

Pajaro River Watershed Long Term Drought Preparedness

ATTACHMENT 2: PROJECT JUSTIFICATION

Attachment 2 is mandatory and includes a summary of the proposed projects; the estimated physical benefits of the projects; justifies how the project is technically feasible; describes how the project can achieve the claimed level of benefits; and explains whether the benefits will be attained through the least cost alternative. Both projects included in the Pajaro River Watershed Long Term Drought Preparedness proposal are designed to comply with the new Hexavalent Chromium (Chromium 6) water quality regulations and ensure compliance with the Human Right to Water requirement for the Cities of Hollister and Watsonville.

Project 2 Hexavalent Chromium Treatment Project provides a direct water quality benefit to the City of Watsonville, which includes a service area entirely comprised of a Disadvantaged Community (DAC). The project involves pilot testing and final design of a Chromium 6 groundwater treatment system. As such, the following Attachment 2 sections are not required:

- Quantification of physical benefits, qualitative discussion only;
- Technical analysis of physical benefits, explanation of project need only;
- Project Performance Monitoring Plan; and
- Cost Effective Analysis.

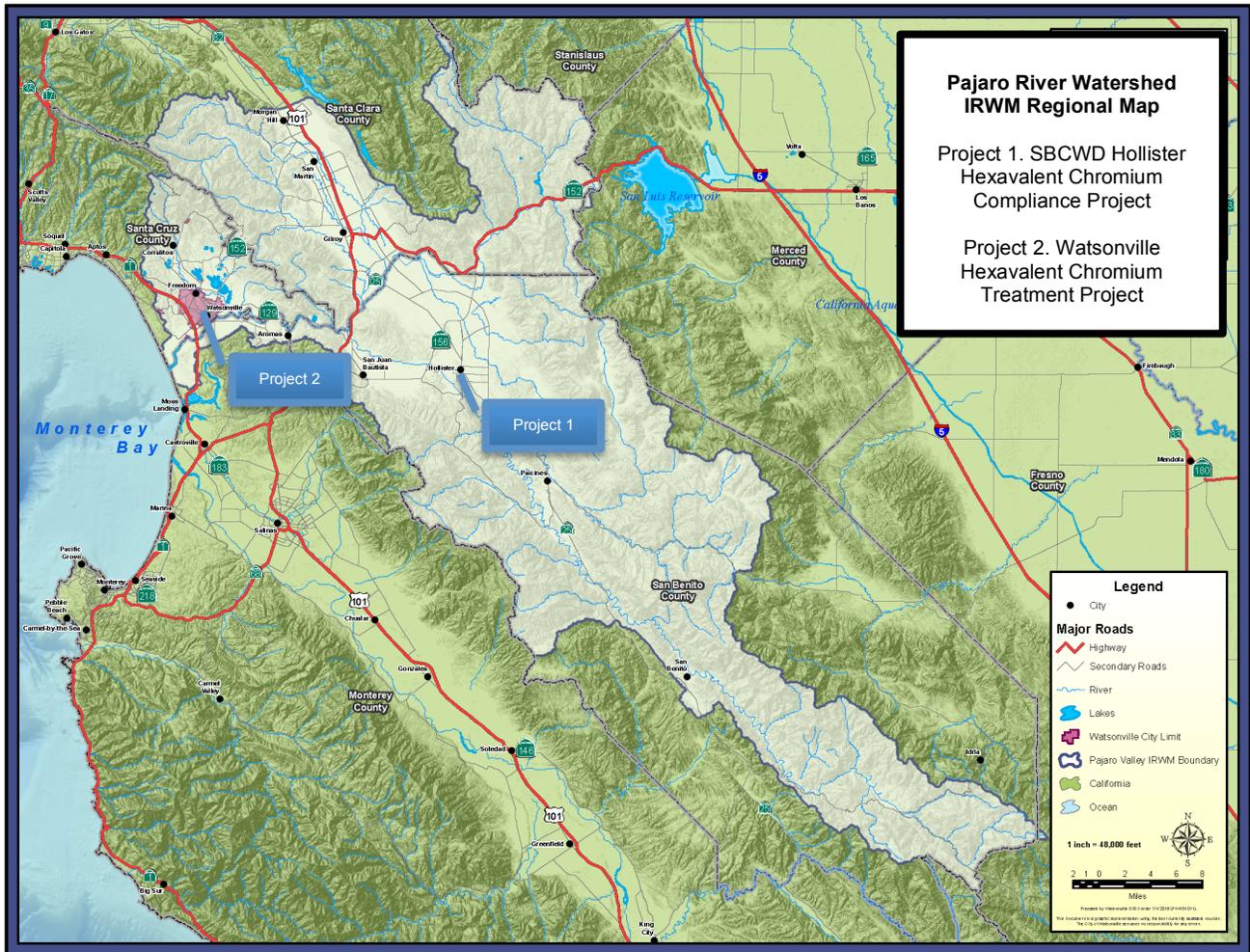
2.1 PROJECT SUMMARY TABLE

To be eligible, each project must match at least one project element listed in Table 2.1. As shown in the table and documented in the following sections, the San Benito County Water District (SBCWD) Hollister Hexavalent Chromium Compliance Project and the City of Watsonville Hexavalent Chromium Treatment each address multiple IRWM project elements (see Figure 2.1 regional map for project locations). The primary benefit offered by both projects is the reduction of Hexavalent Chromium in drinking water supplies and preservation of the Hollister and Watsonville communities Human Right to Water.

Table 2.1 2015 IRWM Grant Solicitation Project Summary Table			
IRWM Project Element		P1. SBCWD Hollister Hexavalent Chromium Compliance Project	P2. Watsonville Hexavalent Chromium Treatment
IR.1	Water supply reliability, water conservation, and water use efficiency	X	X
IR.2	Stormwater capture, storage, clean-up, treatment, and management		
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands		
IR.4	Non-point source pollution reduction, management, and monitoring		
IR.5	Groundwater recharge and management projects		
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users		X
IR.7	Water banking, exchange, reclamation, and improvement of water quality		
IR.8	Planning and implementation of multipurpose flood management programs		
IR.9	Watershed protection and management		
IR.10	Drinking water treatment and distribution	X	X
IR.11	Ecosystem and fisheries restoration and protection		

2.2 PAJARO RIVER WATERSHED IRWM REGIONAL MAP

FIGURE 2.1 PAJARO RIVER WATERSHED IRWM REGIONAL MAP



2.3 HOLLISTER HEXAVALENT CHROMIUM COMPLIANCE PROJECT

2.3.1. HOLLISTER HEXAVALENT CHROMIUM COMPLIANCE PROJECT DESCRIPTION

Implementation Project: Hollister Hexavalent Chromium Compliance Project (HHCCP)

Implementing Agency: San Benito County Water District (SBCWD)

Project Statement: The HHCCP includes transmission pipelines and blending facilities needed to meet the State of California’s new Hexavalent Chromium (Chromium 6) water quality regulations for the City of Hollister.

The new HHCCP transmission pipelines and blending facilities coupled with SBCWD’s new West Hills Water Treatment Plant (West Hills WTP) are an integral part of the Water Program serving the Hollister Urban Area (HUA) in San Benito County California. The HUA is located approximately 50 miles southeast of the City of San Jose and 40 miles east of Monterey Bay, as shown in Figure 2.2. The HUA includes the City of Hollister (City), Sunnyslope County Water District (SSCWD), and adjacent unincorporated areas of San Benito County designated for urban development. The agencies have worked together to develop regional solutions for their water supply. In addition to the significant coordination with the HUA partners, SBCWD will partner with the Resource Conservation District (RCD) to improve their presence in the County and enhance their irrigation efficiency program.

