salmon (coho) (*Oncorhynchus kisutch*), a state and federally listed endangered species, and the Central California Coast steelhead (steelhead) (*Oncorhynchus mykiss*), a federally listed threatened species. This process has been lengthy due to the nature of the data required for long-term permitting, the inherent challenges of balancing water supply with anadromous instream flows, agency staff changes, the drought of 2012 through 2015, and other related factors.

The ASHCP conservation strategy is designed to avoid, minimize, and fully mitigate the effects of the City's "Covered Activities" on "Covered Species" (steelhead and coho) and their habitat in support of the long-term viability of these

[12] A HCP is prepared under Section 10 of the federal ESA by nonfederal parties seeking to obtain a permit for incidental take of federally listed fish and wildlife species. A HCP can also form the basis for an application for incidental take of state-listed species under Section 2081 of the CESA. A HCP includes descriptions of likely impacts to the subject species and the steps an applicant will take to avoid, minimize, and mitigate such impacts.

populations within streams affected by the ASHCP Covered Activities.[13] The ultimate fate of these populations depends on the actions of many other entities and natural processes both within and beyond areas under the City's control. The conservation strategy recognizes that the City's efforts will support and coordinate with overarching efforts to preserve these species within Santa Cruz County and the larger habitat boundaries for these species. The ASHCP biological goals and objectives address key limiting conditions in the Santa Cruz Mountains diversity stratum, particularly effects of surface water diversions, as identified in the recovery plans for steelhead and coho (NMFS 2012, 2016). Additional information about these local anadromous salmonid species, development of bypass flows and the status of the ASHCP are further discussed below and described in greater detail in Appendix C.

3.2.2.2 Local Anadromous Salmonid Species

The San Lorenzo River and North Coast streams from which the City diverts water are inhabited by two protected anadromous salmonid species, steelhead and coho. Steelhead inhabiting the drainages within the area are part of the Central California Coast Distinct Population Segment (DPS) listed as threatened under the federal ESA (NMFS 1997). The Central California Coast DPS consists entirely of winter-run steelhead and extends from the Russian River south to Soquel Creek in the southern end of Santa Cruz County. Streams in the area are included in the critical habitat designation for Central California Coast steelhead (NMFS 2005). Coho in the area are part of the Central California Coast Evolutionarily Significant Unit (ESU), which is listed as endangered under the federal ESA. Under the ESA, the Central California Coast ESU extends from Punta Gorda in Humboldt County south to, and including, the San Lorenzo River (NMFS 1996). Critical habitat has been designated for the Central California Coast ESU, including the accessible portions of the streams in the area.

Steelhead Life History

Steelhead life history is quite diverse and adaptive, providing the necessary flexibility to survive varied environmental conditions naturally occurring throughout their range and within their natal watershed. In general, steelhead grow and mature in the ocean and spawn in freshwater. In central California, adult steelhead enter coastal streams during the wet season in association with increased runoff. The majority of steelhead enter freshwater from January through March or April, and spawn relatively soon after entering freshwater. Incubation can take from a few weeks to a few months. Young steelhead (or fry) typically disperse to the stream margins. Depending upon the size attained by the fall following emergence, the juveniles aggregate in pools and begin the smolting process that prepares them for life in the ocean (known as smoltification). Juvenile steelhead can spend from 1 to 3 years in freshwater before smolting. Steelhead migrate downstream to the ocean as early as the fall, but most commonly in the spring (March through May). Steelhead may spend from 1 to 2 years in the ocean before reaching maturity and returning to their natal stream to spawn.

Coho Life History

Coho spawning migrations from the ocean to freshwater streams or rivers usually begin after the first heavy rains in late fall or winter. In the short coastal streams of central California, coho typically return to freshwater during November through February. The female may dig several pits to complete spawning, laying an average of 2,500 eggs per female. Newly hatched fry (embryos) remain in gravel for approximately 3 weeks before emerging. As they grow during the spring, juvenile coho disperse to pools where they set up individual territories. After spending the ensuing summer, fall and winter in the stream, the immature yearling coho begin to migrate downstream toward the ocean

[13] The ASHCP Covered Activities include operation, maintenance, and rehabilitation of the City's water supply and water system facilities, including surface water diversions, operation and maintenance of the City's municipal facilities, and management of City lands.

in spring. During this time, juveniles undergo smoltification. Growth in freshwater varies, but typically smolts leave California streams after 1 to 2 years. Outmigration typically peaks from late April to mid-May. Coho have a fairly strict 3-year life cycle, with about half spent in freshwater and half spent in saltwater. After 2 years of growing and sexually maturing in the ocean, coho return to their natal streams as 3-year-olds to spawn and die. Some precocious males (jacks) return to freshwater at 2 years of age. There is very little variability in age of spawning for female coho; nearly all wild female coho spawn at 3 years.

3.2.2.3 Bypass Flows

Numerous studies undertaken in support of the ASHCP have evaluated what limiting factors may be affecting fish in streams from which the City diverts water. Among other things, these analytical efforts include evaluation of instream flow needs during all freshwater life phases (migration, spawning, incubation, and rearing) over a range of hydrologic year types. Because these studies indicated that, at certain times and locations, habitat conditions in these streams could be improved by bypassing flows which would otherwise be diverted (bypass flows),[14] the City began voluntarily diverting less flow in 2007 on an interim basis in connection with the pursuit of the ASHCP. Currently, the City is implementing interim bypass flow requirements[15] protective of steelhead and coho in agreement with CDFW at the diversions on the North Coast streams and at one of two diversions on the San Lorenzo River (the Tait Diversion) that supply surface water to the City (see Appendix C for the interim bypass flow requirements).

The City has negotiated long-term minimum bypass flow requirements (Agreed Flows) with CDFW and NMFS as part of the ASHCP process. In particular, the ASHCP seeks to optimize habitat conditions for all life-stages of the subject species within the natural variability of the hydrologic regime. Any impacts to coho would be of particular concern because coho populations south of the Golden Gate Bridge are on the brink of extirpation. Provision of the Agreed Flows would generally require reduced diversions from the North Coast sources and from the San Lorenzo River at Tait at certain times and corresponding increased use of stored water from Loch Lomond Reservoir and use of groundwater. This would result in reduced storage in Loch Lomond Reservoir available for use during dry and drought periods. Overall, the implementation of the Agreed Flows would further reduce the City's dry-year water supply reliability, as it would further limit the amount of water that the City can divert.

The Proposed Project in its entirety would serve to provide additional flexibility in the use of all City water sources to address the reduced storage at Loch Lomond Reservoir while benefiting instream flows for salmonid habitat. Without such flexibility, it would not be feasible for the City to implement the Agreed Flows and meet current and future demands. At the same time, the Proposed Project would potentially benefit regional water supply security and provide opportunities to address regional groundwater overdraft. Therefore, the ASHCP conservation strategy assumes, and is dependent upon, approval of the Proposed Project by the City and the SWRCB.

3.2.2.4 Anadromous Salmonid Habitat Conservation Plan Status

The ASHCP was submitted to CDFW and NMFS for agency review in spring 2021 (City of Santa Cruz 2021). Initiation of environmental review for the ASHCP and associated permit applications is expected to commence in fiscal year 2022 with the goal of permit process completion by late 2022 or early 2023.

[14] A bypass flow refers to requirements that water that would otherwise be diverted instead be bypassed from the diversion and left in the stream.

[15] The interim bypass flow requirements are those flow requirements agreed to by CDFW and the City as part of an April 2018 agreement between CDFW and the City. The City and CDFW have had numerous such agreements since 2007 during development of the ASHCP.

The City's adoption of the ASHCP will be subject to a separate review under CEQA, and NMFS's processing of the ASHCP as a Section 10 permit application will be subject to a separate environmental review under the National Environmental Policy Act. However, as both CDFW and NMFS have tentatively agreed on the bypass flow requirements, the City has committed to implement the Agreed Flows as part of this Proposed Project regardless of the final outcome of the ASHCP process. See Section 3.4.2.6, Bypass Requirements (Agreed Flows), for additional information about the Agreed Flows.

3.3 Project Purpose and Objectives

Section 15124 of the CEQA Guidelines indicates that the EIR project description shall include a statement of the objectives sought by the Proposed Project. A clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to evaluate in the EIR and will aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project.

The underlying purpose of the Proposed Project is to improve flexibility in operation of the City's water system while enhancing stream flows for local anadromous fisheries. Incorporating the Agreed Flows into all City water rights is necessary to benefit local fisheries, specifically for coho and steelhead, but would further constrain the City's limited surface water supply. Consequently, the City needs to improve operational flexibility of the water system within existing rights, permits, and licenses to allow better use of limited water resources. To do this, the City is proposing water rights modifications to its existing rights, permits, and licenses to expand the authorized place of use (POU), to better utilize existing diversions, and to extend the City's time to put water to full beneficial use. The objectives for the Project are as follows:

1. Improve the flexibility with which the City operates the water system to facilitate the City's ability to meet drinking water demand while providing flow conditions protective of coho and steelhead.
2. Provide flow conditions that are protective of coho and steelhead within all streams from which the City diverts water, as negotiated with CDFW and NMFS during the preparation of the pending ASHCP, which is the habitat conservation plan being developed under the federal ESA and CESA.
3. To improve the City's limited storage and support the implementation of the City's Water Supply Augmentation Strategy Element 1 (passive recharge of regional aquifers via water transfers and exchanges) and Element 2 (active recharge of regional aquifers via ASR) in order to deliver a safe, adequate, reliable and environmentally sustainable water supply.
4. Facilitate opportunities within the City and regionally for conjunctive use[16] of the City's surface water rights in combination with groundwater, including by addressing significant barriers to implementing conjunctive use due to the place of use associated with the City's water-right permits and licenses to, among other things, assist in implementation of the "Water Transfers/In Lieu Groundwater Recharge" element of the Santa Cruz Mid-County Groundwater Basin Groundwater Sustainability Plan.
5. Provide more options for where and how the City can utilize its existing appropriative water rights.
6. Provide for the underground storage of surface water primarily to support more reliable and improved water supply by allowing the City to use such stored water during dry periods and also to contribute to the

[16] Conjunctive use refers to a range of actions and projects that provide for the coordinated management of surface water and groundwater supplies to increase total supplies and enhance water supply reliability. Conjunctive use actions and projects can also be used to sustainably manage groundwater supplies.

protection of groundwater quality from seawater intrusion per the Santa Cruz Mid-County Groundwater Basin GSP and to allow for the implementation of the "Aquifer Storage and Recovery" element of the Santa Cruz Mid-County Groundwater Basin GSP.

7. Remove potential operational constraints on City water rights that do not explicitly recognize direct diversion.
8. Allow additional time for the City to fully reach beneficial use under existing water-right permits at Felton.
9. Improve fish screening at the Felton Diversion and Tait Diversion and improve fish passage at the Felton Diversion. Consideration of fish passage improvements at Tait Diversion would be incorporated into future projects as required.
10. Address reliability and operational deficits at the Tait Diversion and Coast Pump Station to meet other project objectives.
11. Implement state policy favoring integrated regional water management by involving the City and other local agencies in "significantly improving" the "reliability of water supplies" by "diversifying water portfolios, taking advantage of local and regional opportunities, and considering a broad variety of water management strategies," specifically by making more extensive conjunctive use of the surface-water, groundwater and groundwater-storage resources available to the City and, when Agreed Flows and City demands are met, making excess surface water under the City's surface-water rights available to neighboring agencies who are dependent on overdrafted groundwater basins. (Water Code Section 10531[c].)
12. Consider other related actions or activities that would be foreseeable as a logical part in a chain of contemplated actions should the Proposed Project be approved, including facilities that would provide for ASR, water transfers, and water exchanges.

3.4 Project Characteristics

3.4.1 Overview

The Proposed Project includes components that are considered in the EIR at a "project" level (project components) and components that are considered at a "programmatic" level (programmatic components), and therefore this EIR is both a project EIR and a program EIR. (See Chapter 2 for information about the distinction between a project and program EIR.) The programmatic components of the Proposed Project would include potential future activities that may occur after the City water rights are modified. Because these activities are considered to be foreseeable as a logical part in a chain of contemplated actions, but the full physical extent and timing of these improvements are not known at this time, these activities are addressed in the EIR at a programmatic level. Some of these actions would be undertaken in conjunction with surrounding water districts and some would be undertaken solely by the City. If warranted, additional environmental analysis will be undertaken at the time these foreseeable future activities or actions are under active consideration. See Chapter 2, Introduction, for information about additional environmental documentation that may be required.

Table 3-3 identifies these components, which include the following:

- **Water rights modifications,** which are evaluated at a project level in this EIR, including modifications related to place of use, method of diversion, points of diversion and rediversion, underground storage and purpose of use, extension of time and stream bypass requirements for fish habitat (referred to in this EIR as Agreed Flows);
- **Water supply augmentation components,** which are evaluated at a project or programmatic level in this EIR, depending on what is known about the components, including:

  - ASR, which is evaluated at a programmatic level, unless otherwise specified below:
    - New ASR facilities at unidentified locations (referred to as "new ASR facilities" in this EIR).
    - Beltz ASR facilities at the existing Beltz well facilities (referred to as "Beltz ASR facilities" in this EIR), which are evaluated at a project level.
  - Water transfers and exchanges and associated intertie improvements, which are evaluated at a programmatic level in this EIR.
- **Surface water diversion improvements**, which are evaluated at a programmatic level in this EIR, including the Felton Diversion fish passage improvements and the Tait Diversion and Coast Pump Station improvements.

Certification of this EIR will support the City's consideration of the approval and construction of the Beltz ASR project component, as well as the SWRCB's consideration of the water rights modifications project component.

The subsections below further describe the project components and programmatic components.

Table 3-3. Project and Programmatic Components

Proposed Project Components	Project Components	Programmatic Components
WATER RIGHTS MODIFICATIONS		
Place of Use	✓	
Points of Diversion	✓	
Underground Storage and Purpose of Use	✓	
Method of Diversion	✓	
Extension of Time	✓	
Bypass Requirement (Agreed Flows)	✓	
INFRASTRUCTURE COMPONENTS		
Water Supply Augmentation Components		
Aquifer Storage and Recovery (ASR)		✓
New ASR Facilities at Unidentified Locations		✓
Beltz ASR Facilities at Existing Beltz Well Facilities	✓	
Water Transfers and Exchanges and Intertie Improvements		✓
Surface Water Diversion Improvements		
Felton Diversion Fish Passage Improvements		✓
Tait Diversion and Coast Pump Station Improvements		✓

3.4.2 Water Rights Modifications

Project components of the Proposed Project include modifications to the City's existing pre-1914 and post-1914 appropriative water rights (see Table 3-4).

Table 3-4. Summary of Proposed Water Rights Modifications

Location	Place of Use	Method of Diversion	Points of Diversion	Underground Storage and Purpose of Use	Extension of Time	Bypass Requirement
All North Coast Streams: Statements of Water Diversion and Use S002043, S002042, S002044, and S008610	Expand the authorized POUs to (1) ensure that the POUs of all of the City's water rights are consistent, (2) include the Santa Margarita and Santa Cruz Mid-County Groundwater Basins, and (3) include the service areas of potential partnering regional water districts[2]	—	Add Beltz 8, 9, 10, and 12 wells as points of rediversion into and out of groundwater storage	Add protection of water quality as new beneficial use	—	Add minimum bypass flows to reflect Agreed Flows
Tait: Licenses 1553 and 7200 (A004017 and A005215)	Expand the authorized POUs to (1) ensure that the POUs of all of the City's water rights are consistent, (2) include the Santa Margarita and Santa Cruz Mid-County Groundwater Basins, and (3) include the service areas of potential partnering regional water districts[2]	—	Add Beltz 8, 9, 10, and 12 wells as points of rediversion into and out of groundwater storage	Add underground storage supplement associated with Beltz 8, 9, 10, and 12 wells Add protection of water quality as new beneficial use	—	Add minimum bypass flows to reflect Agreed Flows Enhance fish screening at the Tait Diversion consistent with the ASHCP and incidental take permit for anadromous species
Felton: Permits 16123 and 16601 (A022318 and A023710)	Expand the authorized POUs to (1) ensure that the POUs of all of the City's water rights are consistent, (2) include the Santa Margarita and Santa Cruz Mid-County Groundwater Basins, and (3) include the service areas of potential partnering regional water districts[2]	Explicitly recognize direct diversion	Add Beltz 8, 9, 10, and 12 wells as points of rediversion into and out of groundwater storage Add Tait Diversion Facility as an authorized point of diversion	Add underground storage supplement associated with Beltz 8, 9, 10, and 12 wells Add protection of water quality as new beneficial use	Extend time to maximize beneficial use under the permits to 2043[1]	Add minimum bypass flows to reflect Agreed Flows Enhance fish passage and screening at the Felton Diversion consistent with the ASHCP and incidental take permit for anadromous species

Table 3-4. Summary of Proposed Water Rights Modifications (continued)

Location	Place of Use	Method of Diversion	Points of Diversion	Underground Storage and Purpose of Use	Extension of Time	Bypass Requirement
Newell Creek: License 9847 (A017913)	Expand the authorized POUs to (1) ensure that the POUs of all of the City's water rights are consistent, (2) include the Santa Margarita and Santa Cruz Mid-County Groundwater Basins, and (3) include the service areas of potential partnering regional water districts[2]	Explicitly recognize direct diversion Add a maximum direct diversion rate of 31 cfs	—	Add protection of water quality as new beneficial use	—	Add minimum bypass flows to reflect Agreed Flows

Notes: ASHCP = Anadromous Species Habitat Conservation Plan; cfs= cubic feet per second; POU = place of use.

1 The time to maximize beneficial use ended on December 31, 2006, although the City filed a prior extension petition before that date.

2 Service areas of potential partnering regional water districts to include: SqCWD, SVWD, SLVWD, and CWD, as shown on Figure 3-3.

In order to both develop and analyze the Proposed Project presented in this EIR, the City has utilized a modeling system comprised of a hydrologic model, a water supply model, and a biological effects model. Together, these tools have allowed the City to understand the potential effects of Proposed Project features on both water supply availability and anadromous fisheries, allowing refinements in the Proposed Project to maximize available water supply while protecting local anadromous fisheries. See Section 3.5, Proposed Project Modeling, for additional information about the modeling of the Proposed Project and Appendix D for hydrologic, water supply, and fisheries habitat modeling of the effects of the proposed water rights modifications based on the reasonably foreseeable operations of the City's water system.

The City will pursue changes to its pre-1914 water rights through action by the Santa Cruz City Council. The City is pursuing proposed changes to its post-1914 permits and licenses through the filing of change and extension petitions with the SWRCB. These change and extension petitions were filed with the SWRCB in August 2020 (see Appendix B). No change to the authorized amounts of diversions under any of the City's appropriative water rights is proposed as part of the Proposed Project. Overall, implementation of these modifications would provide the City greater flexibility in the operation of the water system while enhancing stream flows for local anadromous fisheries.

3.4.2.1 Place of Use

The Proposed Project would expand the POUs of the City's pre-1914 and post-1914 appropriative water rights to include the areas served by the City, two local groundwater basins, and the service areas of neighboring water agencies, as shown in Figure 3-3. A significant barrier to implementing more conjunctive use of the City's sources of supply is existing constraints on the POUs for these sources. The Proposed Project would align the POUs of all of the City's appropriative water rights to cover the same area and expand those authorized POUs to include the Santa Cruz Mid-County Basin and Santa Margarita Basin as well as the service areas of the SqCWD, SVWD, SLVWD, and CWD. Expanded POUs are also necessary for improving the potential for conjunctive use of the region's resources with adjoining water agencies and within the region's groundwater basins. Conjunctive use of surface and groundwater supplies through the City's ASR operations could make some additional recovered groundwater available to the City and potentially to the region during dry periods. See Table 3-4 for the proposed water rights modifications being sought by the City that relate to POUs. See Section 3.4.3, Water Supply Augmentation, for additional information.