PROJECT NEED. The Hollister Hexavalent Chromium Compliance Project (HHCCP) is needed to:

- Provide a Human Right to Water benefit through compliance with the State of California Hexavalent Chromium regulations in the City of Hollister groundwater supply wells, and
- Reduce the energy consumption required to provide high quality potable water in the HUA.

On July 1, 2014, the California Division of Drinking Water (DDW) adopted water quality regulations that limit the levels of Chromium 6 to a maximum of 10 parts per billion (ppb) in drinking water. Municipal supplies in the HUA are currently served by a blend of local groundwater and imported CVP water treated at the existing Lessalt WTP. Although the treated water meets all primary federal drinking water limits, the City of Hollister’s four active wells are not compliant with the new State regulations for Chromium 6, as summarized in Table 2.2. Therefore, without a solution to the Chromium 6 compliance requirements, a majority of the City’s residents would not have access to safe drinking water (Human Right to Water).

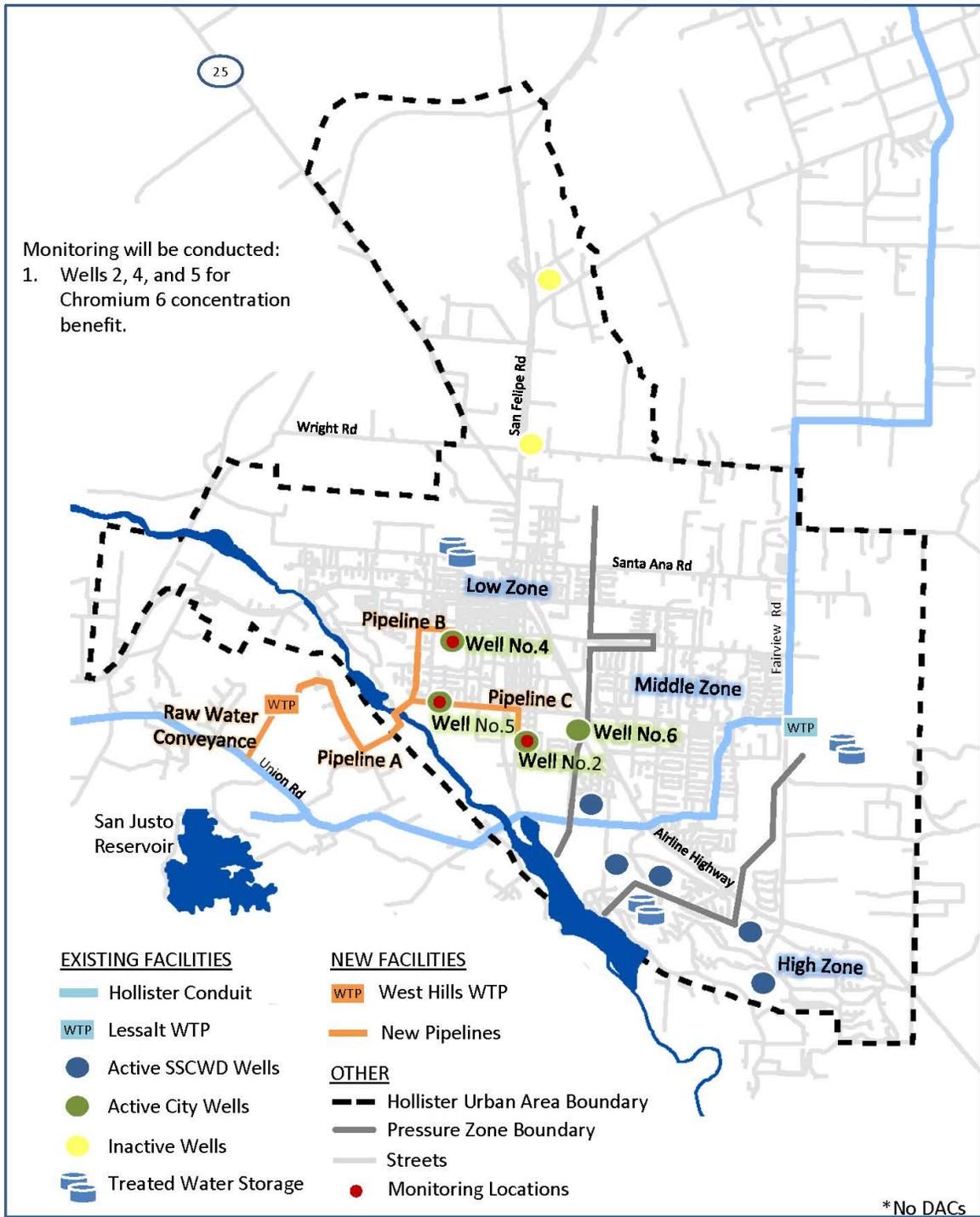
Well	Well Capacity (gpm)	Range of Chromium 6 Test Results (ppb)
No. 2 (Bundeson)	1425	11 - 15
No. 4 (South)	1670	15 - 17
No. 5 (Nash)	1825	12 - 14
No. 6 (Airline)	435	15 - 16

Note: California DDW MCL for Chromium 6 is 10 ppb.

PROJECT BENEFIT. The HHCCP is an enhancement to the West Hills WTP, a component of the overall HUA Water System Improvement Program. The two most significant benefits of the HHCCP are improved water quality and reduced energy consumption. The project will reduce Chromium 6 levels to meet the regulatory standards and protects the Human Right to Water for the HUA. Additionally, the project provides a significant energy savings when compared to any other method to achieve the Chromium 6 requirements. Other methods to achieve compliance would require wellhead treatment, at a significant cost and energy requirement. The most energy efficient alternative would require 932,000 kWh/yr, whereas the HHCCP will take advantage of the new West Hills WTP (being funded under a separate grant agreement) by adding additional transmission pipelines to convey the treated surface water, by gravity, directly to the City’s wells, where the surface water will be blended with groundwater to achieve compliance with the Chromium 6 regulation at a significantly lower energy requirement.

PROJECT FACILITIES. The HHCCP includes the extension of dedicated transmission pipelines to convey treated surface water (from the West Hills WTP) to three existing City groundwater wells and blending facilities at the wells to facilitate mixing (Figure 2.3). The blended drinking water supply will be Chromium 6 compliant and ensure a clean, safe drinking water supply for the City of Hollister.

FIGURE 2.3 HOLLISTER HEXAVALENT CHROMIUM COMPLIANCE PROJECT FACILITIES MAP



2.3.3. HOLLISTER HEXAVALENT CHROMIUM COMPLIANCE PROJECT PHYSICAL BENEFITS

Municipal supplies in the HUA are currently served by a blend of local groundwater and imported Central Valley Project (CVP) water treated at the existing Lessalt WTP. The City of Hollister’s four active potable groundwater wells are not compliant with the new State regulations for Hexavalent Chromium (Chromium 6) and must be blended with treated CVP water to meet the Chromium 6 regulations. A second surface water treatment facility, the West Hills WTP, will begin construction in the fall of 2015 and is funded from a prior Proposition 84 IRWM Implementation Grant; it will serve as the source of treated CVP water to blend with the City’s groundwater. The HHCCP includes the extension of dedicated transmission pipelines to convey treated surface water (from the West Hills WTP) to three existing City groundwater wells and blending facilities at the wells to facilitate mixing (Figure 2.3). The physical benefits of the Hollister Hexavalent Chromium Compliance Project (HHCCP) include:

- **PRIMARY PHYSICAL BENEFIT WATER QUALITY – REDUCED HEXAVALENT CHROMIUM IN THE DRINKING WATER:** The primary physical benefit of the HHCCP is the reduction of Chromium 6 levels in the HUA drinking water supply. The HHCCP will provide a clean drinking water supply to the HUA and ensure the community’s Human Right to Water is satisfied. An extension of the new transmission pipelines from the new West Hills WTP will facilitate the conveyance of treated CVP water directly to the City’s contaminated wells in order to blend the supplies and achieve compliance with the Chromium 6 regulation (Table 2.3).
- **SECONDARY PHYSICAL BENEFIT ENERGY SAVINGS:** The secondary physical benefit of the HHCCP is the avoided energy consumption, and associated greenhouse gases, that would be required to treat the City’s groundwater to achieve compliance with the Chromium 6 regulation. The avoided energy savings provided by the HHCCP in lieu of wellhead treatment is estimated to be 932,129 kWh/year (Table 2.4).