3.4.2.2 Method of Diversion

The Proposed Project would result in explicit authorization of direct diversion as a method of diversion under the City's Newell Creek License and Felton Permits to complement the existing stated storage rights and add a new maximum direct diversion rate of 31 cubic feet per second (cfs) to the Newell Creek License. The existing Newell Creek License and Felton Permits do not explicitly authorize the diversion and use of water until it has been stored in Loch Lomond Reservoir for at least 30 days. The City has determined, however, that the amounts of diversion authorized by its license for Loch Lomond Reservoir (License 9847) could only be possible utilizing direct diversion as a second method of diversion. Because a water-right license confirms prior usage and maximum beneficial use of water, License 9847 implicitly incorporates direct diversions. If enforced strictly, the explicit terms of the City's existing Felton Permits and Newell Creek License could have the potential to constrain the City's ability to deliver water for beneficial use until 30 days after water has been collected and stored in the Loch Lomond Reservoir. To support the necessary flexibility in the use of the reservoir, the City needs to be able to directly divert water as a method of diversion from both the Felton Diversion and Newell Creek at Loch Lomond

Reservoir without a 30-day storage requirement. Direct diversion under the Felton Permits would allow for water diverted under the permits to be sent directly to the City's GHWTP without storage in Loch Lomond Reservoir. The new maximum diversion rate for the Newell Creek License of 31 cfs is being added per request to the SWRCB as set forth in the City's 2020 change petitions filing. The maximum diversion rate proposed was based on the City's anticipated maximum infrastructure capacity. See Table 3-4 for the proposed water rights modifications being sought by the City that relate to method of diversion.

3.4.2.3 Points of Diversion

Points of Rediversion for Each Water Right

The Proposed Project would add the City's existing Beltz system (Beltz 8, 9, 10, and 12 facilities) as points of rediversion[17] into and out of groundwater storage to the City's Tait Licenses, Felton Permits and pre-1914 appropriative rights. This would provide flexibility for utilization of the City's San Lorenzo River surface water supplies for the Beltz ASR component of the Proposed Project. The Proposed Project would also include the Beltz system as points of rediversion into and out of groundwater storage for the City's water rights on North Coast streams. See Section 3.4.3, Water Supply Augmentation, for a description of the ASR component of the Proposed Project. See Table 3-4 for the proposed water rights modifications being sought by the City that relate to points of rediversion.

Points of Diversion for the Felton Permits

The Proposed Project would add the Tait Diversion as a new point of diversion on the Felton Permits. Because the implementation of the Agreed Flows would constrain the water system in order to be protective of local fisheries, the City needs to increase the operational flexibility of the water system. The City needs the option of diverting water under the existing Felton Diversion water rights at either the Felton Diversion or downstream at the Tait Diversion. This would provide the ability to divert water under the Felton Permits with or without activation of the Felton Diversion inflatable dam and improve operational flexibility. Additionally, when water under the Felton Permits would be diverted at the Tait Diversion, water would remain in the San Lorenzo River longer, bypassing the Felton Diversion before being diverted at the Tait Diversion, thus providing fisheries benefits. The maximum rates of diversion at the Felton Diversion and Tait Diversion, respectively, would remain unchanged. See Table 3-4 for the proposed water rights modifications being sought by the City that relate to points of diversion for the Felton Permits.

3.4.2.4 Underground Storage and Purpose of Use

The Proposed Project would add underground storage supplements to the City's Tait Licenses and Felton Permits to allow for the Beltz ASR component of the Proposed Project. An underground storage supplement is required to be filed with the SWRCB for post-1914 water-right permits and licenses seeking to divert surface water to groundwater aquifers to artificially recharge these aquifers for further beneficial use. The underground storage supplements to allow for Beltz ASR are the only underground storage supplements being pursued now because these facilities are the only proposed ASR facilities whose locations and proposed capacities are currently known. The City would not be able to implement and operate other ASR facilities under its post-1914 permits and licenses without submitting additional underground storage supplements to those permits and licenses to the SWRCB and obtaining the

[17] A point of rediversion is a point, other than the point of initial diversion, where controlled water is diverted from a natural stream or another water source. In this case, water would be rediverted into and out of groundwater storage in the Beltz system.

SWRCB's approval. The City would potentially need to analyze those additional underground storage supplements in a future project-level environmental document building upon the programmatic analysis found in this EIR (see Chapter 2, Introduction, for information about additional environmental documentation that may be required). While an underground storage supplement is not necessary for the addition of ASR operations to the City's pre-1914 appropriative water rights, that element would be added to those rights through a City Council action.

Protection of water quality would also be added as a new purpose of use to all City appropriative water rights to support the use of surface water for ASR as it contributes to the protection of groundwater quality from seawater intrusion per the Santa Cruz Mid-County GSP. See Section 3.4.3, Water Supply Augmentation, for a description of the ASR component of the Proposed Project. See also Table 3-4 for the proposed water rights modifications being sought by the City that relate to underground storage and purpose of use.

3.4.2.5 Extension of Time

The Proposed Project would extend the time under the Felton Permits to December 31, 2043 in which the City could make full beneficial use of the 3,000 afy diversion. Due to an extensive and successful water conservation program among other factors, reductions in per-capita water use from 2005 and 2015 have more than offset population increases; that is, even though the population of the areas served by the City has been slowly rising, total water use has declined (City of Santa Cruz 2015). Full implementation of the Agreed Flows as part of the Proposed Project, however, necessitates increased flexibility within the water system, requiring additional time under the City's Felton Permits to fully reach beneficial use. Additional time is also needed to implement water supply options that may be necessary to meet City water supply needs, including components such as ASR and other water supply augmentation components that may be pursued in conjunction with partnering water agencies (see Section 3.4.3, Water Supply Augmentation). Additionally, under the Felton Permits, explicitly authorizing direct diversion and adding the Tait Diversion as an authorized point of diversion would also facilitate full utilization of the 3,000 afy of diversion authorized by those Permits. See Table 3-4 for the proposed water rights modifications being sought by the City that relate to extension of time.

3.4.2.6 Bypass Requirements (Agreed Flows)

Agreed Flows

The Proposed Project would include modifying City water rights to incorporate the bypass requirements for each water right the City negotiated with CDFW and NMFS during development of the ASHCP to better protect federally listed coho and steelhead in all watersheds from which the City diverts water. As described in Section 3.2.2, Anadromous Salmonid Habitat Conservation Plan Development, these bypass requirements are referred to as Agreed Flows, given that they were developed in conjunction with CDFW and NMFS. The Agreed Flows would be incorporated into both pre-1914 rights on the North Coast streams and post-1914 permits and licenses on the San Lorenzo River and Newell Creek. This would improve instream habitat and flow conditions for these fish species in the San Lorenzo River compared to historic operations. While it is expected that Agreed Flows will become terms and conditions of permits and authorizations issued under the ESA, CESA, and Section 1600 et seq. of the Fish and Game Code, the Proposed Project would commit the City to these flows regardless of the outcomes of these processes.

Through interim bypass agreements with CDFW, the City has already begun implementing improved bypass flows not required by its existing water rights at diversion facilities on the North Coast streams and at the Tait Diversion on the San Lorenzo River, further constraining the City's limited water supply, particularly in dry years.

Application of the Agreed Flows to all City surface water rights as part of the Proposed Project would further reduce the City's dry-year water supply reliability, as it would further limit the amount of water that the City can divert. The implementation of the Agreed Flows and resulting constraints on water supply are a primary driver of the City's need to increase the resiliency of the water supply system, as described in Section 3.3, Project Purpose and Objectives.

The Agreed Flows comprise a schedule of minimum instream flows (bypass flows) that would avoid and minimize effects on steelhead and coho due to operation of the Laguna Creek, Liddell Spring, Majors Creek, Tait and Felton Diversions, as well as the Loch Lomond Reservoir. The minimum instream flow requirements are those flows needed to maintain habitat for steelhead and coho during all freshwater life stages (migration, spawning, incubation, and rearing) over a range of Hydrologic Condition Types (see Table 3-5a). The Hydrologic Condition Types are based on the record of cumulative daily average flow by water year (October 1–September 30) at the Big Trees gage on the San Lorenzo River. To develop the Hydrologic Condition Types, cumulative flow was calculated for each month in the record (water years 1937–2015), sorted from lowest to highest, and split into five equal parts representing a range of hydrologic conditions from driest to wettest conditions. Operationally, the Hydrologic Condition Type would be determined each month based on conditions for the preceding month, and the bypass flows would be established based on the month and hydrologic condition as described in Table 3-5a.

Table 3-5a. Agreed Flows Hydrologic Condition Types

Month	Flow Ranges Used to Determine Monthly Hydrologic Condition Type[1] (cfs) Using San Lorenzo River End-of-Month Cumulative Daily Flow[2]				
	Hydrologic Condition 5 (driest)	*Hydrologic Condition 4 (dry)*	*Hydrologic Condition 3 (normal)*	*Hydrologic Condition 2 (wet)*	*Hydrologic Condition 1 (wettest)*
Oct	≤459	460 – 539	540 – 709	710 – 875	>875
Nov	≤1,186	1,187 – 1,497	1,498 – 1,827	1,828 – 2,485	>2,485
Dec	≤2,397	2,398 – 3,134	3,135 – 5,642	5,643 – 10,196	>10,196
Jan	≤4,322	4,323 – 8,456	8,457 – 16,694	16,695 – 28,019	>28,019
Feb	≤8,442	8,443 – 16,368	16,369 – 29,140	29,141 – 42,995	>42,995
Mar	≤13,004	13,005 – 22,948	22,949 – 35,371	35,372 – 57,968	>57,968
Apr	≤14,203	14,204 – 24,491	24,492 – 39,487	39,488 – 67,884	>67,884
May	≤15,448	15,449 – 25,279	25,280 – 41,659	41,660 – 71,412	>71,412
Jun	≤16,005	16,006 – 26,116	26,117 – 43,123	43,124 – 73,420	>73,420
Jul	≤16,364	16,365 – 26,819	26,820 – 44,073	44,074 – 74,718	>74,718
Aug	≤16,653	16,654 – 27,355	27,356 – 44,799	44,800 – 75,591	>75,591
Sep	≤16,978	16,979 – 27,843	27,844 – 45,398	45,399 – 76,368	>76,368

Notes: cfs = cubic feet per second.

1 The Hydrologic Condition Types are based on the record of cumulative daily average flow by water year (water years 1937–2015) at the Big Trees gage on the San Lorenzo River.

2 To implement the Agreed Flows, the Hydrologic Condition type is determined on the first day of each month based upon the previous month's San Lorenzo River end-of-month cumulative flow for the Water Year. Water Year is defined as the 12-month period from October 1 through September 30.

a. The end-of-month cumulative daily flow is calculated by adding the San Lorenzo River daily flows, as measured at the Big Trees Gage, from the first day of the Water Year to the last day of the month.

b. The flow ranges for the month are then reviewed to determine within which Hydrologic Condition type this end-of-month cumulative daily flow falls.

c. This Hydrologic Condition type is used until the first day of the next month to determine bypass flow conditions under the Agreed Flows across all City of Santa Cruz source waters.

Agreed Flows are presented as bypass flows in Tables 3-5b through 3-5g for each of the City diversions and described in more detail in Appendix C. Values in the tables represent a limit for City diversions such that diversions would not reduce flow below these levels. Bypass flow requirements vary by life stage, and the applicable minimum flow is determined by the life stage requiring the highest flow.

All flow above the required level for each time period is available for diversion, up to the diversion capacity for each facility. If the required bypass flow is greater than the available streamflow, then the full streamflow is bypassed and the City diversion would not operate.

Laguna Creek Diversion

Laguna Creek was given the highest priority of the North Coast streams for restoration of anadromous species during the development of the ASHCP. It is the largest watershed and has the longest reach of anadromous habitat of the North Coast streams from which the City diverts water. It also has the potential to support coho and has a nearly intact lagoon system that can be very productive for steelhead. Instream flow requirements for Laguna Creek are described below and summarized in Table 3-5b.

The City would provide the following minimum bypass flows in the anadromous reach of Laguna Creek for steelhead:

- For rearing juvenile steelhead, 2.0 cfs at all times;
- For adult migration, a lower threshold of 11.3 cfs and an upper threshold of 15.5 cfs[18] when flow would be at this level without City diversion during December through March and additionally in April for Hydrologic Conditions 1-3;
- For spawning, 9.4 cfs during December through May for 14 days following any adult migration period;
- For egg incubation, 4.0 cfs during January through May for 60 days after the last spawning day or until May 31, whichever is earliest; and
- For smolt outmigration, 3.8 cfs
    - in Hydrologic Condition Types 1–4, during January through May, and
    - in Hydrologic Condition 5, for at least 3 consecutive days per week in March, April, and May.

The required minimum bypass flow in any given month is determined by the life stage requiring the highest flow.

The point of compliance for minimum bypass flows is the City-maintained stream gage in the anadromous reach of Laguna Creek. Other gages would also be used to ascertain effects of diversions by others on flows and habitat availability in the anadromous reach.

[18] When river flows reach the lower threshold, minimum bypass flows would be as follows: when river flows without City diversion are above the upper threshold, the minimum bypass is the upper threshold; when river flow without City diversion is between the lower and upper threshold, the minimum bypass is the natural flow; and when river flows without City diversion fall below the lower threshold again, adult migration bypass flow requirements cease and required minimum bypass flow is determined by the life stage requiring the next-highest flow.

Table 3-5b. Agreed Flows for Laguna Creek Diversion, as Measured at the Laguna Creek Anadromous Gage[1]

Month	Rearing (Base Flow) (cfs)					Adult Migration (cfs)	Spawning[2] (cfs)	Egg Incubation[3] (cfs)	Smolt Out-migration[4] (cfs)
	Hydrologic Condition 5 (driest)	*Hydrologic Condition 4 (dry)*	*Hydrologic Condition 3 (normal)*	*Hydrologic Condition 2 (wet)*	*Hydrologic Condition 1 (very wet)*				
Jan	2.0	2.0	2.0	2.0	2.0	11.3/15.5	9.4	4.0	3.8
Feb	2.0	2.0	2.0	2.0	2.0	11.3/15.5	9.4	4.0	3.8
Mar	2.0	2.0	2.0	2.0	2.0	11.3/15.5	9.4	4.0	3.8
Apr	2.0	2.0	2.0	2.0	2.0	11.3/15.5[5]	9.4	4.0	3.8
May	2.0	2.0	2.0	2.0	2.0	—	9.4	4.0	3.8
Jun	2.0	2.0	2.0	2.0	2.0	—	—	—	—
Jul	2.0	2.0	2.0	2.0	2.0	—	—	—	—
Aug	2.0	2.0	2.0	2.0	2.0	—	—	—	—
Sep	2.0	2.0	2.0	2.0	2.0	—	—	—	—
Oct	2.0	2.0	2.0	2.0	2.0	—	—	—	—
Nov	2.0	2.0	2.0	2.0	2.0	—	—	—	—
Dec	2.0	2.0	2.0	2.0	2.0	11.3/15.5	9.4	—	—

Notes: cfs = cubic feet per second.

1 The required flow is determined by the life stage requiring the highest flow in any given month.

2 Provided for 14-day period after any potential migration event.

3 Provided for 60 days following occurrence of last spawning flow or May 31, whichever occurs first.

4 Provided in Hydrologic Conditions 1–4 and for 3 consecutive days per week in Hydrologic Condition 5 in March, April, and May.

5 April adult migration flows provided in Hydrologic Conditions 1–3.

Liddell Spring Diversion

The City's diversion is located at Liddell Spring, which feeds Liddell Creek. NMFS and CDFW gave Liddell Creek lower restoration priority for anadromous species than Laguna Creek and the San Lorenzo River due to limited productive capacity for steelhead, unsuitability of habitat for coho, relatively short anadromous reach, and the relatively small size of the City's diversion. While the Liddell Spring diversion is relatively small, it is an important component of the City's water supply because it is used to improve the quality of the blended water treated at the GHWTP, and as a spring, it is persistent in dry conditions. Productive capacity for anadromous fish is limited in Liddell Creek due to excessive amounts of fine sediment and a lack of a functional lagoon. Instream flow requirements for Liddell Creek are described below and summarized in Table 3-5c.

The City would provide the following minimum bypass flows in the anadromous reach of Liddell Creek:

- For rearing juvenile steelhead
  - in Hydrologic Conditions 4–5, 0.25 cfs, and
  - in Hydrologic Conditions 1–3, up to 5.2 cfs, as detailed in Table 3-5c;
- For adult migration, a lower threshold of 4.9 cfs and an upper threshold of 11.3 cfs[19] when flow would be at this level without City diversion during December through April in Hydrologic Conditions 1–3;

19 When river flows reach the lower threshold, minimum bypass flows would be as follows: when river flows without City diversion are above the upper threshold, the minimum bypass is the upper threshold; when river flow without City diversion is between the lower and upper threshold, the minimum bypass is the natural flow; and when river flows without City diversion fall below the lower threshold again, adult migration bypass flow requirements cease and required minimum bypass flow is determined by the life stage requiring the next-highest flow.

- For spawning, 7.4 cfs during December through May in Hydrologic Conditions 1–3 for 14 days following any adult migration period;
- For egg incubation, 2.0 cfs during January through May in Hydrologic Conditions 1–3 for 60 days after the last spawning day or until May 31, whichever is earliest; and
- For smolt outmigration, 2.0 cfs
    - in Hydrologic Conditions 1–3 during January through May and
    - in Hydrologic Conditions 4–5 for at least three consecutive days per week during March through May.

The required minimum bypass flow in any given month is determined by the life stage requiring the highest flow.

The point of compliance for minimum bypass flows is the City-maintained stream gage in the anadromous reach of Liddell Creek. Other gages would also be used to ascertain effects of diversions by others on flows and habitat availability in the anadromous reach.

Table 3-5c. Agreed Flows for Liddell Spring Diversion, as Measured at the Liddell Creek Anadromous Gage[1]

Month	Rearing (Base Flow) (cfs)					Adult Migration[2] (cfs)	Spawning[3] (cfs)	Egg Incubation[4] (cfs)	Smolt Out-migration[5] (cfs)
	Hydrologic Condition 5 (driest)	*Hydrologic Condition 4 (dry)*	*Hydrologic Condition 3 (normal)*	*Hydrologic Condition 2 (wet)*	*Hydrologic Condition 1 (very wet)*				
Jan	0.25	0.25	2.9	3.6	4.7	4.9/11.3	7.4	2.0	2.0
Feb	0.25	0.25	4.6	3.9	5.1	4.9/11.3	7.4	2.0	2.0
Mar	0.25	0.25	3.5	4.8	5.2	4.9/11.3	7.4	2.0	2.0
Apr	0.25	0.25	3.0	4.3	4.6	4.9/11.3	7.4	2.0	2.0
May	0.25	0.25	2.6	3.3	4.0	—	7.4	2.0	2.0
Jun	0.25	0.25	2.0	2.4	2.9	—	—	—	—
Jul	0.25	0.25	1.6	1.9	2.2	—	—	—	—
Aug	0.25	0.25	1.4	1.7	1.8	—	—	—	—
Sep	0.25	0.25	1.3	1.5	1.6	—	—	—	—
Oct	0.25	0.25	1.5	1.5	1.6	—	—	—	—
Nov	0.25	0.25	1.8	1.9	1.9	—	—	—	—
Dec	0.25	0.25	2.1	2.6	3.0	14.9/11.3	7.4	—	—

Notes: cfs = cubic feet per second.

1 The required flow is determined by the life stage requiring the highest flow in any given month.
2 Provided in Hydrologic Conditions 1–3 only.
3 Provide for 14-day period after any potential migration event in Hydrologic Conditions 1–3.
4 Provided in Hydrologic Conditions 1–3 for 60-day period following occurrence of last spawning flow or May 31, whichever occurs first
5 Provided in Hydrologic Conditions 1–3, and for 3 consecutive days per week in March, April, and May in Hydrologic Conditions 4–5.

Majors Creek Diversion

In the development of the ASHCP, NMFS and CDFW gave Majors Creek lower restoration priority for anadromous species than Laguna Creek and the San Lorenzo River due to its relatively short anadromous reach length, unsuitability of habitat for coho, and lack of a developed lagoon. The City also has a relatively small diversion capacity on Majors Creek relative to Laguna Creek and the San Lorenzo River. Instream flow requirements for Majors Creek are described below and summarized in Table 3-5d.