Table 2.3 – Annual Project Physical Benefits - Benefit A (Primary)			
Project Name: West Hills Water Project			
Type of Benefit Claimed: Water Quality. Hexavalent Chromium concentration reduction			
Units of the Benefit Claimed: Hexavalent Chromium concentration (ppb)			
Anticipated Useful Life of Project (years): 50 years			
(a)	(b)	(c)	(d)
Physical Benefits			
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2015	14.1	Under construction	0.0
2016	14.1	Under construction	0.0
2017	14.1	Under construction	0.0
2018 - 2067	14.1	8	-6.1
Comments: The without project Chromium 6 concentration is calculated based on the flow weighted average of the Chromium 6 levels in the four active wells in the Low Pressure Zone. The with project Chromium 6 concentration will be 8 ppb after blending with treated surface water.			

Table 2.4 – Annual Project Physical Benefits - Benefit B (Secondary)

Project Name: Hollister Hexavalent Chromium Compliance Project
Type of Benefit Claimed: Energy Savings
Units of the Benefit Claimed: kWh/year
Anticipated Useful Life of Project (years): 50

(a)	(b)	(c)	(d)
Physical Benefits			
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2015	0	Under construction	0
2016	0	Under construction	0
2017	0	Under construction	0
2018 - 2067	932,129	0	-932,129

Comments: The without project energy consumption is calculated based on the annual average energy required for preferred treatment to treat the City’s wells in the Low Pressure Zone. The with project energy consumption is 0 kWh/year because the treated CVP water used for blending will be delivered by gravity.

2.3.4. TECHNICAL ANALYSIS OF EACH PHYSICAL BENEFIT CLAIMED

PROJECT NEED: Municipal supplies in the HUA are currently served by a blend of local groundwater and imported CVP water treated at the existing Lessalt WTP. On July 1, 2014, the California Division of Drinking Water (DDW) adopted water quality regulations that limit the levels of Chromium 6 to a maximum of 10 parts per billion (ppb) in drinking water. Water quality sampling and testing by the City of Hollister shows that all four of the City’s active water supply wells exceed the new maximum contaminant level (MCL) as summarized in Table 2.5.

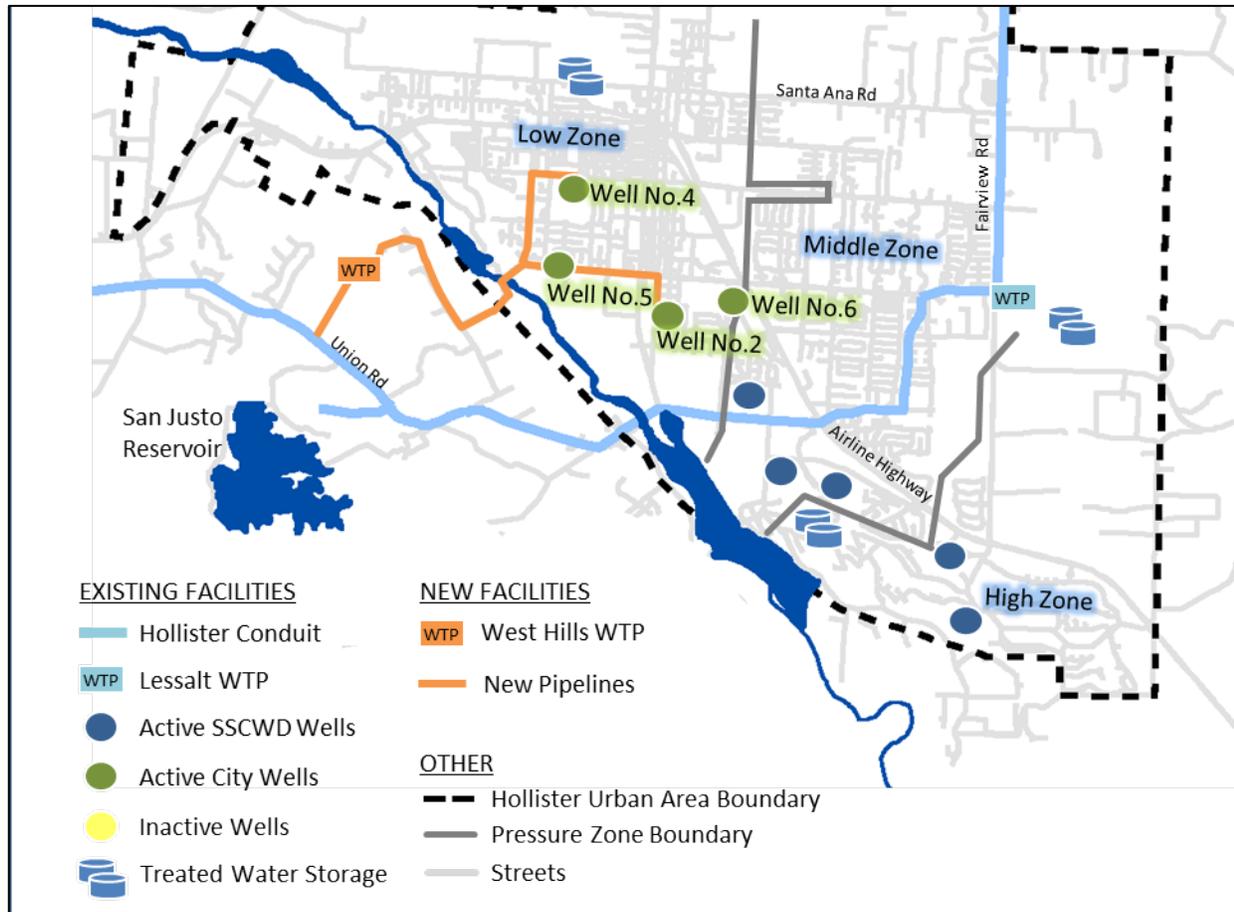
Table 2.5 Chromium 6 Concentrations in City of Hollister Groundwater Wells

Well	Well Capacity (gpm)	Range of Chromium 6 Test Results (ppb)
No. 2 (Bundeson)	1425	11 - 15
No. 4 (South)	1670	15 - 17
No. 5 (Nash)	1825	12 - 14
No. 6 (Airline)	435	15 - 16

Note: California DDW MCL for Chromium 6 is 10 ppb.

The City’s four active wells supply all of the drinking water to the Low Pressure Zone, shown in Figure 2.4 below. Therefore, without a solution to the Chromium 6 compliance requirements, approximately 70% of the City’s residents would not have access to a clean, safe potable drinking water (Human Right to Water).