The City would provide the following minimum bypass flows in the anadromous reach of Majors Creek for steelhead:

- For rearing juvenile steelhead,
    - in Hydrologic Conditions 4–5, 0.25 cfs, and
    - in Hydrologic Conditions 1–3, up to 4.7 cfs, as detailed in Table 3-5d;
- For adult migration, a lower threshold of 9.0 cfs and an upper threshold of 16.0 cfs[20] when flow would be at this level without City diversion during December through April in Hydrologic Conditions 1–3;
- For spawning, 12.1 cfs during December through May in Hydrologic Conditions 1–3 for 14 days following any adult migration period;
- For egg incubation, 2.9 cfs during January through May in Hydrologic Conditions 1–3 for 60 days after the last spawning day or until May 31, whichever is earliest; and
- For smolt outmigration, 3.4 cfs
    - in Hydrologic Conditions 1–3 during January through May and
    - in Hydrologic Conditions 4–5 during March through May for at least three consecutive days per week.

The required minimum bypass flow in any given month is determined by the life stage requiring the highest flow.

The point of compliance for minimum bypass flows is the City-maintained stream gage in the anadromous reach of Majors Creek. Other gages would also be used to ascertain effects of diversions by others on flows and habitat availability in the anadromous reach.

Table 3-5d. Agreed Flows for Majors Creek Diversion, as Measured at the Majors Creek Anadromous Gage[1]

Month	Rearing (Base Flow) (cfs)					Adult Migration[2] (cfs)	Spawning[3] (cfs)	Egg Incubation[4] (cfs)	Smolt Out-migration (cfs)
	Hydrologic Condition 5 (driest)	*Hydrologic Condition 4 (dry)*	*Hydrologic Condition 3 (normal)*	*Hydrologic Condition 2 (wet)*	*Hydrologic Condition 1 (very wet)*				
Jan	0.25	0.25	2.2	2.7	4.1	9.0/16.0	12.1	2.9	3.4
Feb	0.25	0.25	4.1	3.0	4.4	9.0/16.0	12.1	2.9	3.4
Mar	0.25	0.25	2.4	4.3	4.7	9.0/16.0	12.1	2.9	3.4[5]
Apr	0.25	0.25	1.7	3.1	3.2	9.0/16.0	12.1	2.9	3.4[5]
May	0.25	0.25	1.4	1.8	2.4	—	12.1	2.9	3.4[5]
Jun	0.25	0.25	1.0	1.2	1.6	—	—	—	—
Jul	0.25	0.25	0.8	1.0	1.1	—	—	—	—
Aug	0.25	0.25	0.7	0.8	0.9	—	—	—	—
Sep	0.25	0.25	0.6	0.7	0.7	—	—	—	—
Oct	0.25	0.25	0.8	0.9	0.8	—	—	—	—
Nov	0.25	0.25	1.1	1.2	1.2	—	—	—	—
Dec	0.25	0.25	1.5	1.9	2.1	9.0/16.0	12.1	—	—

Notes: cfs = cubic feet per second.

1 The required flow is determined by the life stage requiring the highest flow in any given month.

2 Provided in Hydrologic Conditions 1–3 only.

3 Provide for 14-day period after any potential migration event in Hydrologic Conditions 1–3.

4 Provided in Hydrologic Conditions 1–3 for 60-day period following occurrence of last spawning flow or May 31, whichever occurs first.

5 Provided in Hydrologic Conditions 1–3, and for 3 consecutive days per week in March, April, and May in Hydrologic Conditions 4–5.

20 When river flows reach the lower threshold, minimum bypass flows would be as follows: when river flows without City diversion are above the upper threshold, the minimum bypass is the upper threshold; when river flow without City diversion is between the lower and upper threshold, the minimum bypass is the natural flow; and when river flows without City diversion fall below the lower threshold again, adult migration bypass flow requirements cease and required minimum bypass flow is determined by the life stage requiring the next-highest flow.

Tait Diversion, San Lorenzo River

NMFS and CDFW gave the San Lorenzo River a high priority for restoration of anadromous species in the development of the ASHCP. It has a large watershed with extensive habitat in both the main stem and its tributaries. The San Lorenzo River supports steelhead and potentially coho. Its lagoon is important for rearing juvenile steelhead. Instream flow requirements for the San Lorenzo River below Tait Diversion are described below and summarized in Table 3-5e.

The City would provide the following minimum bypass flows downstream of Tait Diversion on the San Lorenzo River for steelhead and coho:

- For rearing juvenile steelhead,
    - in Hydrologic Conditions 4–5, 8.0 cfs, and
    - in Hydrologic Conditions 1–3, up to 18.5 cfs, as detailed in Table 3-5e;
- For adult migration, a lower threshold of 17.0. cfs and an upper threshold of 25.2 cfs[21] when flow would be at this level without City diversion in December through April in Hydrologic Conditions 1–3, in December through March in Hydrologic Conditions 4 and 5, and with the following exceptions:
    - May be reduced to 3 consecutive days a week if storage levels in Loch Lomond Reservoir fall below the following levels in million gallons (mg): December—1,900 mg, January—2,000 mg, February—2,100 mg, and March—2,200 mg.
    - May be reduced to 5 consecutive days after each storm event that exceeds 17 cfs if storage levels in Loch Lomond Reservoir fall below the following levels: December—1,600 mg, January—1,700 mg, February—1,800 mg, and March—1,900 mg.
- For smolt outmigration, 10 cfs
    - in Hydrologic Conditions 1–4 during January through May, and
    - in Hydrologic Condition 5 during March through May for at least 3 consecutive days per week.

The required minimum bypass flow in any given month is determined by the life stage requiring the highest flow.

The point of compliance for minimum bypass flows is the City-funded United States Geological Survey-maintained stream gage in the San Lorenzo River immediately downstream of Tait Diversion.

[21] When river flows reach the lower threshold, minimum bypass flows would be as follows: when river flows without City diversion are above the upper threshold, the minimum bypass is the upper threshold; when river flow without City diversion is between the lower and upper threshold, the minimum bypass is the natural flow; and when river flows without City diversion fall below the lower threshold again, adult migration bypass flow requirements cease and required minimum bypass flow is determined by the life stage requiring the next-highest flow.

Table 3-5e. Agreed Flows for Tait Diversion on the San Lorenzo River, as Measured at the City Gage immediately downstream of Tait Diversion[1]

Month	Rearing (Base Flow) (cfs)					Adult Migration[2] (cfs)	Spawning[3] (cfs)	Egg Incubation[3] (cfs)	Smolt Out-migration (cfs)
	Hydrologic Condition 5 (driest)	*Hydrologic Condition 4 (dry)*	*Hydrologic Condition 3 (normal)*	*Hydrologic Condition 2 (wet)*	*Hydrologic Condition 1 (very wet)*				
Jan	8.0	8.0	15.8	16.4	17.5	17.0/25.2	—	—	10.0
Feb	8.0	8.0	15.9	16.7	18.0	17.0/25.2	—	—	10.0
Mar	80.	8.0	16.3	17.3	18.2	17.0/25.2	—	—	10.0[4]
Apr	8.0	8.0	17.2	17.9	18.4	17.0/25.2[5]	—	—	10.0[4]
May	8.0	8.0	17.7	18.2	18.5	—	—	—	10.0[4]
Jun	8.0	8.0	16.6	18.1	18.5	—	—	—	—
Jul	8.0	8.0	12.4	15.8	18.2	—	—	—	—
Aug	8.0	8.0	9.8	11.9	16.4	—	—	—	—
Sep	8.0	8.0	9.0	11.1	13.3	—	—	—	—
Oct	8.0	8.0	9.8	11.4	13.3	—	—	—	—
Nov	8.0	8.0	12.5	14.1	16.4	—	—	—	—
Dec	8.0	8.0	15.1	16.2	17.6	17.0/25.2	—	—	—

Notes: cfs = cubic feet per second.

1 The required flow is determined by the life stage requiring the highest flow in any given month.

2 May be reduced to 3 consecutive days a week if storage levels in Loch Lomond fall below the following levels in million gallons (mg): Dec-1900 mg; Jan-2000 mg; Feb-2100 mg; Mar-2200 mg. Further, adult migration flows may be reduced to 5 consecutive days after each storm event that exceeds 17 cfs if storage levels in Loch Lomond fall below the following levels: Dec-1600 mg; Jan-1700 mg; Feb-1800 mg; Mar-1900 mg.

3 No spawning or incubation occurs in this reach.

4 During Hydrologic Conditions 5, provided at least 3 days per week.

5 April adult migration flows provided only in Hydrologic Conditions 1–3.

Felton Diversion, San Lorenzo River

As described above, NMFS and CDFW gave the San Lorenzo River a high priority for restoration of anadromous species in the development of the ASHCP. Instream flow requirements for the San Lorenzo River below Felton Diversion are described below and summarized in Table 3-5f. No diversions are permitted at Felton Diversion during June through August.

The City would provide the following minimum bypass flows downstream of Felton Diversion on the San Lorenzo River for steelhead and coho:

- For rearing juvenile steelhead, egg incubation, and smolt migration
    - during October, 25 cfs,
    - during November through May, 20 cfs, and
    - during September, 10 cfs;
- For adult migration, 40 cfs during December through April when flow would be at this level without City diversion and the river mouth is open; and
- For spawning, 40 cfs during December through May for 14 days after any adult migration period.

The required minimum bypass flow in any given month is determined by the life stage requiring the highest flow.

The point of compliance for minimum bypass flows is the U.S. Geographical Survey–maintained stream gage near Henry Cowell Redwoods State Park entrance (Big Trees Gage).

Table 3-5f. Agreed Flows for Felton Diversion on the San Lorenzo River, as Measured at the Big Trees Gage[1]

Month	Rearing (Base Flow) (cfs)					Adult Migration[2] (cfs)	Spawning[3] (cfs)
	Hydrologic Condition 5 (driest)	*Hydrologic Condition 4 (dry)*	*Hydrologic Condition 3 (normal)*	*Hydrologic Condition 2 (wet)*	*Hydrologic Condition 1 (very wet)*		
Jan	20.0	20.0	20.0	20.0	20.0	40.0	40.0
Feb	20.0	20.0	20.0	20.0	20.0	40.0	40.0
Mar	20.0	20.0	20.0	20.0	20.0	40.0	40.0
Apr	20.0	20.0	20.0	20.0	20.0	40.0	40.0
May	20.0	20.0	20.0	20.0	20.0	—	40.0
Jun	No Diversion						
Jul							
Aug							
Sep	10.0	10.0	10.0	10.0	10.0	—	—
Oct	25.0	25.0	25.0	25.0	25.0	—	—
Nov	20.0	20.0	20.0	20.0	20.0	—	—
Dec	20.0	20.0	20.0	20.0	20.0	40.0	40.0

Notes: cfs = cubic feet per second.

1 The required flow is determined by the life stage requiring the highest flow in any given month.

2 Provided when river mouth is open and natural flow would occur at this level without diversion.

3 Provided for 14 days following any potential migration event.

Newell Creek Diversion

Operation of the Newell Creek Diversion (also referred to as Newell Creek Dam) and Loch Lomond Reservoir alters the natural hydrograph of Newell Creek except during periods when the reservoir is spilling. There is an agreed minimum release of 1 cfs in Newell Creek below Loch Lomond Reservoir. When Loch Lomond Reservoir storage is low enough to result in supply shortages, an exception minimum of 0.25 cfs would be released in place of the 1 cfs. A flow of 1 cfs below Newell Creek Dam exceeds unimpaired flows at certain times. Loch Lomond storage levels that would result in the 0.25 cfs exception minimum bypass flow are provided in Table 3-5g. Instream flow requirements for Newell Creek below Newell Creek Dam are described below and summarized in Table 3-5g.

The City would provide the following minimum bypass flows to Newell Creek downstream of Newell Creek Dam for steelhead:

- For rearing juvenile steelhead, 1.0 cfs, unless storage in Loch Lomond Reservoir is insufficient and triggers the exception minimum as detailed in Table 3-5g.

The point of compliance for minimum bypass flows is the City-maintained stream gage in Newell Creek immediately downstream of Newell Creek Dam.

Table 3-5g. Agreed Flows for the Newell Creek Dam, as Measured at the City Gage immediately downstream of Newell Creek Dam

Month	Exception Minimum (cfs)[1]	Base Flow (cfs)				
		Hydrologic Condition 5 (driest)	*Hydrologic Condition 4 (dry)*	*Hydrologic Condition 3 (normal)*	*Hydrologic Condition 2 (wet)*	*Hydrologic Condition 1 (very wet)*
Jan	0.25	1.0	1.0	1.0	1.0	1.0
Feb	0.25	1.0	1.0	1.0	1.0	1.0
Mar	0.25	1.0	1.0	1.0	1.0	1.0
Apr	0.25	1.0	1.0	1.0	1.0	1.0
May	0.25	1.0	1.0	1.0	1.0	1.0
Jun	0.25	1.0	1.0	1.0	1.0	1.0
Jul	0.25	1.0	1.0	1.0	1.0	1.0
Aug	0.25	1.0	1.0	1.0	1.0	1.0
Sep	0.25	1.0	1.0	1.0	1.0	1.0
Oct	0.25	1.0	1.0	1.0	1.0	1.0
Nov	0.25	1.0	1.0	1.0	1.0	1.0
Dec	0.25	1.0	1.0	1.0	1.0	1.0

Notes: cfs = cubic feet per second.

[1] Exception minimum flows are triggered and would supersede base flow requirements when storage in Loch Lomond Reservoir falls below the following level: 2000 million gallons (mg) during January through June, 1800 mg during July, 1500 mg during August through November, or 1700 mg during December.

Improvements Associated with Agreed Flows

Additionally, the City is committed to enhancing fish screening at the Tait Diversion, and fish passage and screening at the Felton Diversion consistent with anticipated issuance of incidental take permits for steelhead and coho in association with the ASHCP from NMFS and either an Incidental Take Permit or Consistency Determination from CDFW. In this EIR, the upgrades to these facilities are considered programmatic components of the Proposed Project. A description of these activities is provided in Section 3.4.3, Water Supply Augmentation. See Section 4.0, Introduction to Analyses, for a discussion of other City projects considered in the cumulative analysis that would also enhance fishing screening and/or fish passage.

Comparison of Agreed Flows to Interim Bypass Flows

The major differences between the Agreed Flows and the interim bypass flows contained in the 2018 agreement with CDFW are described in detail in Appendix C. The interim bypass flows also contain a non-flow provision that specifies reservation of 650 gallons per minute (gpm) from the North Coast sources for local (North Coast) demand. Under conditions when bypass flow and North Coast demand requirements cannot be met, the City coordinates with North Coast customers to optimize predictability of use and potential for achieving goals, and consults with CDFW on reassessing conservation priorities in the context of water supply reliability. This provision is not included in the Agreed Flows and would not be part of the Proposed Project.

3.4.3 Water Supply Augmentation

3.4.3.1 Aquifer Storage and Recovery Facilities

As indicated in Section 3.2.1, Water Supply Planning Background, the City's Water Supply Augmentation Strategy includes active recharge of regional aquifers referred to as aquifer storage and recovery or ASR. ASR involves using existing infrastructure and potential new infrastructure to inject surface water, treated to drinking water standards, and to store this water during normal or wet periods in local groundwater basins, which would act as underground storage reservoirs. This stored water can then be available for use by the City in dry periods via extraction.

The Proposed Project includes the City installing and operating ASR facilities within the Santa Cruz Mid-County Groundwater Basin inside or outside the areas served by the City, and in the Santa Margarita Groundwater Basin outside the areas served by the City. ASR would include new ASR facilities at unidentified locations (referred to as "new ASR facilities" in this EIR) and Beltz ASR facilities at the existing Beltz well facilities (referred to as "Beltz ASR facilities" in this EIR). Overall, ASR is a programmatic component of the Proposed Project; however, as a subcomponent of ASR, Beltz ASR facilities is a project component of the Proposed Project.

To the extent ASR facilities and operations would occur outside of the City's existing water-right place of use, they would be enabled by the Proposed Project's expansion of the POU of the City's appropriative water rights. As described in Section 3.4.2, Water Rights Modifications, the Proposed Project includes the addition of underground storage supplements to the City's post-1914 appropriative permits and licenses only for the Beltz ASR facilities because those are the only proposed ASR facilities whose locations and proposed capacities are currently known. While additional underground storage supplements to those permits and licenses would have to be submitted to and approved by the SWRCB to implement other ASR facilities, the Proposed Project could ultimately result in the possible installation of ASR facilities in both groundwater basins to allow for injection of treated water from the City's GHWTP and possible subsequent extraction.

The total ASR capacity is intended to provide sufficient capacity to address the City's agreed-upon worst-year water supply gap of 1.2 billion gallons per year during modeled worst-year conditions identified during the WSAC planning process, described in Section 3.2.1, Water Supply Planning Background. ASR would have a total proposed injection infrastructure capacity of 4.5 mgd and a proposed extraction infrastructure capacity of 8.0 mgd, to meet this worst-year gap of 1.2 billion gallons per year. The injection infrastructure sizing is smaller than the extraction infrastructure sizing because, generally, diverted surface water could be injected for groundwater storage over multiple years to be available for extraction over a shorter timeframe during drought or dry periods. Based on water supply modeling, it is estimated that with this infrastructure capacity, an average of approximately 233 mgy, with a maximum of up to approximately 702 mgy, of treated surface water could be injected into the groundwater basin(s), and an average of approximately 176 mgy, with a maximum of approximately 1,064 mgy, of injected water could be extracted. To contribute to groundwater sustainability of the Santa Cruz Mid-County Groundwater Basin and the Santa Margarita Groundwater Basin, estimated annual operations show that long-term average extraction volumes would be lower than long-term average injection volumes. However, maximum annual extraction volumes could exceed injection volumes during drought or dry periods when more water supply is needed to meet City demands. Table 3-6 summarizes the ASR programmatic component of the Proposed Project and provides a conservative worst-case estimate of the proposed capacity and operational volumes for ASR.

As a subcomponent of ASR, Beltz ASR would provide only a portion of the total ASR capacity and operations, as shown in Table 3-6. The remainder of the total capacity and estimated annual operations would be provided at new ASR facilities. Further planning and analysis are required to determine locations for any potential new ASR facilities. Actual capacity and operational characteristics for new ASR facilities and Beltz ASR facilities would be based on completion of ASR pilot programs, design-level groundwater modeling, and the ASR design process. Additionally, it is possible that these processes could lead to some modification of the proposed facilities described in the following subsections and could potentially lead to the need for additional environmental analysis. See Chapter 2, Introduction, for information about additional environmental documentation that may be required.

Table 3-6. Proposed Aquifer Storage and Recovery Capacity and Estimated Operation

	Proposed Capacity (mgd)		Estimated Operation (mgy)			
	Injection	*Extraction*	*Average*		*Maximum*	
			Injection	*Extraction*	*Injection*	*Extraction*
Total Aquifer Storage and Recovery (ASR)	4.5	8.0	233	176	702	1,064
New ASR Facilities at Unidentified Locations	TBD	TBD	TBD	TBD	TBD	TBD
Beltz ASR Facilities at Existing Beltz Well Facilities	2.10	2.17[1]	188	137	358	315

Source: Gary Fiske and Associates 2021a, 2021c.
Notes: mgd = million gallons per day; mgy = million gallons per year; TBD = to be determined.
[1] Based on the physical limitations of the Beltz well facilities, the maximum extraction capacity at Beltz 8, 9, 10, and 12 is 3.27 mgd. Given that the existing groundwater system at these facilities extracts 1.1 mgd, 2.17 mgd of the total capacity is available for the proposed ASR facilities at these Beltz facilities.

Standard operational practices for ASR facilities described in Section 3.4.5, Standard Operational and Construction Practices, would be implemented during development and operation of ASR facilities. Operation of ASR facilities would be consistent with applicable adopted existing or future GSPs and could contribute to groundwater sustainability of the Santa Cruz Mid-County Groundwater Basin and the Santa Margarita Groundwater Basin, depending on the facilities' locations. Contribution to groundwater sustainability of the Santa Cruz Mid-County Groundwater Basin would also contribute to the protection of groundwater quality from seawater intrusion per the Santa Cruz Mid-County GSP in support of the proposed water quality beneficial use identified in Section 3.4.2, Water Rights Modifications.

Components of new ASR facilities and Beltz ASR facilities along with likely construction, operation, and maintenance characteristics for each are provided below.