FIGURE 2.4 CITY OF HOLLISTER CHROMIUM IMPACTED GROUNDWATER WELLS



PROJECT DEVELOPMENT: To develop the best plan to achieve the water supply and water quality needs of the HUA, a comprehensive alternatives development and screening process was completed in the 2008 Master Plan. The original recommendations for water supply improvements for the HUA were later updated and refined in the 2010 Coordinated Water Supply and Treatment Plan (2010 Coordinated Plan). That process resulted in a wide range of concepts and specific alternatives to meet the needs of the community. The 2011 Hollister Urban Area Water and Wastewater Master Plan and Coordinated Water Supply and Treatment Plan Program Environmental Impact Report (PEIR) refined the alternatives analysis, which included:

- No Project.
- Alternative 1 - Increased Imported Surface Water Supply.
- Alternative 2 - Utilize Local Surface Water Supply.
- Alternative 3 - Demineralize Urban Wells.
- Alternative 4 - Utilize Water from High Groundwater Basins.

Alternative 1 was the preferred alternative, making use of existing CVP water supply entitlements that have not been fully realized in the past. The other alternatives, or some combination thereof, will be needed in the future as development occurs and water demands increase. Alternatives 2 and 4 could be implemented following the West Hills WTP and the water supplies provided could be treated at the new West Hills WTP facilities. Alternative 3 relied on demineralization of existing and future municipal wells. Demineralization would be accomplished using reverse osmosis, which is an energy intensive and costly process. In addition, it was determined that brine disposal could have potentially significant impacts related to water quality and biological resources. Thus, it was determined that the surface water treatment concepts were preferred, including the construction of the West Hills WTP.

The Chromium 6 regulation was promulgated following the conception of the alternatives described above. In response to the Chromium 6 water quality issue, the City of Hollister initiated development of a Chromium 6 Compliance Plan in January 2015. Development of the Chromium 6 Compliance Plan included review of multiple alternatives including:

- Changes to groundwater supply sources,
- Groundwater treatment, and
- Blending with treated surface water from the planned West Hills WTP.

The draft report was completed in July 2015 and recommended an expansion of the West Hills WTP infrastructure to include additional treated water transmission facilities. The additional conveyance will facilitate the required blending of groundwater from Chromium 6 impacted wells with treated surface water to meet the new regulatory requirements. The study documented that this alternative has the lowest capital and life-cycle costs and takes advantage of the economic efficiency of currently planned water supply and treatment facilities to address the Chromium 6 issue in a reliable and cost-effective manner. While the West Hills WTP was originally planned to address water supply reliability and water quality (TDS and hardness) in the distribution system, through regional coordination, SBCWD and its partners were able to take advantage of the timing, location, and method of treated water delivery such that the project will also be used to blend groundwater at the City wells to meet the Chromium 6 regulations.

SBCWD is further developing the regional coordination by partnering with the Resource Conservation District (RCD) to increase education, outreach, and technical assistance to the agricultural water users in the region to improve conservation and drought preparedness. The partnership will be modeled after the Drought Response Irrigation Program (DRIP) currently being implemented by the RCD of Santa Cruz County and the Pajaro Valley Water Management Agency (PVWMA) in the Lower Pajaro River Watershed.

WITHOUT PROJECT CONDITIONS: Without the HHCCP, the City of Hollister would be forced to either abandon its existing groundwater wells, relying solely on imported CVP water, or construct new, costly, wellhead treatment to maintain system reliability while complying with the Chromium 6 regulation. The City would need to install and operate wellhead treatment at three of its active wells. The fourth well (Well No. 6) would be placed on inactive status, reducing the reliability of the system as well as the available active water supply. Therefore, the HHCCP benefits are measured against the benefits, impacts and costs of wellhead treatment at three of the four City wells. As documented in the City Chromium 6 Compliance Plan, the estimated capital cost for wellhead treatment is \$7.71 million and annual O&M costs are estimated to be \$1.2 million per year.

In addition, if the City were to add wellhead treatment at the contaminated wells to meet the Chromium 6 regulation, it is estimated that over 930,000 kWh/year would be required to treat the contaminated groundwater, as described in the City Compliance Plan and summarized in Table 2.6.

Well	Well Capacity (gpm)	Annual Energy Demand (kWh/year)
No. 2 (Bundeson)	1425	269,976
No. 4 (South)	1670	316,393
No. 5 (Nash)	1825	345,759
No. 6 (Airline)	435	N/A
Total		932,129

Note: As described in the Chromium Compliance Plan, the preferred treatment alternative is blending with West Hills treated surface water. Furthermore, it was recommended that Well No. 6 be placed on inactive status due to the low well capacity and high Chromium 6 levels.

In addition to the improved water quality benefits and reduced energy use offered by the HHCCP, the City is protecting the groundwater basin by introducing additional surface water supplies in lieu of fully relying on the groundwater basin that is at risk of overdraft.

ESTIMATING PHYSICAL BENEFITS - WATER QUALITY: The physical water quality benefit for Chromium 6 concentration is calculated based on the existing flow-weighted average of the Chromium 6 levels in the four active wells in the Low Pressure Zone as compared to the calculated flow-weighted average after the new supply from the West Hills WTP is blended with the groundwater. As shown in Table 2.7, the current flow-weighted average Chromium 6 level is 14.1 ppb, when using only the four Hollister wells for potable supply.

After the HHCCP comes on-line, treated water will be delivered to three of the four City wells to provide blending for compliance with the Chromium 6 regulations. An approximate 0.9 mile pipeline will be installed north along Westside Blvd and east along South Street to connect to Well No. 4, while a 0.7 mile pipeline will extend east along Nash Road, past Well No. 5, to Sally Street and then south to Well No. 2. The fourth well (Well No. 6) will be put on inactive status to avoid Chromium 6 violations. After introducing the new treated supply from the West Hills WTP, the flow-weighted average Chromium 6 levels drop to 8.6 ppb, below the regulatory limit of 10 ppb (Table 2.8).

Table 2.7 Chromium 6 Concentrations in City of Hollister Groundwater Wells				
Well	Well Capacity (gpm)	Range of Chromium 6 (ppb)	Average Chromium 6 (ppb)	Flow Weighted Chromium 6
No. 2 (Bundeson)	1425	11 - 15	13	18525
No. 4 (South)	1670	15 - 17	16	26720
No. 5 (Nash)	1825	12 - 14	13	23725
No. 6 (Airline)	435	15 - 16	15.5	6742.5
FLOW WEIGHTED AVERAGE CHROMIUM 6				14.1 ppb
Note: California DDW MCL for Chromium 6 is 10 ppb.				

Table 2.8 Chromium 6 Concentrations in City of Hollister Groundwater Wells plus West Hills				
Well/Supply	Well Capacity/WHWP (gpm)	Range of Chromium 6 (ppb)	Average Chromium 6 (ppb)	Flow Weighted Chromium 6
No. 2 (Bundeson)	1425	11 - 15	13	18525
No. 4 (South)	1670	15 - 17	16	26720
No. 5 (Nash)	1825	12 - 14	13	23725
No. 6 (Airline)	0	15 - 16	15.5	0
West Hills	3124.8	0	0	0
FLOW WEIGHTED AVERAGE CHROMIUM 6				8.6 ppb
Note: California DDW MCL for Chromium 6 is 10 ppb.				

ESTIMATING PHYSICAL BENEFITS – ENERGY SAVINGS: As previously described, without the HHCCP, the City would be forced to construct wellhead treatment at three of its four active wells. The HHCCP allows the City to use an already planned water supply to blend the contaminated groundwater, thereby avoiding the need to provide wellhead treatment. A key savings in avoiding the wellhead treatment is the avoided energy demand associated with treatment. As described above, the estimated annual energy demand for the preferred treatment alternative is approximately 932,129 kWh/year. Thus the HHCCP avoids this energy requirement as well as the associated greenhouse gases.