New Aquifer Storage and Recovery Facilities

New ASR facilities could be located in the Santa Cruz Mid-County and/or the Santa Margarita Groundwater Basins and would likely consist of the following components: (1) a pump control and chemical storage building; (2) a treatment system; (3) backwash tank(s) used in the treatment system; (4) a water well and monitoring wells, submersible pump and concrete pedestal, station piping including treated water pipelines, sewer connections, and stormwater drainage facilities that would connect to nearby facilities in adjacent roadways. Additionally, new ASR facilities would include security fencing and security lighting that would be limited to low-wattage, shielded outdoor lighting, directed onto the site. A typical facility would require a site approximately 0.25 acres in size. Up to four new

ASR facilities and associated sites are anticipated and could be located in the Santa Cruz Mid-County and the Santa Margarita Groundwater Basins.

New ASR Facility Construction Characteristics

Construction of each new ASR facility in the Santa Cruz Mid-County and the Santa Margarita Groundwater Basins would likely occur over a 12- to 18-month period. See Section 3.4.6, Estimated Construction Schedule, for the estimated construction schedule for all infrastructure components. Equipment to be used to perform the work would likely include an excavator or backhoe, a truck to off-haul trench spoils and borehole cuttings and to deliver new backfill and well construction material, support trucks for tools and equipment, a rotary drill rig, support truck with water tank, a vacuum trailer or truck for fluid removal, and a logging van/truck to send geophysical logging tools down the borehole. It is expected that a four-person crew would perform the work. Construction activities would typically occur between 8:00 a.m. and 5:30 p.m. on weekdays. However, during the drilling of new production wells, activities would include continuous 24-hour construction over an approximately 3-month period to avoid the risk of the borehole walls collapsing before the wells are fully constructed. Besides drilling and building of the wells themselves, no other construction-related activities would occur on weekends or holidays, or at night.

Drill fluid would be contained and removed as necessary during the course of the work and disposed of at a facility licensed to handle non-toxic and non-hazardous liquid waste using a qualified vacuum truck. There would be no discharge of well installation materials or fluids generated during construction of the monitoring well into any storm drain. Disposal of non-dewatered construction waste would likely occur at the Monterey Regional Waste Management District Facility in Marina, California. Disposal of dry construction waste would likely occur at the County of Santa Cruz Buena Vista Landfill or the City's Dimeo Lane Landfill/Resource Recovery Facility.

New ASR Operations and Maintenance Characteristics

For new ASR facilities, injection operations would typically take place during the winter months, sometime between the beginning of November and the end of April, and extraction operations would typically take place sometime between the beginning of May and the end of October. This manner of operation of ASR is what the City can reasonably foresee at this time and, for that reason, is reflected in the water-system modeling that supports this EIR. It is possible, however, that in dry conditions, the City might seek to extract groundwater generated by prior ASR injections, during the November-April period. To the extent that such extractions are not reflected in the water-system modeling, they nonetheless are discussed qualitatively in this EIR. See Section 3.5, Proposed Project Modeling, for additional information about the modeling conducted for the water supply augmentation components of the Proposed Project.

Backflushing of injection and extraction facilities would also take place and would result in the generation of sludge that would be discharged to a nearby County of Santa Cruz sanitary sewer line. Sewer discharge permits from the County of Santa Cruz would be required for each new ASR facility.

Both during the injection and extraction operations, the facility would run for 24 hours a day, 7 days a week. Routine maintenance would consist of a daily visit by a City or other water department staff person in a small truck to check on the facility operations. During a typical site visit, City staff would collect pressure, water level, and flow rate information to ensure that values for each parameter are within expected ranges for either an injection or extraction cycle. Although not at every site visit, it is expected that staff would periodically collect water quality samples from injected and extracted water to ensure regulatory compliance. Additionally, staff may decide to manually initiate backflushing of injection and extraction facilities based on information collected during their site visit. Backflushing

would involve reversing the flow of water to flush contaminants from the system. Backwash water would be sent to a reclaim tank for solids settling. Some of this water would then be returned to the system as reclaimed water with the rest being discharged through existing on-site connections to the storm sewer, if storm discharge requirements are met, or otherwise to the sanitary sewer.

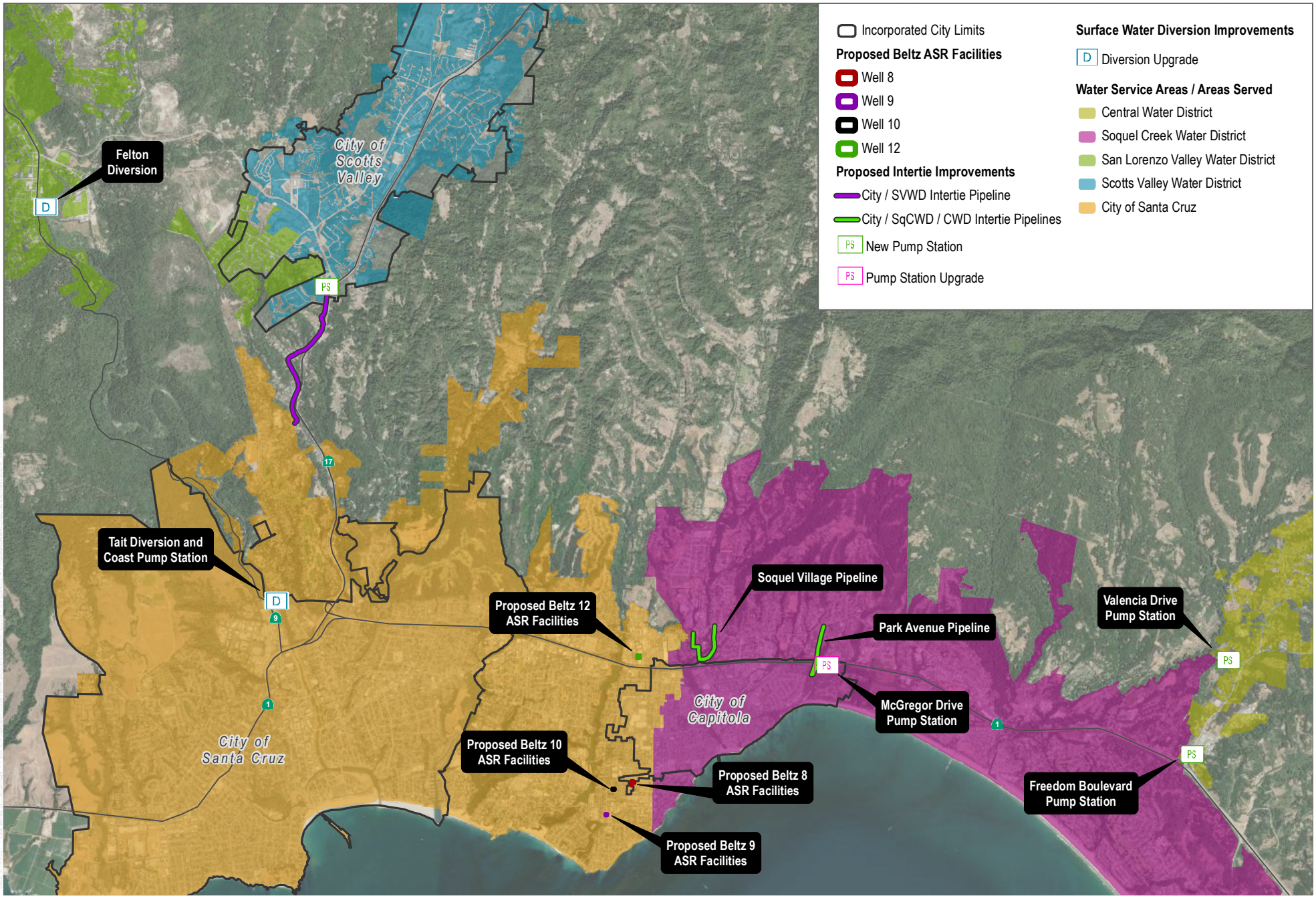
Beltz Aquifer Storage and Recovery

In the Beltz system (see Figure 3-4), this project component would involve injecting surface water, treated to drinking water standards, into the Santa Cruz Mid-County Groundwater Basin, which would act as an underground storage reservoir, consistent with the GSP for this basin (MGA 2019). This project component involves the installation of upgrades to the Beltz system at the existing Beltz 8, 9, 10, and 12 facilities to allow for injection of treated water from the City's GHWTP and subsequent recovery (referred to below as extraction). Proposed improvements at each of the Beltz facilities, along with construction, operations, and maintenance characteristics, are provided below. Figures 3-4a through 3-4d illustrate the project site boundaries and proposed improvements at each of the Beltz sites.

The proposed Beltz ASR system in the Santa Cruz Mid-County Groundwater Basin would retain the existing groundwater extraction capacity of the Beltz system of 1.1 million gallons per day (mgd) subject to seasonal and hydrological constraints. Additionally, the system would be modified to accommodate proposed ASR injection capacity of approximately 2.10 mgd, and proposed ASR extraction capacity of approximately 2.17 mgd[22] (see Table 3-6 above). These capacities are based upon limitations of the existing well infrastructure. The injection infrastructure sizing would be smaller than the extraction infrastructure sizing because, generally, diverted surface water could be injected for groundwater storage over multiple years in order to be available for extraction over a shorter timeframe during drought or dry periods.

Based on water supply modeling, it is estimated that with this system capacity an average of approximately 188 mgy, with a maximum of up to approximately 358 mgy, of treated surface water could be injected and an average of approximately 137 mgy, with a maximum of approximately 315 mgy, of injected water could be extracted from the Beltz ASR component (see Table 3-6). To contribute to groundwater sustainability of the Santa Cruz Mid-County Groundwater Basin per the Santa Cruz Mid-County GSP, estimated annual operations show that average extraction volumes would be lower than injection volumes. However, maximum annual extraction volumes could exceed injection volumes during drought or dry periods when more water supply is needed to meet City demands. Table 3-6 summarizes the Beltz ASR component of the Proposed Project and provides a conservatively high estimate of the proposed capacity and operational volumes for Beltz ASR that is intended to capture all potential environmental effects. As indicated previously, actual capacity and operational characteristics for Beltz ASR would be based on completion of the ASR pilot program underway by the City, design-level groundwater modeling, and the ASR design process.

[22] Based on the physical limitations of the Beltz well facilities the maximum capacity at Beltz 8, 9, 10, and 12 is 3.27 mgd. Given that the existing groundwater system at these facilities pumps 1.1 mgd, 2.17 mgd of the total capacity is available for the proposed ASR facilities at these Beltz facilities.



SOURCE: Bing Maps Accessed 2020, Kennedy/Jenks Consultants 2012 and 2014, URS 2013, County of Santa Cruz 2020

DUDEK

0 3,250 6,500 Feet

FIGURE 3-4

Proposed New and Upgraded Infrastructure Components

Santa Cruz Water Rights Project

Beltz 8 Aquifer Storage and Recovery Facility

Existing Facility

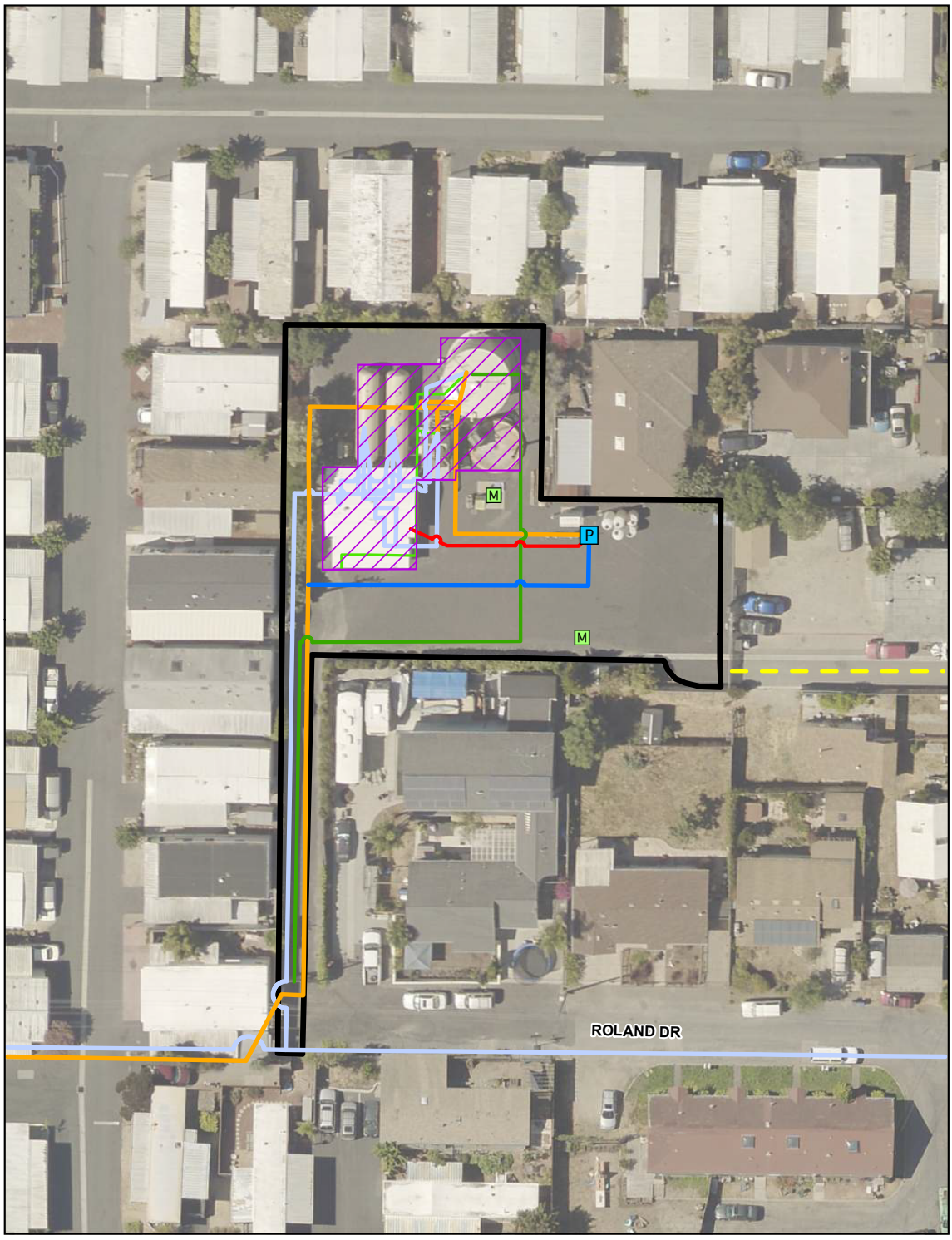
Beltz No. 8 (Beltz 8) and associated treatment facilities are located on City-owned property at 3701 Roland Drive in the unincorporated County of Santa Cruz, California (see Figure 3-4a for location). Components of the existing facility include the following: (1) a pump control and chemical storage buildings; (2) an iron and manganese treatment system consisting of two pressurized dual media filter tanks; (3) one 75,000-gallon backwash tank used in the iron and manganese treatment; and (4) a 210-foot-deep well that has a casing diameter of 14 inches, submersible pump and concrete pedestal, station piping including treated water pipeline, and a sewer connection that connects to other facilities in Roland Drive.

Facility Upgrades

For injection purposes, a new permanent supply pipeline between the well and the existing on-site distribution system piping would be installed. The pipeline would be approximately 120 feet in length and 6 inches in diameter, and would be installed within the existing City-owned property along an already-paved alignment. A new pipeline between the existing tank and the existing storm drain inlet would also be installed and used during the injection process. For maintenance purposes and to maintain well efficiency, during an injection cycle, the well would be back flushed into the existing tank. Decanted and dechlorinated water from the existing tank would be sent to the storm drain system through this new approximately 14-inch storm drain pipeline.

The new approximately 6-inch injection pipeline would have a backflow prevention device and be capable of delivering up to approximately 400 gpm of treated injection water. Modifications to the well head would be made to allow for the installation of multiple 2-inch-diameter stainless steel drop tubes, or a single 3- or 4-inch-diameter drop tube with adjustable flow control valves.

For extraction purposes, the existing submersible pump and motor assembly currently rated at 350 gpm at 155 feet of Total Dynamic Head (TDH) would be removed and replaced with a new submersible pump and motor assembly rated for approximately 800 gpm at approximately 150 feet TDH, which would be capable of extracting approximately 700 gpm. During installation of the new submersible pump, the new injection flow control valves would also be installed inside the well. The control panel for the flow control valves would most likely be installed adjacent to the existing control panel. New piping (approximately two 1-inch-diameter pipes) and electrical conduits (approximately two 1-inch-diameter conduits) would be installed between the well head and the new control panel. In addition, as part of a treatment plant upgrade, a second backwash tank might be installed to handle the additional backwash volumes once all existing Beltz wells (8, 9, 10 and 12) are converted to ASR wells. The existing pump and motors might be upsized to handle additional flows from the wells once all wells are converted to ASR wells. The exact size of individual pumps and motors would not be known until after pilot testing of individual wells. No additional nighttime security lighting would be required. Figure 3-4a illustrates the proposed improvements.



SOURCE: City of Santa Cruz 2021

FIGURE 3-4A

Proposed Beltz 8 ASR Facilities

Santa Cruz Water Rights Project

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Beltz 9 Aquifer Storage and Recovery Facility

Existing Facility

Beltz No. 9 (Beltz 9) is located on City-owned property at 740 30th Avenue, in the unincorporated County of Santa Cruz, California (see Figure 3-4b for location). Components of the existing facility include the following: (1) a pump control cabinet and (2) a 240-foot-deep well that has a casing diameter of 14 inches, submersible pump and concrete pedestal, and well head station piping.

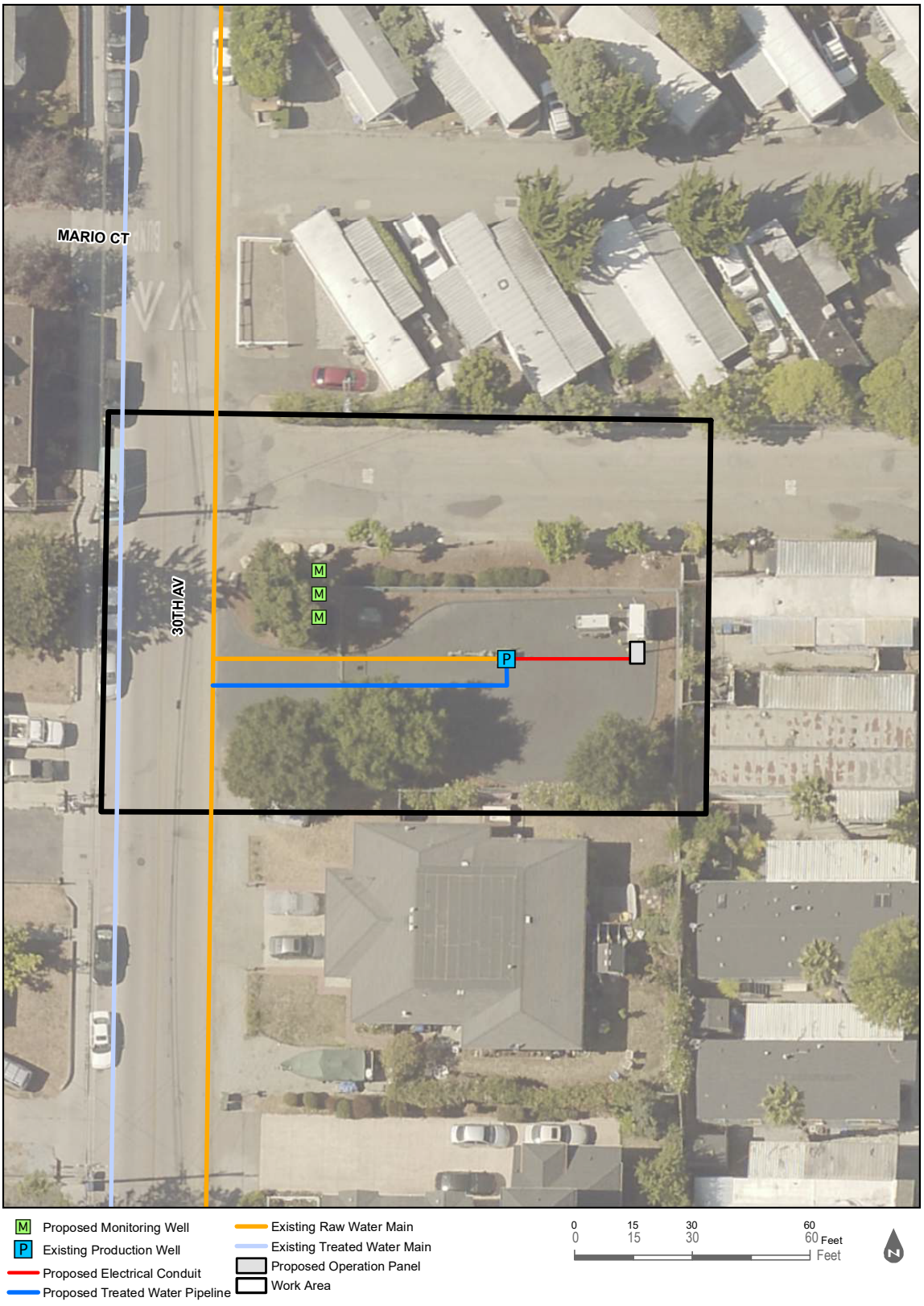
Facility Upgrades

For injection purposes, a new permanent supply pipeline between the well and the existing distribution system piping located on 30th Avenue would be installed. The pipeline would be approximately 120 feet in length and 6 inches in diameter; approximately 60 feet of the pipeline would be installed in paved right-of-way and the remainder would be installed in a paved alignment on City-owned property at the Beltz 9 ASR facility.

The new approximately 6-inch injection pipeline would have a backflow prevention device and be capable of delivering up to approximately 400 gpm of treated injection water. Modifications to the well head would be made to allow for the installation of multiple 2-inch-diameter stainless steel drop tubes, or a single 3- or 4-inch-diameter drop tube with adjustable flow control valves.

For extraction purposes, the existing submersible pump and motor assembly currently rated at 385 gpm at 300 feet TDH would be removed and replaced with a new submersible pump and motor assembly rated for approximately 800 gpm at approximately 300 feet TDH, which would be capable of extracting approximately 700 gpm. During installation of the new submersible pump, the new injection flow control valves would also be installed inside the well. The control panel for the flow control valve would most likely be installed adjacent to the existing control panel. New piping (approximately two 1-inch-diameter pipes) and electrical conduits (approximately two 1-inch-diameter conduits) would be installed between the well head and the new control panel.

At Beltz 9 ASR facility, up to three additional approximately 2-inch-diameter monitoring wells (screened in the A and AA formation of the Purisima Aquifer) could be constructed. The wells would be constructed within the City-owned property in existing pavement or adjacent to the pavement within an existing planter area. No additional nighttime security lighting would be required. Figure 3-4b illustrates the proposed improvements.



SOURCE: City of Santa Cruz 2019

FIGURE 3-4B

Proposed Beltz 9 ASR Facilities

Santa Cruz Water Rights Project

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Beltz 10 Aquifer Storage and Recovery Facility

Existing Facility

Beltz No. 10 (Beltz 10) is located on City-owned property at 977 34th Avenue, in the unincorporated County of Santa Cruz, California (see Figure 3-4c for location). Components of the existing facility include the following: (1) a pump control cabinet and (2) a 240-foot-deep well that has a casing diameter of 14 inches, submersible pump and concrete pedestal, and well head station piping.

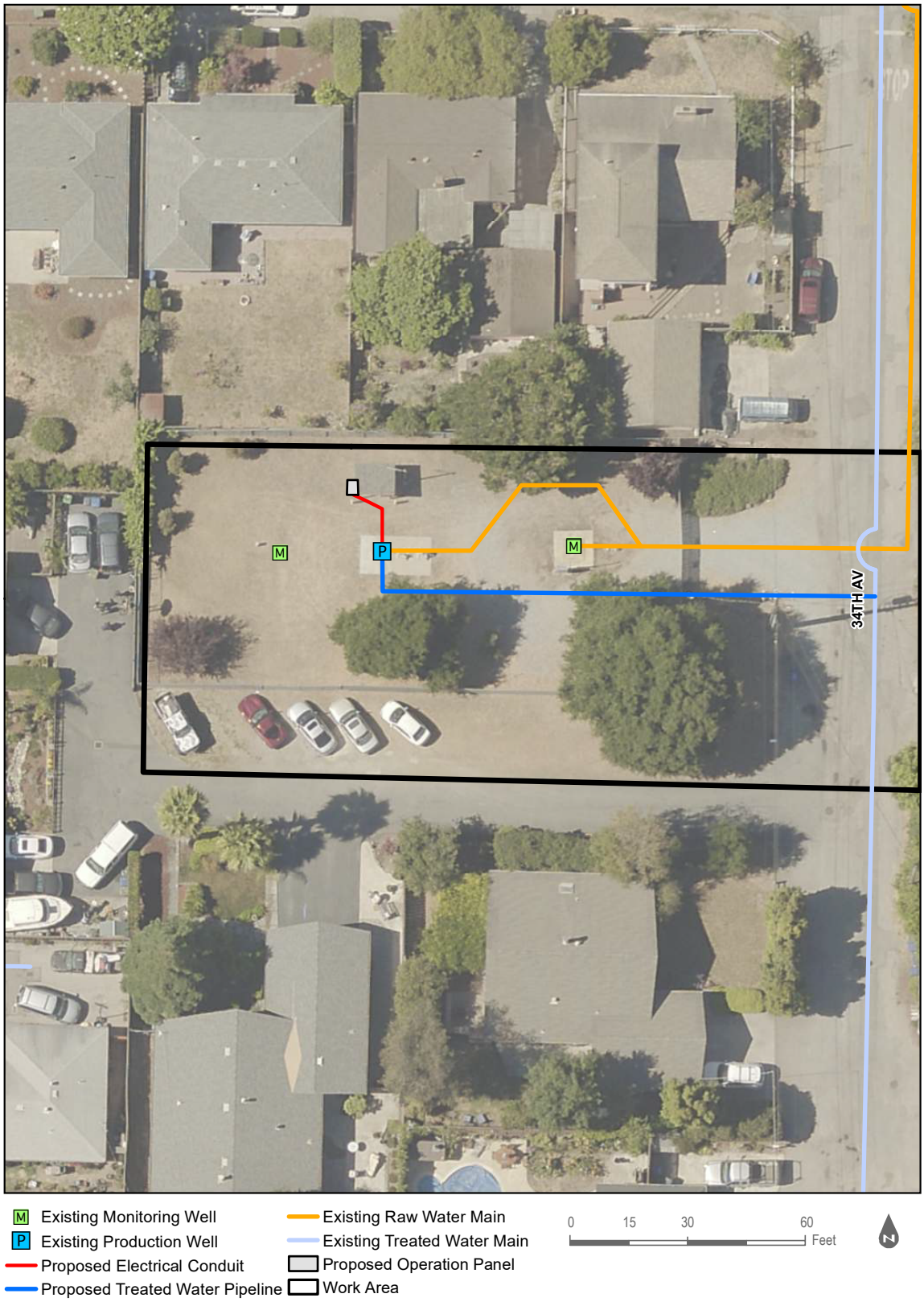
Facility Upgrades

For injection purposes, a new permanent supply pipeline between the well and the existing distribution system piping located on 34th Avenue would be installed. The pipeline would be approximately 140 feet in length and 6 inches in diameter; approximately 30 feet of the pipeline would be installed in paved right-of-way and the remainder would be installed in City property at the Beltz 10 ASR facility under graveled surface.

The new approximately 6-inch injection pipeline would have a backflow prevention device and be capable of delivering up to approximately 400 gpm of treated injection water. Modifications to the well head would be made that would allow for the installation of multiple 2-inch-diameter stainless steel drop tubes, or a single 3- or 4-inch-diameter drop tube with adjustable flow control valves.

For extraction purposes, the existing submersible pump and motor assembly currently rated at 250 gpm at 310 feet TDH would be removed and replaced with a new submersible pump and motor assembly rated for approximately 800 gpm at approximately 310 feet TDH, which would be capable of extracting approximately 700 gpm. During installation of the new submersible pump, the new injection flow control valves would also be installed inside the well. The control panel for the flow control valve would most likely be installed adjacent to the existing control panel. New piping (approximately two 1-inch-diameter pipes) and electrical conduits (approximately two 1-inch-diameter conduits) would be installed between the well head and the new control panel.

No additional monitoring wells would be constructed, as there is an existing monitoring well approximately 50 feet from Beltz 10 ASR facility from which adequate monitoring data can be obtained. Additionally, no additional nighttime security lighting would be required. Figure 3-4c illustrates the proposed improvements.



SOURCE: City of Santa Cruz 2021

FIGURE 3-4C

Proposed Beltz 10 ASR Facilities

Santa Cruz Water Rights Project

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Beltz 12 Aquifer Storage and Recovery Facility

Existing Facility

Beltz No. 12 (Beltz 12) and associated treatment facilities are located on City-owned property at 2750 Research Park Drive, in Soquel, California (see Figure 3-4d for location). Components of the existing facility include the following: (1) a pump control and chemical storage building; (2) an iron and manganese treatment system consisting of a pressurized filter tank with various media inside; (3) two backwash tanks used in the iron and manganese treatment that each have a capacity of 35,000 gallons; and (4) a 640-foot-deep well that has a casing diameter of 16 inches, submersible pump and concrete pedestal, station piping including treated water pipeline, sewer connections, and stormwater drainage facilities that connect to other facilities in Research Park Drive.

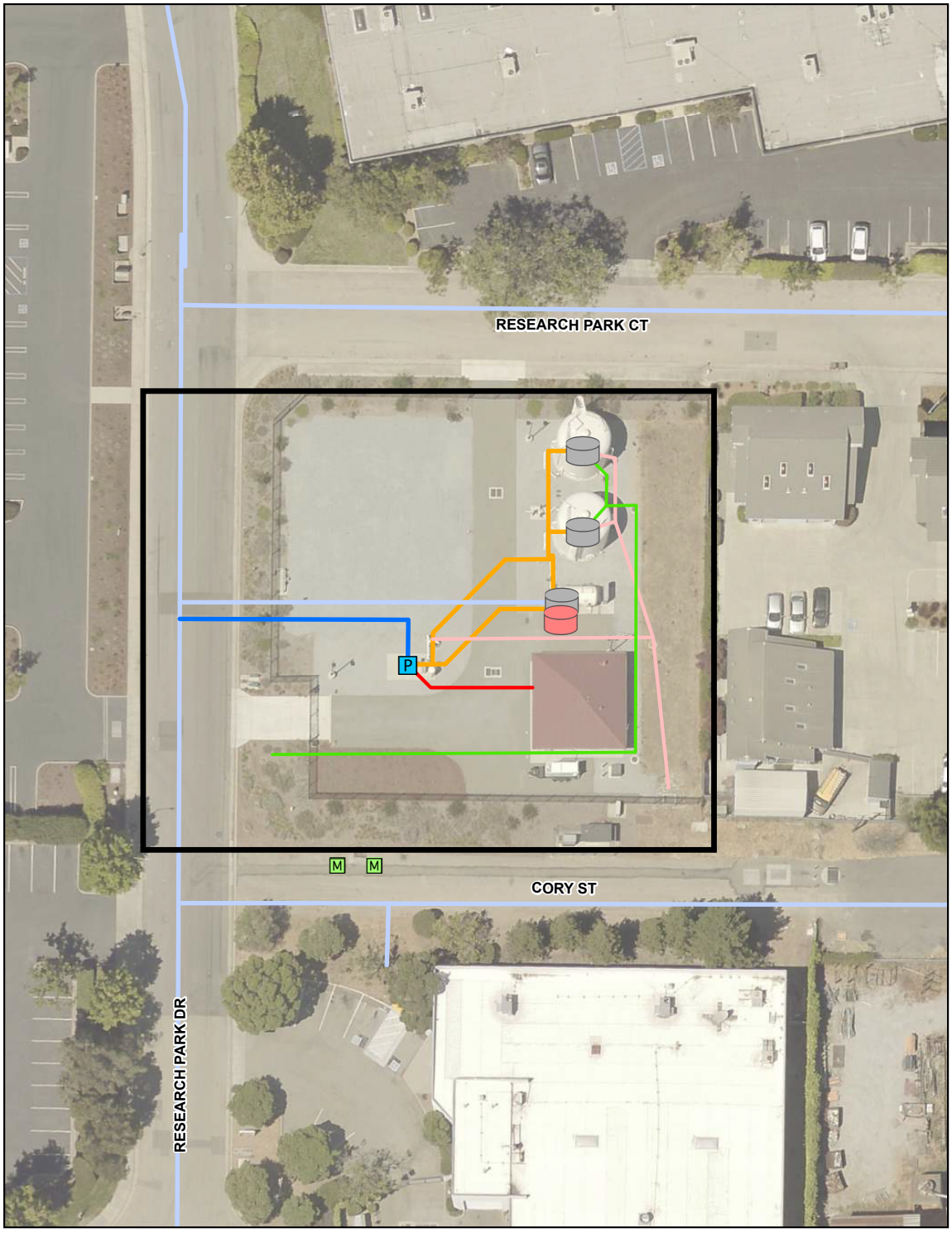
Facility Upgrades

For injection purposes, a new permanent supply pipeline between the well and the existing distribution system on Research Park Drive adjacent to the site would be installed. The pipeline would be approximately 100 feet in length and 6 inches in diameter; approximately 35 feet of the pipeline would be installed in paved right-of-way and the remainder would be installed in unpaved right-of-way and in City-owned property at the Beltz 12 ASR facility.

The new injection pipeline would have a backflow prevention device and be capable of delivering up to approximately 400 gpm of treated injection water delivered from the GHWTP through the City's water distribution system. Modifications to the well head would be made to allow for the installation of multiple 2-inch-diameter stainless steel drop tubes, or a single 3- or 4-inch-diameter drop tube with adjustable flow control valves.

For extraction purposes, the existing submersible pump and motor assembly at Beltz 12 currently rated at 400 gpm at 500 feet TDH would be removed and replaced with a new submersible pump and motor assembly rated for approximately 800 gpm at approximately 500 feet of TDH, which would be capable of extracting approximately 700 gpm. During installation of the new submersible pump, the new injection flow control valves would also be installed inside the well. The control panel for the flow control valve would most likely be installed inside the existing control building. New piping (approximately two 1-inch-diameter pipes) and electrical conduits (approximately two 1-inch-diameter conduits) would be installed between the well head and the existing control building. In addition, a second pressurized media filter tank used in the iron and manganese treatment system may be installed if needed to handle the additional flow delivered from the well. No new backwash pipelines would be installed, but modification to the existing backwash piping would be made to facilitate flushing into and draining of the existing backwash tanks.

No additional monitoring wells would be constructed as there is an existing monitoring well approximately 70 feet from Beltz 12 from which adequate monitoring data can be obtained. Additionally, no additional nighttime security lighting would be required. Figure 3-4d illustrates the proposed improvements.



SOURCE: City of Santa Cruz 2021

FIGURE 3-4D

Proposed Beltz 12 ASR Facilities

Santa Cruz Water Rights Project

DUDEK

Beltz ASR Construction Characteristics

Beltz 8, 9, 10, and 12 ASR Equipment and Schedule

Construction of the proposed upgrades at each of the Beltz 8, 9, 10, and 12 ASR facility sites would occur over a 1- to 3-month period. If constructed sequentially, construction for all sites would occur within about a 1-year timeframe. See Section 3.4.6, Estimated Construction Schedule, for the estimated construction schedule for all infrastructure components. Figures 3-4a through 3-4d illustrate the worst-case area of disturbance associated with construction at each facility, including temporary staging of materials and equipment. Equipment to be used to perform the work would include an excavator or backhoe, a truck to off-haul trench spoils and borehole cuttings (Beltz 9 ASR facility site only) and deliver new backfill material and well construction material (Beltz 9 ASR facility only), support trucks for tools and equipment, and a drill rig. Additional equipment for the monitoring well construction at the Beltz 9 ASR facility would include a support truck with water tank, a vacuum trailer or truck for fluid removal, and a logging van/truck to send geophysical logging tools down the borehole. It is expected that a four-person crew would perform the work at each site. Disposal of dry construction waste would likely occur at the County of Santa Cruz Buena Vista Landfill or the City's Dimeo Lane Landfill/Resource Recovery Facility. Disposal of non-dewatered construction waste such as drilling and well development fluids, would likely occur at the Monterey Regional Waste Management District Facility in Marina, California. Except under special circumstances, construction activities would occur between 8:00 a.m. and 5:30 p.m. on weekdays. No construction-related activities would occur on weekends or holidays, or at night.

Beltz 9 ASR Monitoring Well Construction Process

To construct the monitoring wells, up to three boreholes (9 to 12 inches wide and up to approximately 400 feet deep) would be drilled. The boreholes would be drilled and lithologically and geophysically logged. The wells would be drilled by a contractor licensed in the State of California utilizing a direct circulation mud-rotary drilling method.

During borehole excavation (drilling), drill fluid consisting of bentonite clay slurry and cutting consisting of native clay, silt, sand, and gravel would be contained. Drill cutting generated during the course of the work would ultimately be disposed of properly off site, most likely at the City Landfill on Dimeo Lane or County of Santa Cruz's Buena Vista Landfill. Drilling fluids and well development fluids would be removed as necessary during the course of the work using a qualified vacuum truck service and would likely be disposed of at the Monterey Regional Waste Management District Facility in Marina, a facility licensed to handle non-toxic and non-hazardous liquid waste. There would be no discharge of well installation materials or fluids generated during construction of the monitoring well into any storm drain.

Within each borehole, a single monitoring well would be installed. Each monitoring well would consist of a 2-inch-diameter well casing. The space between the wells and the casing would be filled with gravel pack, bentonite, and a cement sanity seal in accordance with state and County of Santa Cruz standards. Final design and actual construction would be based on the borehole lithological and geophysical logs and actual conditions encountered during drilling of the borehole. Well construction would also include well development whereby the well is cleared of the drilling mud and fluids used during the drilling process. After construction of the monitoring wells, the wells would be secured using locking well caps to prevent tampering and enclosed in flush-mounted traffic-rated vaults.

Beltz ASR Operations and Maintenance Characteristics

For the Beltz ASR system, injection operations would typically be expected to take place during the winter months, sometime between the beginning of November and the end of April, and extraction operations could typically take place sometime between the beginning of May through the end of October. This manner of operation of ASR is what the City can reasonably foresee at this time and, for that reason, is reflected in the water-system modeling that supports this EIR. It is possible, however, that in dry conditions the City might seek to extract groundwater generated by prior ASR injections, during the November-April period. To the extent that such extractions are not reflected in the water-system modeling, they nonetheless are discussed qualitatively in this EIR. See Section 3.5, Proposed Project Modeling, for additional information about the modeling conducted for the water supply augmentation components of the Proposed Project.

Both during the injection and extraction operations, the facilities would run for 24 hours a day, 7 days a week. Noise levels would be consistent with existing levels during ASR operations. Routine maintenance would consist of a daily visit by a City staff person in a small truck to check on the facility operations at each site. During a typical site visit, City staff would collect pressure, water level, and flow rate information to ensure that values for each parameter are within expected ranges for either an injection or extraction cycle. In addition, although not at every site visit, it is also expected that staff would periodically collect water quality samples from injected and extracted water to ensure regulatory compliance. Additional operations and maintenance information is provided below.

Beltz 8 and 12 ASR Facilities

Approximately once a week during injection operations, the wells at Beltz ASR 8 and 12 ASR facilities would be backwashed to remove particulates deposited in the well filter pack. During the extraction, operation of the facility would remain the same as under existing conditions. The filter media would be backwashed daily to remove the accumulated iron and manganese. The backwash would then be piped to the backwash tank where the iron and manganese would settle out from the groundwater. The clear water is recirculated to the wellhead treatment and the remaining sludge, composed of particulate sediment, iron, manganese and other naturally occurring constituents, would be discharged to the County of Santa Cruz sanitary sewer line located immediately adjacent to the Beltz 8 and 12 sites via existing connections as per current operation. Given that backwashing during injection would also be required, as noted above, ASR at Beltz 8 and 12 would result in an increase in the sludge that would be discharged to the County of Santa Cruz sanitary sewer line. However, these operations would continue to occur under the existing sewer discharge permits with the County of Santa Cruz and associated requirements related to flow rate, volume, and quality.