Two other regional water benefits, but not counted towards the quantified water supply benefit, are the irrigation efficiencies that will be accomplished through the RCD program and the in lieu recharge of the groundwater basin. The RCD program will support the regions long term drought preparedness efforts by improving agricultural irrigation practices and the use of more surface water in wet and normal years allows for the reservation of groundwater for dry years when less surface water is available.

REQUIRED NEW FACILITIES AND ACTIONS: As described in the City's Chromium Compliance Plan, many alternatives were considered for the HHCCP, including blending with surface water, wellhead treatment, and combinations thereof. In addition, multiple subalternatives were evaluated for wellhead treatment options as well as the number of wells that would be treated and/or blended.

Ultimately, the recommended project configuration for the HHCCP includes the delivery of treated surface water from the new West Hills WTP to three of the four City wells to provide blending for compliance with the Chromium 6 regulations and to avoid the cost and energy associated with adding wellhead treatment. Referring to Figure 2.3, the HHCCP project facilities will include:

- Approximately 0.9 mile pipeline (labeled Pipeline B) will be installed north along Westside Blvd and east along South Street to connect to Well No. 4,
- Approximately 0.7 mile pipeline (labeled Pipeline C) will extend east along Nash Road to connect to Well No. 5,
- Pipeline C will continue past Well No. 5 to Sally Street and then south to Well No. 2.

The fourth well (Well No. 6) will be put on inactive status to avoid Chromium 6 violations.

The RCD irrigation efficiency program will include:

- 1) Outreach to recruit grower participation in the irrigation efficiency program by raising awareness of the benefits of employing best irrigation efficiency practices,
- 2) Performing irrigation system efficiency evaluations and providing growers with education about how to improve their system's performance,
- 3) Providing technical assistance to implement projects that will improve irrigation system performance and will result in water supply and water quality benefits, and

Equipment required for the program will include irrigation system infrastructure (e.g., pipes, nozzles, drip lines) and metering equipment such as soil moisture meters and flow meters. There are no permitting requirements associated with this component of the project. Performance monitoring of water use will document physical benefits resulting from the irrigation efficiency monitoring.

POTENTIAL ADVERSE EFFECTS: It is expected that the project will have temporary construction related impacts that will be mitigated to less than significant levels. There are no other adverse effects anticipated, although an environmental review is scheduled to start in late 2015 to identify potential adverse effects of the HHCCP.

LONG TERM DROUGHT PREPAREDNESS: The HHCCP will contribute to long-term drought preparedness through the following:

- Provides sufficient water with which to blend groundwater from existing wells that have Chromium 6 concentrations in exceedence of the State MCL, thereby maintaining the ability to use existing groundwater.
- Provides a conjunctive use system to manage the groundwater basin for long-term sustainable use.
- Promotes improved irrigation practices and reduced water use through education and training.

2.3.5 DIRECT WATER RELATED BENEFIT TO A DAC

Not Applicable.

2.3.6 PROJECT PERFORMANCE MONITORING PLAN

The Project Performance Monitoring Plan will be designed to verify the reduced Chromium 6 levels in the delivered potable water as described in Table 2.9. There is no monitoring required for the reduced energy consumption, the benefit is inherent in the operation of the gravity fed conveyance system.

Table 2.9 Project Performance Monitoring Plan		
Project: West Hills Water Project		
Proposed Physical Benefits	Targets	Measurement tools and methods
Reduction in Chromium 6 Concentration in the Drinking Water to Meet DDW MCL of 10 ppb	8 ppb Chromium 6	Quarterly water quality sampling at City Wells 2, 4, and 5, consistent with Chromium 6 Compliance Plan
Improved agricultural irrigation efficiencies	Increased participation in RCD led education and training for irrigators and ranch managers in San Benito County	Number of growers receiving training and assistance from the RCD

2.3.7 COST EFFECTIVE ANALYSIS

The HHCCP delivers water quality benefits through the delivery of reduced Chromium 6 levels in the drinking water and reduced energy demand benefits through the avoidance of wellhead treatment. Several alternatives were considered and the HHCCP is the least cost alternative as documented in Table 2.10.

Table 2.10 Cost Effective Analysis	
Project name: Hollister Hexavalent Chromium Compliance Project	
Question 1	Of the many benefits provided by the Hollister Hexavalent Chromium Compliance Project, two of the most significant are a Human Right to water quality and reduced energy demands for residents of the City of Hollister. Additional benefits include water supply reliability, groundwater recharge and management, and ability to meet Waste Discharge Requirements.
Question 2	A large number of alternatives were considered in developing the Hollister Hexavalent Chromium Compliance Project. These alternatives are described in detail in the City of Hollister Hexavalent Chromium Compliance Plan (Draft) July 2015. A wide range of alternatives were developed and subjected to a preliminary screening process. The feasible alternatives were then further developed and evaluated with respect to economic and non-economic criteria.
Question 3	The Hollister Hexavalent Chromium Compliance Project is the least cost alternative considering both initial capital costs and long-term life-cycle costs.
Comments: The Hollister Hexavalent Chromium Compliance Project provides a reliable water supply for the Hollister Urban Area. Furthermore, it enables the City of Hollister to comply with regulations for Chromium 6 in the groundwater supply while avoiding costly wellhead treatment and its associated energy requirements.	

2.4 HEXAVALENT CHROMIUM TREATMENT PROJECT

2.4.1 HEXAVALENT CHROMIUM TREATMENT PROJECT DESCRIPTION

Implementation Project: Hexavalent Chromium Treatment Project (HCTP)

Implementing Agency: City of Watsonville (City)

Project Statement: Design of the system required to treat groundwater from six wells with hexavalent chromium above the MCL and ensure a safe water supply for Watsonville (DAC).

Project Need: 95% of the City's drinking water supply comes from the Pajaro Valley Groundwater Basin. The basin is in severe overdraft and is experiencing significant seawater intrusion. Compounding the groundwater problem and jeopardizing the drinking water supply for the City is the impact of hexavalent chromium (Chromium 6). On April 15, 2014 the SWRCB Division of Drinking Water (DDW) issued a final Maximum Contaminant Level (MCL) for Chromium 6 at 10 ppb. The City, a disadvantaged community (DAC), has six critical groundwater wells that comprise nearly three quarters of the City's public water supply that have Chromium 6 above the MCL (Table 2.11).

Parameter	Units	Well 2	Well 3	Well 7	Well 14	Well 17	Well 18	Total
Capacity	gpm	1,625	930	650	1,900	1,350	1,640	8,095
Utilization	%	57	89	41	28	42	24	
Q1/15 Chromium 6	ppb	18	13	12	14	12	19	
Annual Production	MG	487	435	140	280	298	207	1,846

Note: California DDW MCL for Chromium 6 is 10 ppb.

Human Right to Water: Assembly Bill 685, signed into law in September of 2012, states that “every human being has the right to safe, clean, affordable, and accessible water”. This is known as the Human Right to Water. Until treatment is implemented, the impacted wells will not meet primary drinking water standards leaving the City vulnerable to drinking water MCL violations and unable to serve its community with a safe and clean water supply.

Need for Expedited Funding: The City of Watsonville is a DAC, with an MHI less than 80% of the state average. The City needs expedited funding for design of the treatment system to continue to provide safe and affordable water in compliance with the Human Right to Water. The City estimates the cost of compliance to be approximately \$2 million for planning and design, and between \$12.4 and \$22.5 million for construction of the treatment systems, and an additional \$0.47 to \$1.2 million per year for operations and maintenance. The City's Water Division has an annual capital improvement budget of \$500,000 per year. The cost for compliance with the proposed regulation would need to be generated through a 50% rate increase. The cost of compliance would be devastating to the disadvantaged community. The residents of Watsonville should not have to choose between safe water or affordable water. While the City very much intends to move forward with treating these supplies, expedited funding is required to proceed immediately with the requisite planning and engineering and environmental permitting in order to make the water safe and affordable as quickly as possible.