Beltz ASR 9 and 10 ASR Facilities

Approximately once a week during injection operations, the wells at Beltz 9 and 10 ASR facilities would be backwashed to remove particulates deposited in the well filter pack. Backflush water would be pumped from the wells, using the well pump, to the reclaim tank located at the Beltz Groundwater Treatment Plant at the Beltz 8 ASR facility. During the extraction, operation of the Beltz 9 and 10 ASR facilities would remain the same as under existing conditions. Water extracted from these wells would also be sent to the treatment facility located at the Beltz 8 ASR facility.

3.4.3.2 Water Transfers and Exchanges and Intertie Improvements

As indicated in Section 3.2.1, Water Supply Planning Background, the City's Water Supply Augmentation Strategy also includes passive recharge of regional aquifers by transferring treated drinking water to other water districts in the area so they can rest their groundwater wells, help the aquifers recover, and potentially store water for use by the City in dry periods.

Modification of the City's appropriative water rights as proposed would facilitate the opportunity for potential future water transfers and exchanges with neighboring water agencies, including SVWD, SLVWD, SqCWD, and CWD. Such transfers and exchanges would likely be provided for via agreements with defined terms related to timing, volume of water, water year conditions, return of water, etc., that would be developed between the City and one or more of the neighboring agencies. New or improved interties between the water systems of the City and of neighboring water agencies may be needed to facilitate future water transfers and exchanges once City water rights are modified (see Figure 3-4).

Several options have been considered recently to reasonably describe potential future water transfer and exchange conditions. When water is available and conditions of future agreements are met, these transfers include a range of water volumes of approximately 98 mgy to 277 mgy (0.5 to 1.5 mgd from November 1–April 30) transferred by the City to SqCWD and/or CWD via the intertie facilities identified below, with some volume of water potentially returned to the City during dry periods. Additionally, up to approximately 163 mgy (0.9 mgd from November 1–April 30) of water could be transferred by the City to SVWD and/or SLVWD via the intertie facilities identified below, again with some volume of water potentially returned to the City during dry conditions. The amount of water that may be returned through exchanges is unknown at this time. The Santa Cruz Mid-County Groundwater Basin GSP indicates that if water transfers benefit groundwater levels, and are sustainable over time, and the Basin's performance consistently reaches sustainability targets, then the City potentially could recover some of the increase in groundwater in storage as a supplemental supply during dry periods, as described in Section 3.2.1.3, Santa Cruz Mid-County Groundwater Sustainability Plan. As indicated previously, the conditions of such transfers and exchanges would be established in future agreements between the City and one or more of the neighboring water agencies, if such a project or projects are pursued. Standard operational practices for transfers and exchanges described in Section 3.4.5, Standard Operational and Construction Practices, would be implemented during development and operation.

Because no new interties or intertie improvements are currently being planned and designed, the number, specific location, size, and design cannot be specifically known at this time. However, conceptual planning information is available regarding the interconnection of the above systems based on prior planning for the scwd[2] Regional Seawater Desalination Project (URS 2013a); Scotts Valley Multi-Agency Regional Intertie Project (URS 2013b); and Cooperative Water Transfer, Groundwater Recharge, and Resource Management Pilot Project (City of Santa Cruz and SqCWD 2016; City of Santa Cruz 2015) and based on coordination with SqCWD, CWD, SVWD, and SLVWD conducted during the preparation of this EIR. The conceptual plans described below and illustrated in Figures 3-4e through 3-4g, provide an indication of the general location and the length and type of facilities required to interconnect the water systems of the above agencies.

City/SVWD Intertie

The City's water supply system could be interconnected to the SVWD's system through installation of approximately 8,000 linear feet of new 12-inch-diameter intertie piping from Sims Road in the south, along La Madrona Drive to the north to the City of Scotts Valley where a new pump station would be constructed (URS 2013b) (see Figure 3-4e). A generalized location for the pump station is provided in Figure 3-4e, but the precise location, facility footprint, and equipment characteristics and sizing are not known at this time. Given typical pump stations in Santa Cruz County, this pump station is expected to be a single-story building with outdoor paved area surrounded by security fencing. It would also include security lighting that would be limited to low-wattage, shielded outdoor lighting, directed onto the site.

The City could deliver water to SLVWD through the City's potential intertie with SVWD and SVWD's existing interconnection with SLVWD. Interconnection of the SVWD and the SLVWD systems has already been constructed and permitted for emergency use, as part of the Scotts Valley Multi-Agency Regional Intertie Project. Additional permitting would be required to use the existing intertie for non-emergency use such as could be pursued as part of a potential future water supply transfer and exchange project.

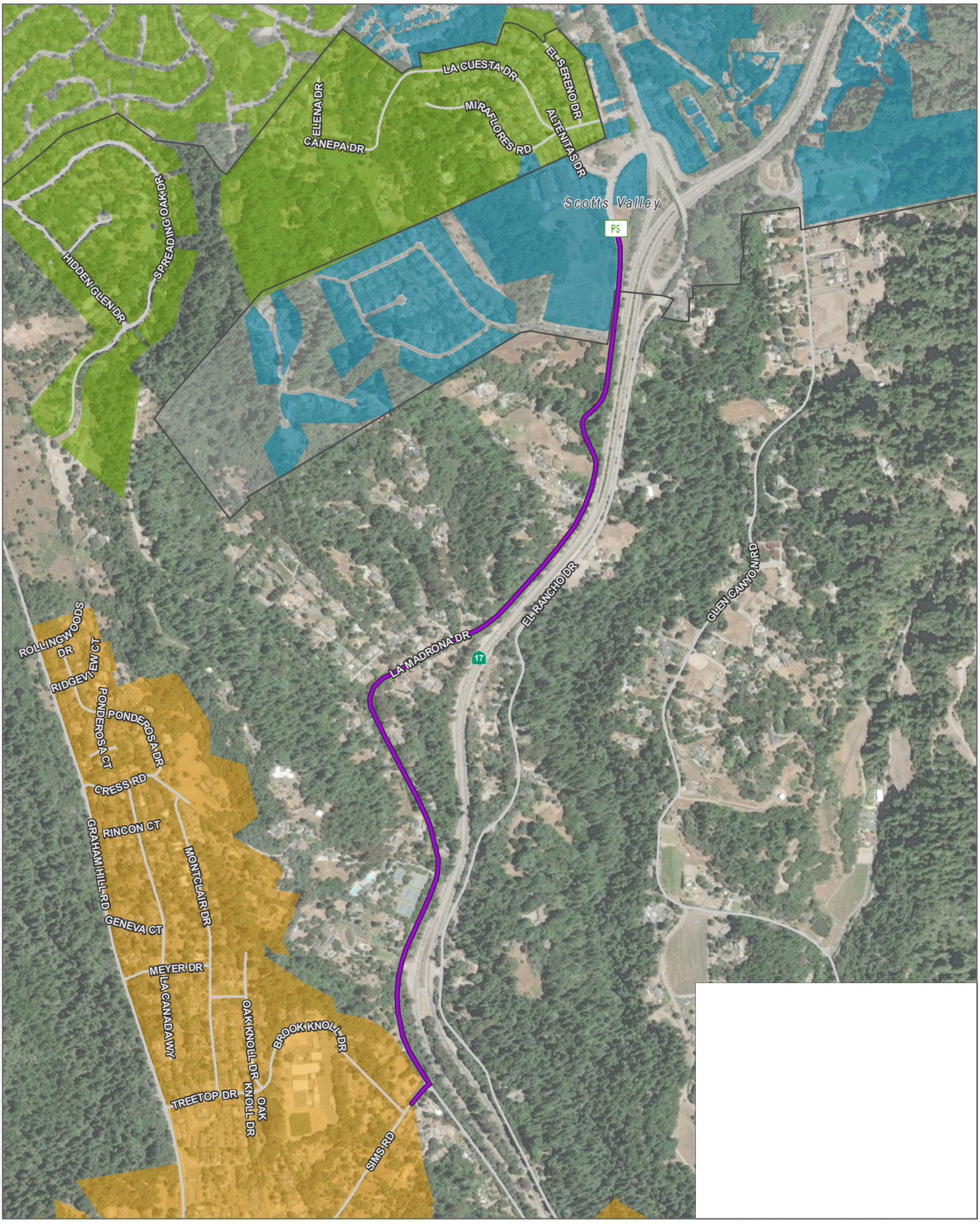
It is possible that other alignments to connect the City's system to SVWD and/or SLVWD could be considered in the future. A range of alternative pipeline alignments and pump station locations would likely be considered if and when an intertie project is pursued, planned, and designed. Depending upon the ultimate alignment and project selected, additional environmental review under CEQA may be required.

City/SqCWD/CWD Intertie

As described in the Cooperative Water Transfer, Groundwater Recharge, and Resource Management Pilot Project Initial Study/Negative Declaration, the existing interties between the City's water system and the SqCWD's water system have capacity for 1.5 mgd during normal operations (City of Santa Cruz 2015). However, additional pipeline replacements, referred to as the Soquel Village pipeline and Park Avenue pipeline in this EIR, and an upgrade to SqCWD's McGregor Drive pump station would likely be needed to more efficiently move water through its service area (see Figure 3-4f). The McGregor Drive pump station upgrade would involve replacing two 25-horsepower (HP) pumps with two 50-HP pumps. All piping and electrical is already appropriately sized and would not require upgrading. No other improvements would be required at the existing McGregor Drive pump station.

According to SqCWD staff, SqCWD has two interties with the CWD, one on Huntington Drive near Valencia Road and one on Soquel Drive near Freedom Boulevard. Currently, CWD can move water to SqCWD, but SqCWD cannot move water to CWD due to the hydraulics in the water distribution systems for both districts (Dufour, pers. comm. 2019). New booster pump stations on these two interties would be required to allow SqCWD to move water to CWD (see Figure 3-4g). These booster pump stations are referred to as the Freedom Boulevard pump station and the Valencia Road pump station in this EIR. Generalized locations for these pump stations are provided in Figure 3-4g, but precise locations, facility footprints, and equipment characteristics and sizing are not known at this time. Given typical pump stations in Santa Cruz County, these pump stations are expected to be single-story buildings with outdoor paved areas surrounded by security fencing. They would also include security lighting that would be limited to low-wattage, shielded outdoor lighting, directed onto the site.

Potential pump station locations would likely be considered if and when such pump stations are pursued, planned, and designed. Depending upon the ultimate site or sites selected, additional environmental review under CEQA may be required.



SOURCE: Bing Maps Accessed 2019, Kennedy/Jenks Consultants 2012 and 2014, URS 2013, County of Santa Cruz 2020

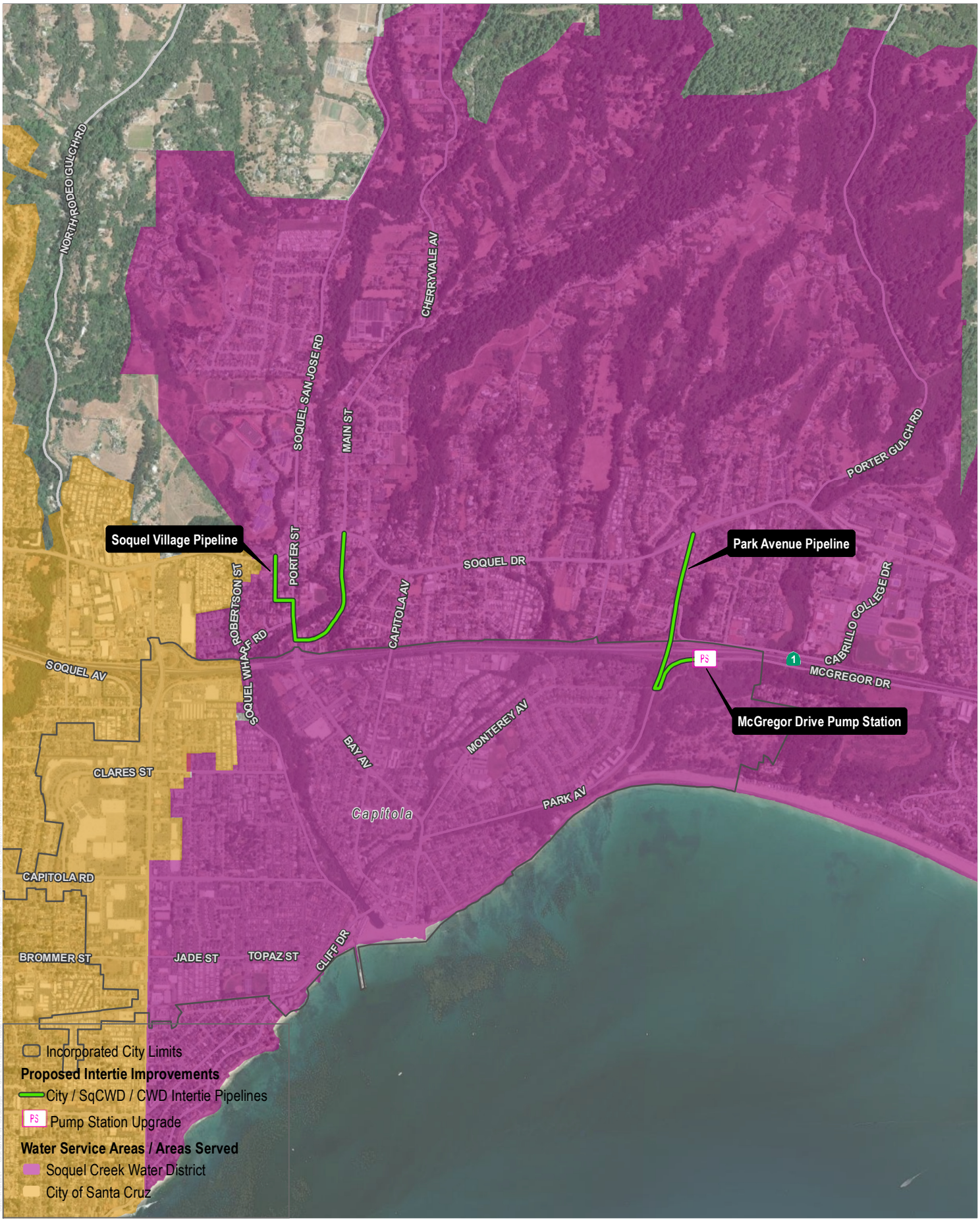
DUDEK

0 500 1,000 Feet

FIGURE 3-4E

City of Santa Cruz and Scotts Valley Water District Intertie

Santa Cruz Water Rights Project



SOURCE: Bing Maps Accessed 2019, Kennedy/Jenks Consultants 2012 and 2014, URS 2013, County of Santa Cruz 2020

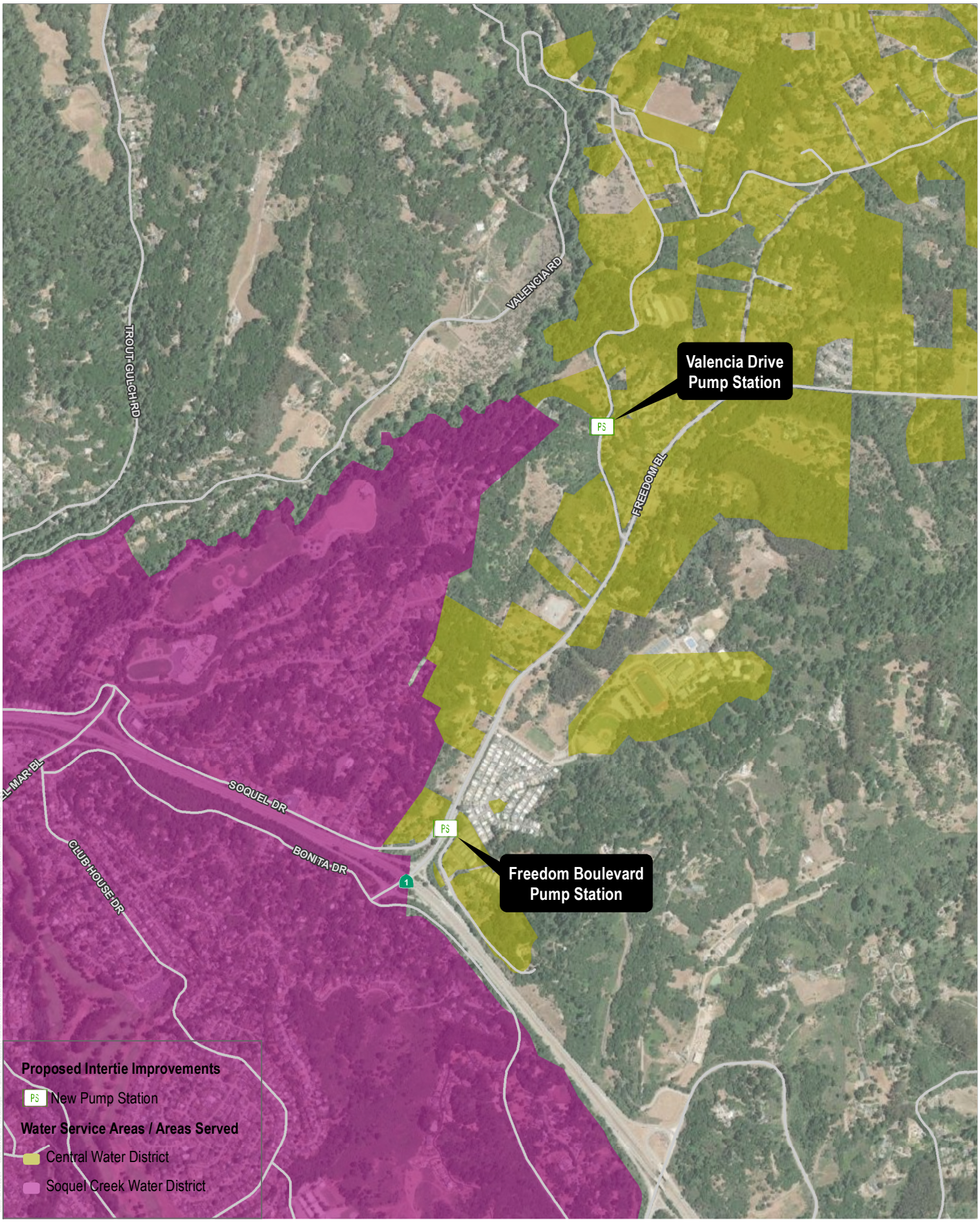
DUDEK

0 1,000 2,000 Feet

FIGURE 3-4F

City of Santa Cruz and Soquel Creek Water District Intertie Improvements

Santa Cruz Water Rights Project



SOURCE: Bing Maps Accessed 2019, Kennedy/Jenks Consultants 2012 and 2014, URS 2013, County of Santa Cruz 2020