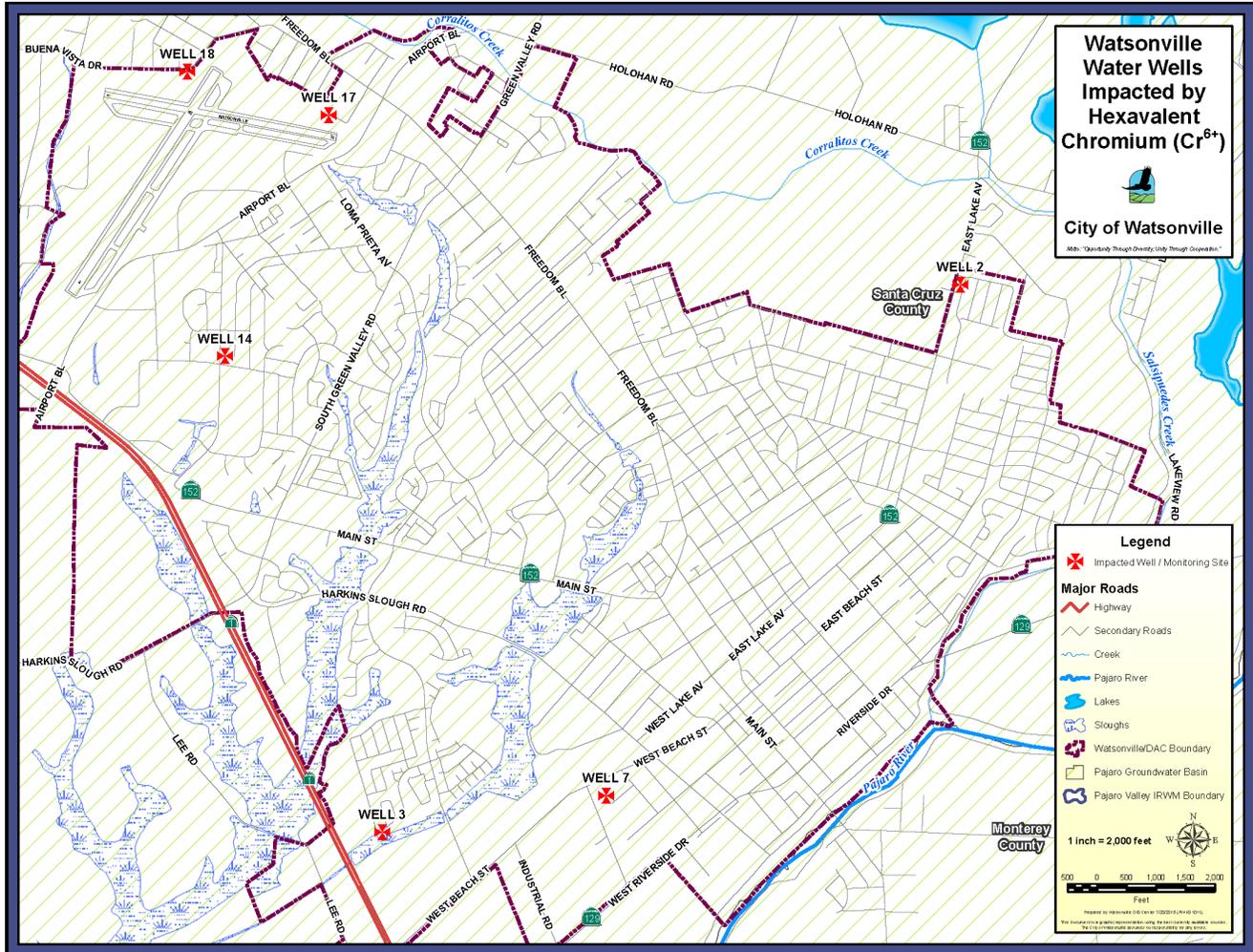
Project Approach: A technology evaluation identified reduction/coagulation/filtration (RCF) as the most cost effective treatment solution (Townsend and Gorman, 2015). The purpose of this project is to ensure safe and affordable drinking water for the residents of Watsonville, by planning and engineering for the construction of these treatment units. The project will result in final plans and specifications for the Chromium 6 RCF treatment. Additionally, the City is going to use the Chromium 6 treatment plant installation as an opportunity to communicate the importance of ongoing conservation. The current conservation outreach goals are in support of the Governor's declaration of the drought emergency and focus on water conservation. The City intends to expand on its current outreach approach to incorporate information about hexavalent chromium and steps that the City is taking to comply with the regulation. These messages will be through new water campaigns that are in development.

Physical Benefits: The primary physical benefit is the water quality benefit, a reduction of Chromium 6 levels between 4 and 11 ppb, so that the treated water will have no more than 8 ppb. The project is to design the system necessary to provide safe drinking water that meets all public health standards to the residents of Watsonville. Currently nearly three quarters of the water being served is above the Chromium 6 MCL 10 ppb regulatory standard. These wells require treatment, so that the city can provide safe water. The secondary physical benefit is water supply. The City will use this project as an opportunity to communicate with residents about the continued importance of conservation. This will be done as an enhancement to the existing conservation program. Although Chromium 6 project is anticipated to reduce water use in response to increased rates, the City expects to encourage enhanced conservation through the expanded outreach program.

2.4.2 HEXAVALENT CHROMIUM TREATMENT PROJECT MAP

The entire City of Watsonville is a disadvantaged community, as shown on the map (Figure 2.5). 95% of the City's drinking water supply comes from the Pajaro Valley Groundwater Basin. The six Chromium 6 impacted wells shown on the map comprise nearly three quarters of the City's public water supply.

FIGURE 2.5 CITY OF WATSONVILLE HEXAVALENT CHROMIUM TREATMENT PROJECT MAP



2.4.3 HEXAVALENT CHROMIUM TREATMENT PROJECT PHYSICAL BENEFITS

The Hexavalent Chromium Treatment Project (HCTP) provides a direct water quality benefit to the Disadvantaged Community of Watsonville. The project involves pilot testing and final design of a Chromium 6 groundwater treatment system and, as such, only a qualitative discussion of the project physical benefits upon completion of construction is required and presented below.

In 2014 the California State Water Resource Control Board (SWRCB) Division of Drinking Water (DDW), formerly the California Department of Public Health issued a final Maximum Contaminant Level (MCL) for hexavalent chromium (Chromium 6) at 10 ppb. Watsonville, a disadvantaged community, has six critical groundwater wells with Chromium 6 above the MCL and is actively pursuing long-term solutions for compliance with the Chromium 6 MCL. Completing the planning and design of the Chromium 6 treatment system and increasing the conservation program efforts will deliver the following physical benefits:

- PRIMARY PHYSICAL BENEFIT WATER QUALITY – REDUCED HEXAVALENT CHROMIUM IN THE DRINKING WATER:** The primary physical benefit of the HCTP is the reduction of Chromium 6 levels in the drinking water supply. The HCTP will provide a clean drinking water supply to the City of Watsonville and ensure the community’s Human Right to Water is satisfied. Although not required, the City has calculated the anticipated reduction in Chromium 6 levels as 6.9 ppb, a reduction from an average 14.9 ppb to 8 ppb (Table 2.12).
- SECONDARY PHYSICAL BENEFIT WATER SUPPLY – REDUCED WATER USE:** The City currently has an active conservation program. The planning for installation of Chromium 6 treatment units will be used as another platform to enhance the discussion about the continued importance of conservation with customers.