DUDEK

0 750 1,500 Feet

FIGURE 3-4G

Soquel Creek Water District and Central Water District Intertie Improvements

Santa Cruz Water Rights Project

3.4.4 Surface Water Diversion Improvements

3.4.4.1 Felton Diversion Fish Passage Improvements

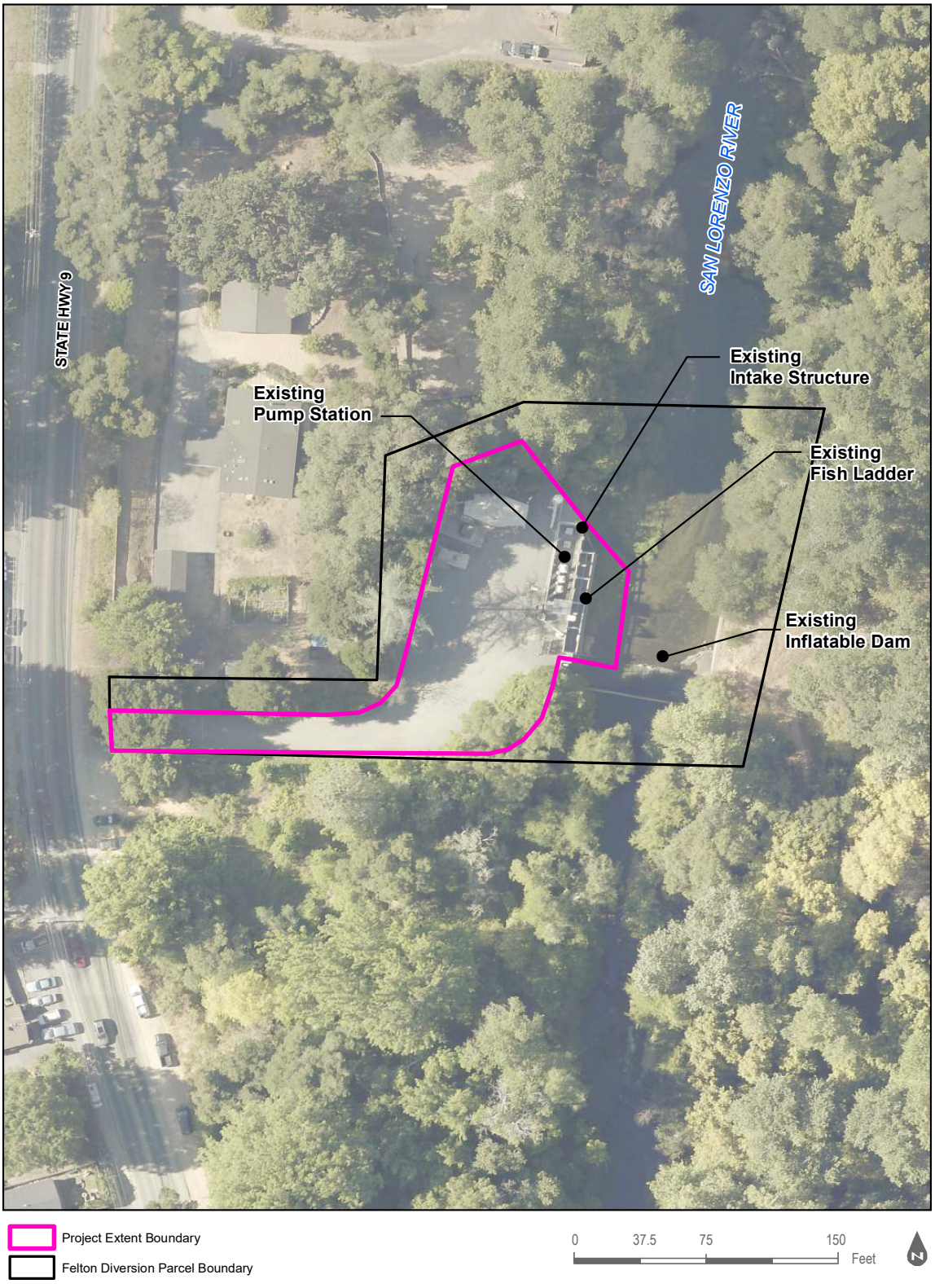
The Felton Diversion is a surface water diversion/intake on the San Lorenzo River that pumps raw water from the river to the City's Loch Lomond Reservoir (see Figure 3-4h). The Felton Diversion was constructed in 1976 and, in general, consists of an inflatable rubber dam, a fish-screened intake structure, a conventional sump and high-lift pump station, a slide-gated bypass channel, a Denil-style fish ladder, an operations building, and miscellaneous site improvements. With the dam fully inflated, a portion of river flow is bypassed through the existing Denil fish ladder and the bypass channel, depending on slide gate position. The bypass channel is adjacent to the intake structure, and both structures share a common wall. The fish ladder shares a common wall with the bypass channel and is located on the streamside of the structure. The fishway consists of several 4-foot-wide fabricated metal chute modules featuring incrementally spaced baffles of standard configuration. The Felton Diversion was constructed based on the best fish passage design information available at the time. Since that time, fish screening criteria and fishway design guidelines have been published by the CDFW and NMFS.

Proposed fish passage improvements at the Felton Diversion would provide for compliance with current fish passage and screening requirements. Minor modifications to the existing Felton Diversion are needed to comply with the latest fish passage and screening criteria (Wood Rodgers 2006). The modifications would be designed to support use of City water rights while improving passage for coho and steelhead. These improvements may include fish screen replacement, installation of a traveling brush system to keep the fish screens operating at optimum efficiency, and construction of a continuous downstream outmigration bypass route within the existing bypass channel with downstream opening slide gate. These improvements would be constructed on the west side of the Felton Diversion entirely within the existing concrete diversion facility structure. These improvements would not require any construction activities or disturbance in the river bed. The existing concrete bypass channel and fish ladder would be dewatered, if needed, and closed during construction. Dewatering would be accomplished through the hand placement of sandbags on either side of the concrete bypass channel. Once construction is completed, any construction debris would be removed from the bypass channel and fish ladder prior to reopening them. Figure 3-4h shows the worst-case area of disturbance associated with construction of the Felton Diversion improvements. See Section 3.4.5, Standard Operational and Construction Practices, for standard construction practices that would be implemented with this programmatic component.

3.4.4.2 Tait Diversion and Coast Pump Station Improvements

The Tait Diversion is located on a fairly straight, low-gradient section of the San Lorenzo River approximately 2.4 miles upstream of the mouth of the river, and is one of the City's critical water supply sources, supplying up to 12.2 cfs to its overall water supply via the adjacent Coast Pump Station facility (see Figure 3-4i). The original Tait Diversion was constructed in 1961; it was modified in 1983 with a fish screen that met California Department of Fish and Game[23] and NMFS regulatory design criteria at that time. The City's Coast Pump Station facility has evolved over time and currently includes two pump stations, the Coast Pumps and the River Pumps, which pump raw water from City's North Coast sources and the San Lorenzo River, respectively, to City's GHWTP, approximately 1 mile to the north. Over the last several decades, the San Lorenzo River has experienced periods of channel erosion and sedimentation that have changed the morphology of the River at the Tait Diversion. While storm events have caused pitting and abrasion to the Tait Diversion, the overall stability of the Tait Diversion structure is good for the age of the structure. The risk of structural damage during high streamflows is low due to the prior performance during historic flood events and current structural condition.

[23] The former Department of Fish and Game was renamed the Department of Fish and Wildlife in 2013.



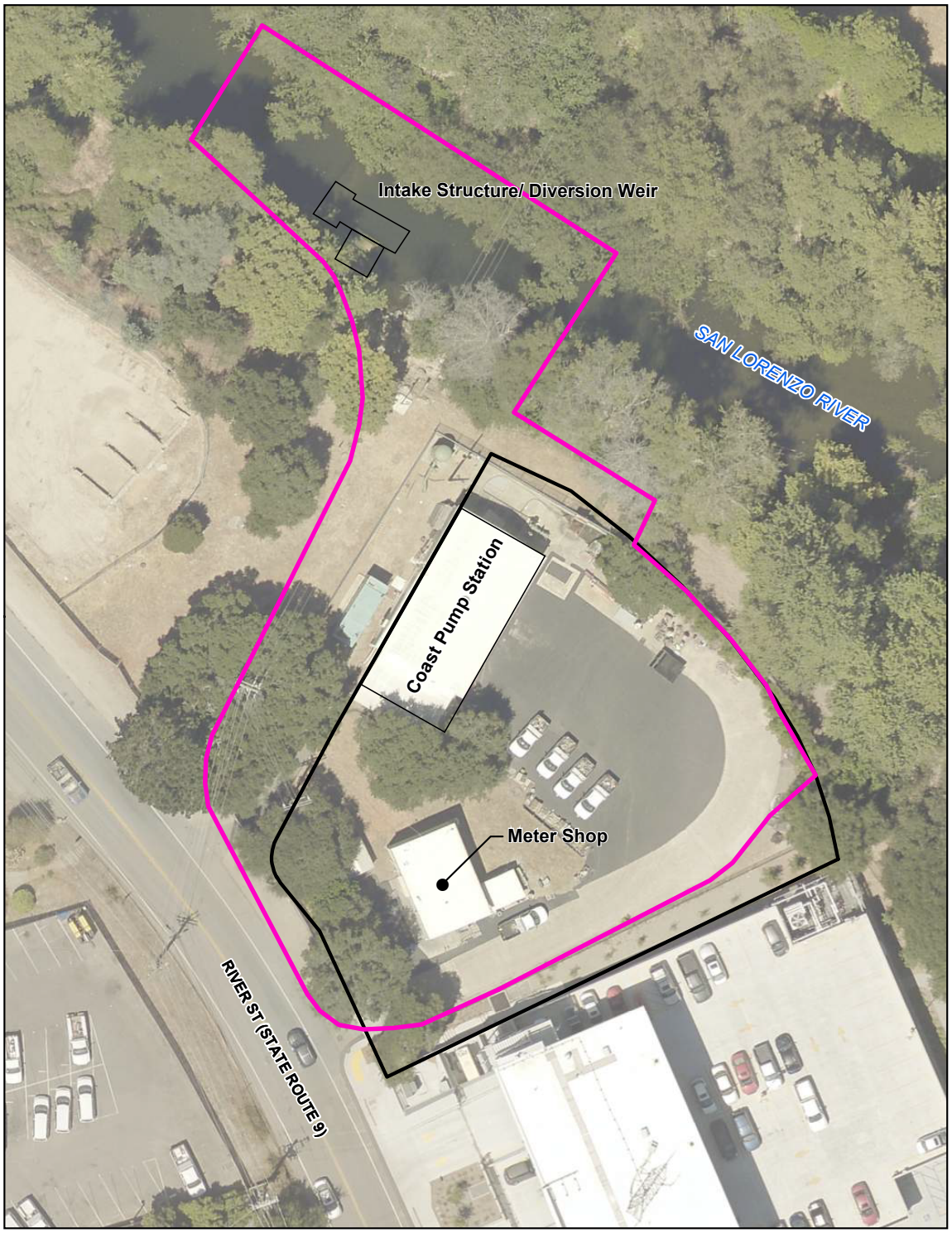
SOURCE: City of Santa Cruz 2019

FIGURE 3-4H

Felton Diversion Fish Passage Improvements Site

Santa Cruz Water Rights Project

DUDEK


Intake Structure/ Diversion Weir
SAN LORENZO RIVER
Coast Pump Station
Meter Shop
RIVER ST (STATE ROUTE 9)
Project Extent Boundary
Coast Pump Station Parcel Boundary
0 25 50 100 Feet
0 25 50 100 Feet
N

Proposed improvements at the Tait Diversion would provide for compliance with current fish screening requirements. The City is in the process of evaluating improvements at the Tait Diversion and Coast Pump Station facility to ensure future reliability of the water supply and to allow the City to divert water under the existing Felton Diversion water rights at either the Felton Diversion or downstream at the Tait Diversion, as described in Section 3.4.2, Water Rights Modifications, and shown in Tables 3-2 and 3-4. Specifically, the capacity of the Tait intake and pump station would be designed to accommodate up to 28 cfs[24] of surface water flows. Improvements at the Tait Diversion could include, but would not be limited to, (1) a new or modified intake design, (2) upstream and/or downstream hydraulic modifications, (3) improvements to the check dam, and (4) any required fish passage upgrades. Upgrades would be implemented to meet current state and federal fisheries protection criteria. Improvements could include, but would not be limited to, one or more of the following:

- Dam notching incorporating a spillway crest gate and new upstream river intake with flat plate intake screen;
- Conventional vertical slot fish ladder and new upstream river intake housing a gallery of retrievable cylindrical fish screens;
- Incorporation of a Coanda intake screen within the dam and conventional Denil-style fish ladder at the right abutment; and/or
- New upstream river intake with horizontal plate screen and series of low-head stone weirs (natural fishway) downstream of the diversion dam.

The River Pumps at the Coast Pump Station facility would also require improvements, which could include, but would not be limited to, (1) new pumps and motors; (2) primary and backup power upgrades, which could include upgrades to the Pacific Gas & Electric substation; (3) a new or modified concrete wet well; and (4) a solids handling system.

The Tait Diversion improvements would likely require construction activities and disturbance in the river bed. Figure 3-4i shows the worst-case area of disturbance associated with construction of the Tait Diversion and Coast Pump Station Facility Improvements. See Section 3.4.5, Standard Operational and Construction Practices, for standard construction practices that would be implemented with this programmatic component.

3.4.5 Standard Operational and Construction Practices

3.4.5.1 Standard Operational Practices

1. Ramping rates[25] developed during the pending ASHCP process and agreed to by CDFW and NMFS will be implemented at all City diversion facilities as follows:
    - During changes in diversion rates, a ramping rate will be implemented at the Laguna Diversion, Liddell Diversion, Majors Diversion, and Tait Diversion to limit downstream flow reductions below the diversions such that the change in stage is no greater than 0.16 feet per hour when fry may be present (January 15 through May 31) and no greater than 0.3 feet per hour at all other times.
    - During changes in bypass rates downstream of Newell Creek Dam, a ramping rate will be implemented to limit flow reductions in Newell Creek such that the change in stage is no greater than 0.16 feet per hour when fry may be present (January 15 through May 31) and no greater than 0.3 feet per hour at all other times.

[24] Intake and pump station capacity of 28 cfs would provide for the proposed diversion of water at the Tait Diversion under both the Tait Licenses and Felton Permits, accommodating for practical throughput of the diverted water at the GHWTP.

[25] Ramping rates are diversion rates that gradually alter diversions from a stream channel to limit the downstream rate of change to stream stage. Stage is the water level in a stream or river defined in reference to a certain height.

- During inflation and deflation of the dam at Felton Diversion, a ramping rate will be implemented such that during inflation of the dam, downstream stage decreases will be limited to no more than 0.55 feet per hour, and during deflation of the dam, downstream stage increases below the diversion will be limited to no more than 1.68 feet per hour.

2. Operation of the ASR injections and extractions anticipated by the Proposed Project will be consistent with the sustainable management criteria, and will avoid any undesirable results identified in the adopted Santa Cruz Mid-County Groundwater Basin GSP and in any future revisions to the GSP. ASR facilities and associated injections and extractions in the Santa Margarita Groundwater Basin will be planned to be installed and operated after the Santa Margarita Groundwater Basin GSP is prepared, adopted, and submitted to the Department of Water Resources in January 2022. The proposed timing will allow ASR injections and extractions to be consistent with the sustainable management criteria, and avoid any undesirable results identified, in the adopted Santa Margarita Groundwater Basin GSP and in any future revisions to the GSP.
3. ASR facilities will be permitted, constructed, and operated in accordance with the SWRCB Water Quality Order 2012-0010, General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater. This Order provides consistent regulation of ASR projects state-wide; provides a streamlined review and permitting process for ASR projects; and ensures compliance with applicable regulations and policies, including the RWQCB Basin Plans and State Water Board Resolution 68-18 (the Antidegradation Policy). The Order addresses possible elevated concentrations of naturally occurring or anthropogenic constituents in the aquifer, as well as the potential effects of mixing water from different sources, which may cause geochemical reactions in the aquifer that can improve or degrade groundwater quality. The Order requires groundwater monitoring of the injection/extraction wells and monitoring wells to evaluate the potential for groundwater quality changes. In accordance with this Order, a technical report will be required in association with ASR permitting, including a hydrogeologic evaluation (e.g., injected aquifer characteristics) and water quality evaluation (e.g., potential impact to ongoing remediation efforts, mobilization of contaminants). A Monitoring and Reporting Program will be required, including requirements for monitoring of injected water quality, groundwater quality, and groundwater elevation/gradient.
4. Diversions from surface streams to provide water for ASR injections will be limited by the following:
    - No diversions to provide water for ASR injections will occur in months classified as Hydrologic Condition 5 (driest) as defined in the Agreed Flows (Table 3-5a).
5. Diversions by the City from surface streams to support City water transfers and/or exchanges to neighboring agencies will be limited by the following:
    - The City will not divert water from surface streams to transfer to neighboring agencies pursuant to the Proposed Project in months classified as Hydrologic Condition 4 (dry) or Hydrologic Condition 5 (driest) as defined in the Agreed Flows (Table 3-5a).
6. At times when the Loch Lomond Reservoir is spilling during late spring and summer when surface temperatures in the reservoir are warmer and the cooler 1 cfs fish release below the dam (generally between 11°C and 14°C) may not be sufficient to maintain temperatures in Newell Creek below 21°C, which is within the suitable range for steelhead and coho, the City will release additional flow through the fish release to achieve a maximum instantaneous temperature of less than 21°C as measured in the anadromous reach of Newell Creek and verified at the City stream gage in Newell Creek below the dam.

3.4.5.2 Standard Construction Practices

The City has identified standard construction practices, presented in this section that will be implemented by the City or its contractors during construction activities associated with the project and programmatic components, where relevant.

Erosion Control and Air Quality Control

1. Implement erosion control best management practices for all construction activities occurring in or adjacent to jurisdictional aquatic resources (resources subject to permitting under Clean Water Act Section 404, Clean Water Act Section 401, Porter-Cologne Water Quality Act Section 13000 et seq., and/or California Fish and Game Code Section 1600). These measures may include, but are not limited to, (1) installation of silt fences, fiber or straw rolls, and/or bales along limits of work/construction areas and from the edge of the water course; (2) covering of stockpiled spoils; (3) revegetation and physical stabilization of disturbed graded and staging areas; and (4) sediment control including fencing, dams, barriers, berms, traps, and associated basins.
2. Provide stockpile containment and exposed soil stabilization structures (e.g., Visqueen plastic sheeting, fiber or straw rolls, gravel bags, and/or hydroseed).
3. Provide runoff control devices (e.g., fiber or straw rolls, gravel bag barriers/chevrons) used during construction phases conducted during the rainy season. Following all rain events, runoff control devices shall be inspected for their performance and repaired immediately if they are found to be deficient.
4. Implement wind erosion (dust) controls, including the following:
    - Use a water truck;
    - Water active construction areas as necessary to control fugitive dust;
    - Hydro seed and/or apply non-toxic soil binders to exposed areas after cut and fill operations;
    - Cover inactive storage piles;
    - Cover all trucks hauling dirt, sand, or loose materials off site; and
    - Install appropriately effective track-out capture methods at the construction site for all exiting trucks.

Water Quality Protection

5. Locate and stabilize spoil disposal sites and other debris areas such as concrete wash sites. Sediment control measures shall be implemented so that sediment is not conveyed to waterways or jurisdictional resources (resources subject to permitting under Clean Water Act Section 404, Clean Water Act Section 401, and/or California Fish and Game Code Section 1600).
6. Minimize potential for hazardous spills from heavy equipment by not storing equipment or fueling within a minimum of 65 feet of any active stream channel or water body unless approved by permitting agencies along with implementation of additional spill prevention methods such as secondary containment and inspection.
7. Ensure that gas, oil, or any other substances that could be hazardous to aquatic life or pollute habitat are prevented from contaminating the soil or entering waters of the state or of the United States by storing these types of materials within an established containment area. Vehicles and equipment will have spill kits available, be checked daily for leaks, and will be properly maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. Any gas, oil, or other substance that could be considered hazardous shall be stored in water-tight containers with secondary containment. Emergency spill kits shall be on site at all times.
8. Prevent equipment fluid leaks through regular equipment inspections.
9. Implement proper waste/trash management.

In-Channel Work and Fish Species Protection

10. For facilities that are in or adjacent to streams and drainages, avoid activities in the active (i.e., flowing) channel whenever possible. New ASR facilities shall avoid streams and drainages.
11. Isolate work areas as needed and bypass flowing water around work site (see dewatering measures below).
12. Personnel shall use the appropriate equipment for the job that minimizes disturbance to the channel bed and banks. Appropriately tired vehicles, either tracked or wheeled, shall be used depending on the situation.

General Habitat Protection

13. Avoid disturbance of retained riparian vegetation to the maximum extent feasible when working in or adjacent to an active stream channel.
14. Restore all temporarily disturbed natural communities/areas by replanting native vegetation using a vegetation mix appropriate for the site.
15. Require decontamination of any used tools and equipment prior to entering water ways.
16. A qualified biologist shall conduct a training-educational session for project construction personnel prior to any mobilization-construction activities within the project sites to inform personnel about species that may be present on site. The training shall consist of basic identification of special-status species that may occur on or near the project site, their habitat, their basic habits, how they may be encountered in the work area, and procedures to follow when they are encountered. The training will include a description of the project boundaries; general provisions of the Migratory Bird Treaty Act, California Fish and Game Code, and federal and state Endangered Species Acts; the necessity for adhering to the provision of these regulations; and general measures for the protection of special-status species, including breeding birds and their nests. Any personnel joining the work crew later shall receive the same training before beginning work.

Dewatering

17. Prior to the start of work or during the installation of temporary water diversion structures, capture native aquatic vertebrates in the work area and transfer them to another reach as determined by a qualified biologist. Capture and relocation of aquatic native vertebrates is not required at individual project sites when site conditions preclude reasonably effective operation of capture gear and equipment, or when the safety of the biologist conducting the capture may be compromised.
18. When work in a flowing stream is unavoidable, isolate the work area from the stream. This may be achieved by diverting the entire streamflow around the work area by a pipe or open channel. Coffer dams shall be installed upstream and downstream, if needed, of the work areas at locations determined suitable based on site-specific conditions, including proximity to the construction zone and type of construction activities being conducted. Coffer dam construction shall be adequate to prevent seepage to the maximum extent feasible into or from the work area. Where feasible, water diversion techniques shall allow stream flows to flow by gravity around or through the work site. If gravity flow is not feasible, stream flows may be pumped around the work site using pumps and screened intake hoses. Sumps or basins may also be used to collect water, where appropriate (e.g., in channels with low flows). The work area will remain isolated from flowing water until any necessary erosion protection is in place. All water shall be discharged in a non-erosive manner (e.g., gravel or vegetated bars, on hay bales, on plastic, on concrete, or in storm drains when equipped with filtering devices).
19. If a bypass will be of open channel design, the berm confining the channel may be constructed of material from the channel.

20. Diversions shall maintain ambient flows below the diversion, and waters discharged below the project site shall not be diminished or degraded by the diversion. All imported materials placed in the channel to dewater the channel shall be removed when the work is completed. Dirt, dust, or other potential discharge material in the work area will be contained and prevented from entering the flowing channel. Normal flows shall be restored to the affected stream as soon as is feasible and safe after completion of work at that location.
21. To the extent that streambed design changes are not part of the Proposed Project, return the streambed, including the low-flow channel, to as close to pre-project condition as possible unless the pre-existing condition was detrimental to channel condition as determined by a qualified biologist or hydrologist.
22. Remove all temporary diversion structures and the supportive material as soon as reasonably possible, but no more than 72 hours after work is completed.
23. Completely remove temporary fills, such as for access ramps, diversion structures, or coffer dams upon finishing the work.

Other Practices

24. In the event that archaeological resources (sites, features, or artifacts) are exposed during construction activities for the Proposed Project, immediately stop all construction work occurring within 100 feet of the find until a qualified archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards, can evaluate the significance of the find, and whether the archaeological resources qualify as unique archaeological resources, historical resources of an archaeological nature, or subsurface tribal cultural resources. The archaeologist will determine whether additional study is warranted. Should it be required, the archaeologist may install temporary flagging around a resource to avoid any disturbances from construction equipment. Depending upon the significance of the find under CEQA (14 CCR 15064.5[f]; California Public Resources Code, Section 21082), the archaeologist may record the find to appropriate standards (thereby addressing any data potential) and allow work to continue. If the archaeologist observes the discovery to be potentially significant under CEQA, preservation in place or additional treatment may be required.
25. In accordance with Section 7050.5 of the California Health and Safety Code, if potential human remains are found, immediately notify the lead agency staff and the County Coroner of the discovery. The coroner will provide a determination within 48 hours of notification. No further excavation or disturbance of the identified material, or any area reasonably suspected to overlie additional remains, can occur until a determination has been made. If the County Coroner determines that the remains are, or are believed to be, Native American, the coroner will notify the Native American Heritage Commission within 24 hours. In accordance with California Public Resources Code, Section 5097.98, the Native American Heritage Commission must immediately notify those persons it believes to be the Most Likely Descendant from the deceased Native American. Within 48 hours of this notification, the Most Likely Descendant will recommend to the lead agency her/his preferred treatment of the remains and associated grave goods.
26. Notify adjacent property owners of nighttime construction schedules. A Construction Noise Coordinator will be identified. The contact number for the Construction Noise Coordinator will be included on notices distributed to neighbors regarding planned nighttime construction activities. The Construction Noise Coordinator will be responsible for responding to any local complaints about construction noise. When a complaint is received, the Construction Noise Coordinator shall notify the City within 48 hours of the complaint, determine the cause of the noise complaint, and implement as possible reasonable measures to resolve the complaint, as deemed acceptable by the City.

27. For construction on undeveloped sites or sites with surrounding trees and other vegetation, internal combustion engine equipment shall include spark arrestors, fire suppression equipment (e.g., fire extinguishers and shovels) must be stored onsite during use of such mechanical equipment, and construction activities may not be conducted during red flag warnings issued by the California Department of Forestry and Fire Protection (CAL FIRE). Red flag warnings and fire weather watches are issued by CAL FIRE based on weather patterns (low humidity, strong winds, dry fuels, etc.) and listed on their website (https://www.fire.ca.gov/programs/communications/red-flag-warnings-fire-weather-watches/).

3.4.6 Estimated Construction Schedule

A summary of estimated construction schedules for the project and programmatic infrastructure components is provided in Table 3-8. The construction timing for Beltz ASR facilities is based on the City's current planning for these facilities. The construction schedules for the other infrastructure components were developed to provide a reasonable worst-case construction scenario for the evaluation of environmental impacts by providing for the earliest possible construction initiation date for each component (see Section 4.2, Air Quality, for additional information). The actual construction schedules for these components could be extended further out in time.

Table 3-8. Construction Schedules for Analysis Purposes

Project and Programmatic Infrastructure Components	Construction Schedule for Analysis Purposes[1]
Aquifer Storage and Recovery (ASR)	
New ASR Facilities (up to 4 new ASR facilities)[2]	
New Monitoring wells (2 to 3 wells per ASR facility)	July 2024 – September 2024
New ASR wells	September 2024 – November 2024
New Treatment facilities	January 2025 – September 2025
Beltz ASR Facilities	
Beltz 9 ASR monitoring well	May 2022
Beltz 12 ASR upgrades	July 2022 – September 2022
Beltz 8 ASR upgrades	September 2022 – January 2023
Beltz 9 ASR upgrades	January 2023 – February 2023
Beltz 10 ASR upgrades	February 2023 – March 2023
Water Transfers and Exchanges and Intertie Improvements	
City/SVWD intertie pipeline	May 2027 – November 2027
City/SVWD intertie pump station	May 2027 – June 2027
City/SqCWD/CWD intertie pipelines	May 2022 – November 2022
City/SqCWD/CWD intertie pump stations (new)	May 2022 – June 2022
City/SqCWD/CWD intertie pump station (upgrade)	April 2022 – May 2022
Felton Diversion Fish Passage Improvements	June 2027 – August 2027
Tait Diversion and Coast Pump Station Improvements	
Coast Pump Station improvements	April 2028 – May 2028
Tait Diversion improvements	May 2028 – December 2028

Notes:

1 The construction schedules for the programmatic components was developed to provide a reasonable worst-case construction scenario for the evaluation of environmental impacts by providing for the earliest possible construction initiation date for each component (see Section 4.2, Air Quality, for additional information). The actual construction schedules for these components could be extended further out in time.

2 Up to four new ASR facilities are anticipated and were conservatively assumed in the analysis to be constructed concurrently.

3.4.7 Project Operations

3.4.7.1 City Water Supply Production with Proposed Project

The proposed water rights modifications would enable implementation of water supply augmentation components, which support the implementation of the City's Water Supply Augmentation Strategy Element 1 (passive recharge of regional aquifers via water transfers and exchanges) and Element 2 (active recharge of regional aquifers via ASR) to meet the project objectives defined in Section 3.3, Project Purpose and Objectives, and to meet the water demand of 3,200 mgy that is forecasted in the City's 2015 UWMP (see Table 3-9). Additionally, the Proposed Project would allow the City to fill the identified worst-year water supply gap of 1.2 mgy (see Table 3-10).

Table 3-9. City Water Supply with Proposed Project

Water Supply	2018 Baseline (mg)	Proposed Project (mg)[1]
Average of All Years		
Treated Surface Water from Graham Hill Water Treatment Plant	2,977	3,589
• *Minus* Water Injected into Underground Storage Via ASR	NA	-233
• *Minus* Water Transferred to Other Suppliers	NA	-424[2]
Total Treated Surface Water to City Customers	*2,977*	*2,932*
Total Beltz Groundwater Extraction to City Customers	*127*	*92*
Total ASR Extraction to City Customers	*NA*	*176*
Total Supply	**3,104**	**3,200**
Average of Critically Dry Years		
Treated Surface Water from Graham Hill Water Treatment Plant	2,501	2,673
• *Minus* Water Injected into Underground Storage Via ASR	NA	-132[3]
• *Minus* Water Transferred to Other Suppliers	NA	-25[2, 3]
Total Surface Water to City Customers	*2,501*	*2,516*
Total Beltz Groundwater Extraction to City Customers	*185*	*166*
Total ASR Extraction to City Customers	*NA*	*518*
Total Supply	**2,686**	**3,200**

Source: Gary Fiske and Associates 2021c.

Notes: mg = million gallons.

1 A negative number is presented for ASR injections given that injection volumes are not available until they are extracted. Likewise, water transfers to other agencies are also shown as negative numbers given that those volumes are transferred and not available to the City.

2 The maximum volume of water for water transfers provided above is based on the hydrologic and water supply modeling conducted for the Proposed Project (Appendix D). However, this chapter uses the existing infrastructure capacities of the existing systems as the basis for the proposed maximum volume of water that could be transferred due to the Proposed Project. That number (440 mg) is slightly larger than the maximum volume of water presented above.

3 ASR injections and water transfers may take place during what turns out to be critically dry or dry years given that critically dry or dry conditions may not be determined until a portion of the water year has elapsed. For example, rains in October and November could provide the conditions where the City would inject and/or transfer water while subsequent months of reduced rainfalls, indicating a critically dry or dry water year, may cause the City to cease these operations.

Table 3-10. Worst-Year Water Supply Gap (in million gallons)[1]

Worst Drought Years in Historical Record	2018 Baseline Conditions	Proposed Project
1976	843	0
1977	1,170	0
Total	**2,013**	**0**

Source: Gary Fiske and Associates 2021b.
Notes:
1 City's agreed-upon worst-year water supply gap of 1.2 billion gallons per year during modeled worst-year conditions identified during the WSAC planning process.

Table 3-9 demonstrates that the Proposed Project would provide needed supplemental water supplies during times of identified water supply shortfalls, based on water supply modeling conducted for the Proposed Project (see Appendix D). Negative numbers are presented in the table to reflect treated surface water that would be routed to underground storage via ASR injections or to water transfers to neighboring water agencies with the Proposed Project. A negative number is presented for ASR injections given that injection volumes are not available to customers of the City's water system until they are extracted. The extraction of that stored surface water, along with Beltz groundwater extraction are then shown as additions to the City's water supply. Water transfers to other neighboring water agencies are also shown as negative numbers because those volumes are not available to customers of the City's water system. Water supplies to the City that could derive from neighboring water agencies returning water to the City as part of an exchange are not shown as supplies in Table 3-9 because it is not reasonably certain how or when they would occur. Some exchanges, however, could occur with the Proposed Project and therefore are discussed programmatically in this EIR.

3.4.7.2 Project Staffing

It is anticipated that up to three new staff would be needed to operate under Proposed Project conditions: one staff for the Agreed Flows implementation and two staff for the new ASR facilities maintenance. Operation and maintenance of other facilities would be expected to be conducted by existing staff.

3.5 Proposed Project Modeling

As indicated in Section 3.4.2, Water Rights Modifications, the City has utilized a modeling system comprised of a hydrologic model, a water supply model, and a biological effects model to both refine and analyze the Proposed Project. See Appendix D for a detailed description of these models. Together, these tools have allowed the City to develop a Proposed Project that can maximize available water supply while being protective of local anadromous fisheries.

As described above, the Agreed Flows were developed over years of coordination with CDFW and NMFS to improve conditions for steelhead and coho in local streams and rivers. At the same time, the City has been developing a supply strategy to address identified water supply shortages that will be exacerbated by the implementation of the Agreed Flows that culminated in the WSAC strategy currently being implemented by the City, as described in Section 3.2.1, Water Supply Planning Background. The same modeling tools were utilized during development of the Agreed Flows and WSAC Strategy as were used to develop the Proposed Project, providing for consistency and stability across planning efforts.

To understand the implications of the Proposed Project, the City developed baseline and Proposed Project modeling to serve as the basis of project analysis. The baseline represents the current system as modeled for City water supply planning, as of the 2018 Notice of Preparation for the Proposed Project. The Proposed Project modeling provides the best possible representation of the Proposed Project within the framework of the modeling system. To represent the Proposed Project, the City developed a series of assumptions regarding the City's existing and future infrastructure capacities, the implications of proposed water rights changes, and the parameters of related supply projects currently under parallel development with the goal of forecasting maximum potential effects to anadromous fisheries from the Proposed Project. None of these modeling assumptions are intended to constrain or otherwise impede system operations in any way other than as described for the Proposed Project in detail above or to prevent future system operational changes or improvements that would be independently pursued and analyzed under CEQA. Key modeling assumptions regarding infrastructure capacity, water supply augmentation, and/or water rights modifications are described below.

3.5.1 Modeling of Infrastructure Capacities

Because approval of the proposed water rights modifications would result in changed conditions that extend into the future, City modeling assumed implementation of all upgrades to existing infrastructure currently being planned. These upgrades include the surface water diversion improvements at the Felton Diversion and Tait Diversion/Coast Pump Station, which are part of the Proposed Project. Additionally, other planned infrastructure upgrades that are not part of the Proposed Project are included in the project modeling as those planned upgrades are being pursued independently of the Proposed Project, but would be a component of the future conditions that would exist with the Proposed Project. (See Section 4.0, Introduction to Analyses, for a description of the City's other planned infrastructure upgrades that are evaluated in the cumulative analysis contained in this EIR.) Together, these modeled infrastructure upgrades allow for analysis of impacts to anadromous fisheries resulting from long-term implementation of the Proposed Project. The assumptions used in the project modeling about infrastructure capacities are as follows:

Assumptions for Surface Water Diversion Improvements (Programmatic Components)

- Felton Diversion – Improvements to the Newell Creek Pipeline eliminate existing hydraulic constraints between the Felton Diversion and Loch Lomond Reservoir (see Newell Creek Pipeline below).
- Tait Diversion and Coast Pump Station – Diversion capacity of combined Tait Diversion and Tait wells increases from 12.2 cfs to 28 cfs and Coast Pump Station capacity also increases to 28 cfs.

Assumptions for Other Planned Infrastructure Upgrades (Cumulative Projects)

- North Coast Pipeline – Eventual replacement/repair of remaining portions of the North Coast Pipeline are implemented; pipeline water loss is reduced from 8% to 3%.
- Newell Creek Pipeline – Eventual replacement of the Newell Creek Pipeline is implemented; pipeline capacity is increased from 13.5 mgd to 20 mgd.
- Graham Hill Water Treatment Plant – The GHWTP Facility Improvements Project results in upgrades to the existing treatment plant with treatment capacity increased from 16.5 mgd to 18 mgd and turbidity treatment improvements resulting in half as many days that high turbidity causes the treatment plant to bypass water from the San Lorenzo River.

3.5.2 Modeling of Water Supply Augmentation

This EIR analyzes water supply augmentation components of the Proposed Project as both project components and programmatic components, as described in Section 3.4.3, Water Supply Augmentation. The modeling for these components represents the best current understanding of how the City would pursue these elements of the WSAC strategy. Key assumptions regarding the water supply augmentation components are described below.

Assumptions for ASR

- ASR infrastructure capacity is sized to fully eliminate the 1.2-billion-gallon worst-year supply shortfall assuming 3.2 billion gallons per year water supply demand as identified in the WSAC strategy.
- The modeling assumes that there is sufficient groundwater storage capacity to receive the modeled ASR injections and does not specify whether that capacity is in the Santa Cruz Mid-County Groundwater Basin, the Santa Margarita Groundwater Basin or a combination of the two. This assumption is supported particularly by the fact that both basins are sizable and the City has not determined the specific locations of its programmatic ASR facilities.
- The Proposed Project explicitly includes diversion to ASR from all City sources except Newell Creek, North Coast sources are prioritized to meet instantaneous City demands due to the high water quality of these sources and therefore they would not be used as a primary source for ASR. Therefore, diversion to ASR is modeled primarily utilizing the San Lorenzo River sources, which includes Felton Diversion and Tait Diversion.
- Supply from storage in ASR and Loch Lomond Reservoir are used concurrently to meet City demand.
- To align the water supply model with typical operations, the model assumes diversion to ASR is limited to November to April each year and extraction is limit to May to October. In practice, the City could divert to and extract from ASR within authorized rights and operational procedures at any time of the year.
- Standard operational practices are implemented as described in Section 3.4.5, Standard Operational and Construction Practices.

Assumptions for Transfers/Exchanges

- The modeling system only models transfers to neighboring water agencies and not exchanges from such agencies, as the amount of water that may be returned through exchanges is unknown at this time (see Section 3.4.3.2, Water Transfers and Exchanges and Intertie Improvements, for additional information about transfers and exchanges). This modeling approach provides a worst-case analysis of fisheries impacts, as greater volumes of surface water would be required compared to a scenario that includes exchanges. There is currently no way to estimate or model the amount of water the City could expect to receive back from neighboring agencies through exchanges.
- Transfer capacity is sized to meet assumed demands of three neighboring agencies: SqCWD, SVWD, and SLVWD. Demands of CWD, the smallest of the neighboring agencies, was not factored into sizing of transfer capacity, but it is assumed that some portion of the transfers could be provided to CWD by reducing transfer to other agencies. For SqCWD, only demand in the Purisima aquifer is considered. The modeled transfer capacity conservatively exceeds the assumed capacity of pipelines and pump stations and the anticipated transfer volume for this component identified in Section 3.4.3.2, Water Transfers and Exchanges and Intertie Improvements.

- Transfers only occur when excess surface water is available from the City's flowing sources. Because the water supply model prioritizes diversions from the North Coast Streams to meet City demand before the San Lorenzo River, the model effectively results in diversions to transfers from the San Lorenzo River only, but in practice, the City would have flexibility to divert to transfer from all flowing sources.
- Standard operational practices are implemented as described in Section 3.4.5, Standard Operational and Construction Practices.

3.5.3 Modeling of the Water Rights Modifications

A summary of the modeling assumptions used for the water rights modifications of the Proposed Project is provided below.

Assumptions for Water Rights Modifications

- Place of Use – To understand the potential effects of the expanded POU, the combined effect of ASR and water transfers are considered. These components could not proceed without expanded POU.
- Method of Diversion – Because the proposed modification to the authorized method of diversion, including the proposed maximum direct diversion rate for the Newell Creek water right license (License 9847), would explicitly authorize current operations, no additional assumptions are required to model the Proposed Project, as compared to the baseline.
- Points of Diversion
    - Points of Rediversion for each Water Right – The ASR component is used to understand the effects of adding the Beltz system as new points of rediversion into and out of groundwater storage.
    - Felton Permits – The effects of adding the Tait Diversion as a new point of diversion to the Felton Permits (water right permits 16123 and 16601) were modeled by combining the allowed diversions under the Tait Licenses (water right licenses 1553 and 7200) and Felton Permits. This combined allowance was then prioritized for diversion first from the Tait Diversion, as permitted, before diversion of any excess allowance at the Felton Diversion. Model runs were back-checked to confirm that diversions from the Felton Diversion never exceeded authorized diversions for this facility. This approach resulted in rare instances of diversion from the Felton Diversion modeled during summer months when diversion from Felton is neither permitted nor feasible. While diversions from the Felton Diversion during summer months would never occur during City operations, the modeling results are considered acceptable because occurrences are both rare and conservative for fisheries analysis. The modeling is conservative because it may overstate the effect of diversions at Felton on relevant resources.
- Underground Storage – The ASR component is used to understand the effects of adding an underground storage supplement for the Beltz system to accommodate the Beltz ASR subcomponent of ASR because ASR encompasses the total volume of potential ASR, including the volume of Beltz ASR.
- Extension of Time – Modeling assumes the opportunity for full beneficial use of diversions authorized under the Felton Permits. No additional assumptions are required to model the Proposed Project as compared to the baseline.
- Agreed Flows – All rules and requirements of the Agreed Flows are fully incorporated into modeling of the Proposed Project.

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