WATER QUALITY: Prior to the 2014 Chromium 6 rule, the MCL for total chromium in California was 50 ppb and all of Watsonville’s wells met that drinking water standard. However, on July 1st, 2014 the new MCL for Chromium 6 became effective. The Chromium 6 MCL is a Primary Drinking Water Standard, meaning that the regulatory limit is based on preventing adverse health impacts.

In 2013, the groundwater wells that have Chromium 6 above the MCL accounted for 74% of the City’s total potable water supply. While Watsonville very much intends to move forward with treating these supplies, the City will require outside funding sources to proceed with the requisite planning and engineering and environmental permitting in order to make the water safe and affordable.

The scope of the HCTP includes the planning, engineering, and permitting to provide Chromium 6 treatment systems, allowing the City to provide safe and affordable drinking water (Human Right to Water). Currently, Senate Bill 385 proposes to give water systems up to 5 years to come into compliance with the Chromium 6 standard. In order to meet that timeline Watsonville must move forward with the planning and engineering process as quickly as possible and will require outside funding sources to proceed. If the City can’t afford to proceed with design and implementation within the 5 years, then they will be in violation of the Primary Drinking Water Standard until they build treatment or develop an alternative water supply. Unfortunately, no alternative surface water supply is available and it is not reasonable to transport this amount of water from another location. If the City does not meet the deadline, the SWRCB DDW will issue a compliance order with a timeline for the water system to return to compliance. The residents of Watsonville will need to be notified of the non-compliance quarterly, until the drinking water meets the Chromium 6 standard. If Watsonville fails to comply, the City could be subject to fines and enforcement actions and the community would not have access to a safe and affordable drinking water supply.

The physical water quality benefit for Chromium 6 concentration is calculated based on the existing flow-weighted average of the Chromium 6 levels in the six impacted wells as compared to the Chromium 6 levels after treatment is in place. As shown in Table 2.12, the current flow-weighted average Chromium 6 level is 14.9 ppb, without treatment. However, after treatment is in place, Chromium 6 levels will be reduced to no greater than 8 ppb, reduction of 6.9 ppb and below the MCL of 10 ppb.

Table 2.12 Chromium 6 Concentrations in City of Watsonville Groundwater Wells				
Well	Well Capacity (gpm)	Chromium 6 (ppb)	Annual Production (MG)	Well Capacity x Chromium 6
No. 2	1625	18	487	8766
No. 3	930	13	435	5655
No. 7	650	12	140	1680
No. 14	1900	14	280	3920
No. 17	1350	12	298	3576
No. 18	1640	19	207	3933
Total			1847	27530
FLOW WEIGHTED AVERAGE Chromium 6				14.9 ppb
Note: California DDW MCL for Chromium 6 is 10 ppb.				

WATER SUPPLY: The City has been implementing a multi-faceted water conservation program for nearly two decades. This includes youth and adult programs, resident conservation tools and workshops, targeted customer outreach, and general and social media awareness campaigns. In support of Governor Brown's declaration of a drought emergency, the Watsonville City Council requested community participation in a voluntary 20% reduction in April of 2014.

To encourage and support the voluntary conservation effort, Watsonville implemented a new educational water conservation campaign through community programming and social media. This connects residents with the existing conservation programs, tools and resources available to them. With outdoor water use doubling in summer, outreach efforts include information that supports and encourages residents to carefully monitor outdoor summer water use, lawn management and other landscape water needs. These enhanced outreach efforts have resulted in water savings. One indicator that the conservation efforts have been successful is that the City's water use today is virtually the same as it was 15 years ago, despite a population increase of 30%.

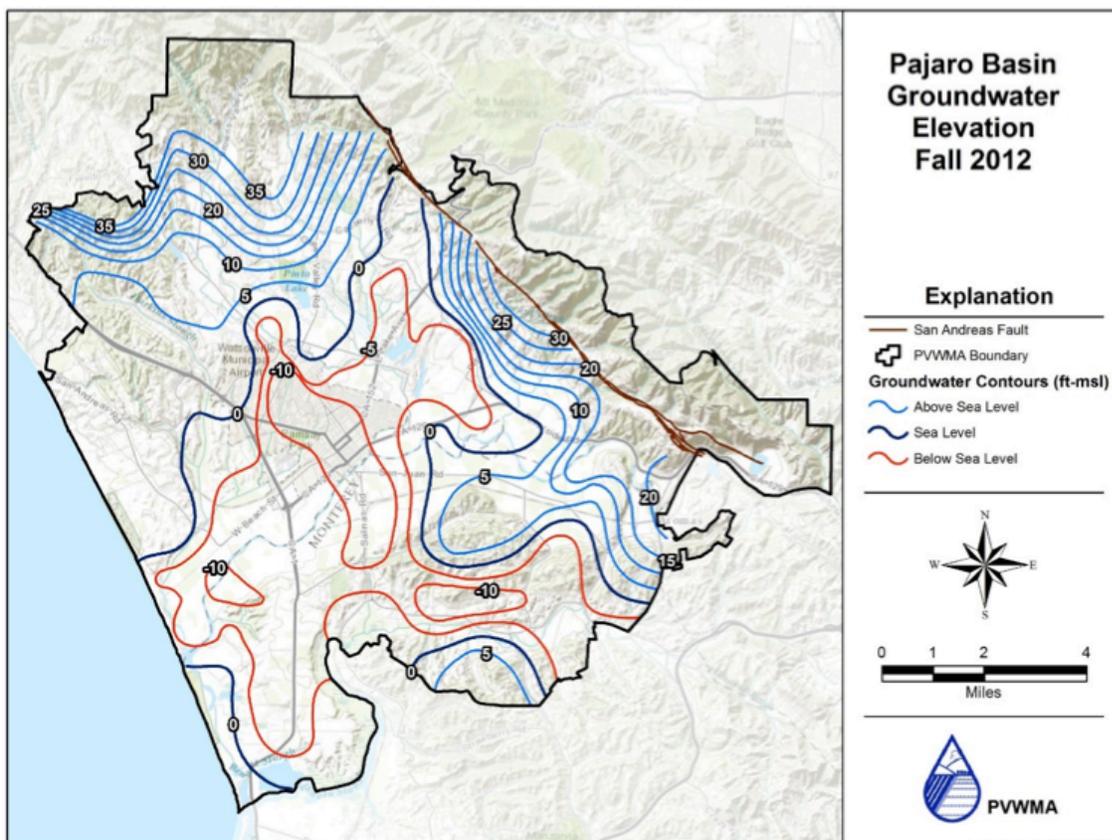
The City will 'piggyback' on the Chromium 6 issue to further expand these education and outreach efforts. The significant rate impact of the HCTP project is expected to produce a conservation effect. (Chesnut and Beecher, 1998, Southwest Florida Water Management District, 2015). The City will also use this project as an opportunity to remind residents of the importance of conservation. The City will produce quarterly outreach updates regarding the status of the Chromium 6 efforts with reminders of conservation programs and events. The information will be distributed to the residents with their water bills and will be integrated into the City's community program and social media campaign.

2.4.4 TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED

The Hexavalent Chromium Treatment Project (HCTP) provides a direct water quality benefit to the Disadvantaged Community of Watsonville. The project involves pilot testing and final design of a Chromium 6 groundwater treatment system and, as such, this section only requires an explanation of the need for the project.

RECENT CONDITIONS: 95% of the City's drinking water supply comes from the Pajaro Valley Groundwater Basin. The basin is in severe overdraft and is experiencing significant seawater intrusion as shown in Figure 2.6.

FIGURE 2.6 PAJARO VALLEY GROUNDWATER BASIN



Compounding the groundwater problem and jeopardizing the drinking water supply for the City is the impact of hexavalent chromium (Chromium 6). On April 15, 2014 the SWRCB Division of Drinking Water (DDW) issued a final Maximum Contaminant Level (MCL) for Chromium 6 at 10 ppb. The City, a disadvantaged community (DAC), has six critical groundwater wells that comprise nearly three quarters of the City's public water supply that have Chromium 6 above the MCL (Table 2.13).

Table 2.13 Chromium 6 Concentrations in City of Watsonville Groundwater Wells								
Parameter	Units	Well 2	Well 3	Well 7	Well 14	Well 17	Well 18	Total
Capacity	gpm	1,625	930	650	1,900	1,350	1,640	8,095
Utilization	%	57	89	41	28	42	24	
Q1/15 Chromium 6	ppb	18	13	12	14	12	19	
Annual Production	MG	487	435	140	280	298	207	1,846

Note: California DDW MCL for Chromium 6 is 10 ppb.

HUMAN RIGHT TO WATER: Assembly Bill 685, signed into law in September of 2012, states that “every human being has the right to safe, clean, affordable, and accessible water”. This is known as the Human Right to Water. Until treatment is implemented, the impacted wells will not meet primary drinking water standards leaving the City vulnerable to drinking water MCL violations and unable to serve its community with a safe and clean water supply.

PROJECT APPROACH: A technology evaluation considered treatment and blending alternatives for Chromium 6 compliance. Two treatment approaches were considered, strong base anion exchange (SBA-IX) and reduction/coagulation/filtration (RCF) technologies (Table 2.13). While other technologies exist for Chromium 6 treatment, such as weak base anion exchange or reverse osmosis, they were eliminated for further consideration in this analysis due to the anticipated operating costs or excessive water loss.

Table 2.13 Chromium 6 Treatment Alternatives		
Well	Alternative 1 Blending/RCOF/RCF	Alternative 2 Blending/SBA-IX
2	RCOF	SBA-IX
3	RCF	SBA-IX
7	Blend with 10 & 15, or RCF	Blend with 10 & 15
10	None	None
14	RCF (Onsite or off-site)	SBA-IX (Onsite or off-site)
15	None	None
17	RCF at Well 17	SBA-IX
18		SBA-IX

The technology evaluation identified reduction/coagulation/filtration (RCF) as the most cost effective treatment solution as shown in Table 2.14 (Townsend and Gorman, 2015). While further pilot testing is needed to refine these costs, RCF will be the selected technology for design.

Table 2.14 Chromium 6 Treatment Alternatives Cost Comparison		
Cost Element	Alternative 1 Blending/RCOF/RCF	Alternative 2 Blending/SBA-IX
Capital (\$M)	\$12.4 - \$22.5	\$13.8 - \$21.7
Annual O&M (\$M/year)	\$0.47 - \$1.2	\$0.56
Net Present Worth (\$M)	\$15.9 - \$36.3	\$22.6 - \$28.6

The purpose of this project is to ensure safe and affordable drinking water for the residents of Watsonville, by planning and engineering for the construction of these treatment units. The project will result in final plans and specifications for the Chromium 6 RCF treatment. The City of Watsonville has completed or is currently completing a significant amount of planning, feasibility studies, and pilot testing at Well 2 for the HCTP. This work will not be included in the grant funded work but is included here as a basis for justifying the design tasks to be included in the grant work plan.

- **Well 2 Pilot Testing:** Pilot-testing is required for Well 2 to determine whether the existing ATEC treatment process equipment, which relies on the oxidation and subsequent filtration and removal of Fe/Mn by greensand, can be modified to simultaneously remove Chromium 6. The challenge of modifying the existing treatment process to what could be termed a reduction/coagulation/oxidation/filtration (RCOF) process is balancing the opposing reduction – oxidation (redox) conditions required to meet all of the water quality objectives. The pilot testing at this site is underway and the test results will be used as a basis of design for Well 2.
- **Water Quality Sampling and Analysis:** Well startup water quality samples must be collected from the City's Chromium 6 impacted wells to clearly inform current conditions for key water quality parameters including Chromium 6, total chromium, nitrate, sulfate, iron, manganese, radionuclides, etc. The sampling and analysis will produce water quality data and time series graphs to be used in the design.
- **Well Treatment Sewer Discharge Capacity Analysis:** This work consists of reviewing relevant planning documents, design standards, and other available data related to the City's sanitary sewer system to verify the sewer system is capable of handling the additional waste from the treatment units. A Sewer Capacity Analysis technical memorandum will be prepared to document the work.
- **Evaluate Impact of Treatment Residuals on WWTP Operations:** This work involves performing a paper-evaluation of the potential impact of RCF treatment residuals (iron and chromium) on WWTP operations. A Treatment Residuals technical memorandum will be prepared to document the work.
- **Preliminary Design for Wells 2, 3, 7, 14, 17, and 18:** The purpose of this work is to coordinate project elements, resolve open issues, and prepare preliminary plans and outline specifications for the design recommendations for the listed wells. This work will result in a Preliminary Design Report that will be used to reach agreement on what will be carried forward into the Final Design.
- **CEQA Documentation:** Before this project can move to the construction phase, the CEQA documentation must be completed and approved. The City of Watsonville is the lead agency and anticipates qualifying for a categorical exemption based on similar projects.

NEED FOR EXPEDITED FUNDING: The City of Watsonville is a DAC, with an MHI less than 80% of the state average. The City needs expedited funding for design of the treatment system to continue to provide safe and affordable water in compliance with the Human Right to Water. The City estimates the cost of compliance to be approximately \$2 million for planning and design, and between \$12.4 and \$22.5 million for construction of the treatment systems, and an additional \$0.47 to \$1.2 million per year for operations and maintenance. The City's Water Division has an annual capital improvement budget of \$500,000 per year. The cost for compliance with the proposed regulation would need to be generated through a 50% rate increase. The cost of compliance would be devastating to our disadvantaged community. The residents of Watsonville should not have to choose between safe water or affordable water. While the City very much intends to move forward with treating these supplies, expedited funding is required to proceed immediately with the requisite planning and engineering and environmental permitting in order to make the water safe and affordable as quickly as possible.

2.4.5 DIRECT WATER RELATED BENEFIT TO A DAC

A DAC is defined as a community with an annual median household income (MHI) that is less than 80 percent of the statewide annual median household income. An MHI of less than \$48,875 is the DAC threshold. The City of Watsonville has an MHI of \$43,905, based on the 2009-2013 American Community Survey data, which is below the threshold and confirms its DAC status. As shown in Figure 2.5, the entire City of Watsonville is within the DAC defined boundary.

The Hexavalent Chromium Treatment Project will include the pilot testing and design of treatment systems necessary to reduce Chromium 6 levels to meet new MCL standards. The groundwater makes up 95% of the City's potable supply and the treatment will meet a critical water quality need for the City of Watsonville.

2.4.6 PROJECT PERFORMANCE MONITORING PLAN

The Hexavalent Chromium Treatment Project (HCTP) provides a direct water quality benefit to a project area entirely comprised of a DAC. The project involves pilot testing and final design of a Chromium 6 groundwater treatment system and does not include construction, as such, a Project Performance Monitoring Plan is not required.

2.4.7 COST EFFECTIVE ANALYSIS

The Hexavalent Chromium Treatment Project (HCTP) provides a direct water quality benefit to a project area entirely comprised of a DAC. The project involves pilot testing and final design of a Chromium 6 groundwater treatment system and does not include construction, as such, a Cost Effective Analysis is not required.