CORONA | ENVIRONMENTAL CONSULTING

Final Report - Executive Summary

Feasibility Study for Long-Term Drinking Water Solutions for the Unincorporated Area North of Moss Landing

Final

November 18, 2021

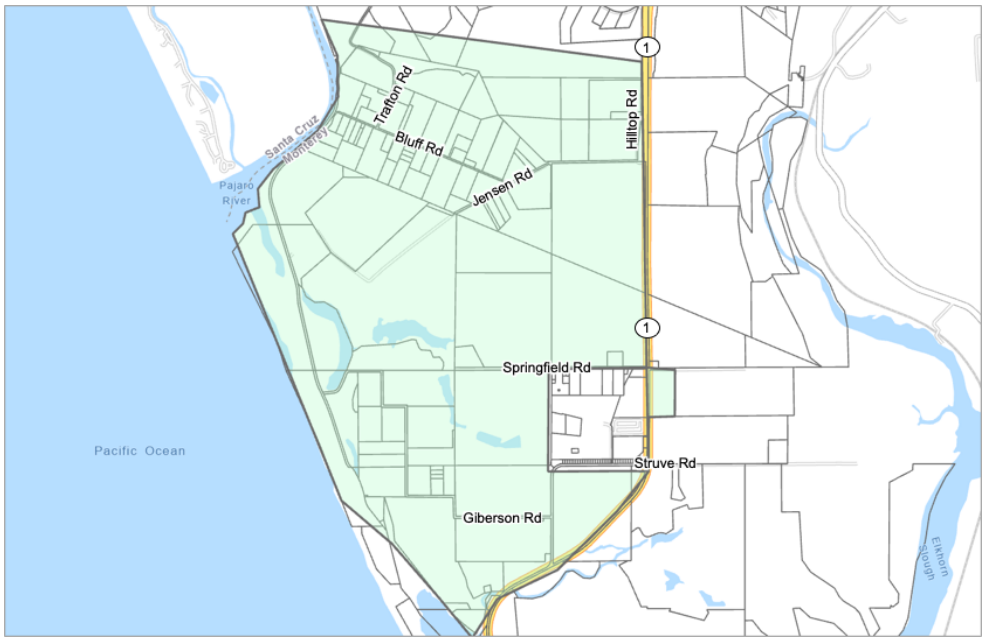
Corona Environmental Consulting, LLC and
KYLE Groundwater, Inc.
in conjunction with Community Water Center

Executive Summary

Background

The Community Water Center (CWC), with funding from the State Water Resources Control Board (SWRCB), provides assistance to communities to develop long-term drinking water solutions to improve both water quality and water supply. One of the communities CWC is currently assisting is the agricultural, low-income area of unincorporated Monterey County north of Moss Landing. The project area is shown in green in the map below (Figure ES-1). This community of approximately 88 households is in need of a long-term drinking water solution as residents are currently receiving drinking water from private and shared wells that have very high levels of chloride (indicating seawater intrusion), total dissolved solids (TDS), nitrate and 1,2,3-Trichloropropane (123-TCP). The following executive summary provides an overview of the study conducted to identify suitable long-term drinking water solutions that could provide safe and affordable drinking water to the community.

Figure ES-1. Project area map. Project area shaded in green. The white square area within the green project area is intended to be served by the Springfield Water System Consolidation Project (Springfield Project) and thus is excluded from the area being considered for this project.



The goals of the study include:

- Conducting an alternatives analysis to evaluate long-term options for supplying safe and affordable drinking water to the community
- Engaging community members and other stakeholders in the evaluation of options
- Supporting community members to make an informed decision and collectively arrive at a preferred drinking water solution
- Selecting a preferred alternative and seeking state grant funding to cover the costs to implement the selected alternative

As part of this project, CWC has engaged with residents and property owners in the project area via virtual community meetings, mailers, phone calls, and one-on-one conversations and surveys to solicit their questions about the project and their feedback on the alternatives being considered. In this Draft Report, Corona Environmental Consulting, with support from CWC, has addressed many questions received from community members. Community feedback is also summarized in detail in Appendix F. CWC and Corona Environmental Consulting have also convened meetings and received feedback from other project stakeholders. Stakeholders for this project whose feedback has informed this Draft Report include nearby water providers (Pajaro Sunny Mesa Community Services District (CSD)), Monterey County Environmental Health Bureau, Monterey County LAFCO, Pajaro Valley Water Management Agency, and the SWRCB.

Alternatives and costs

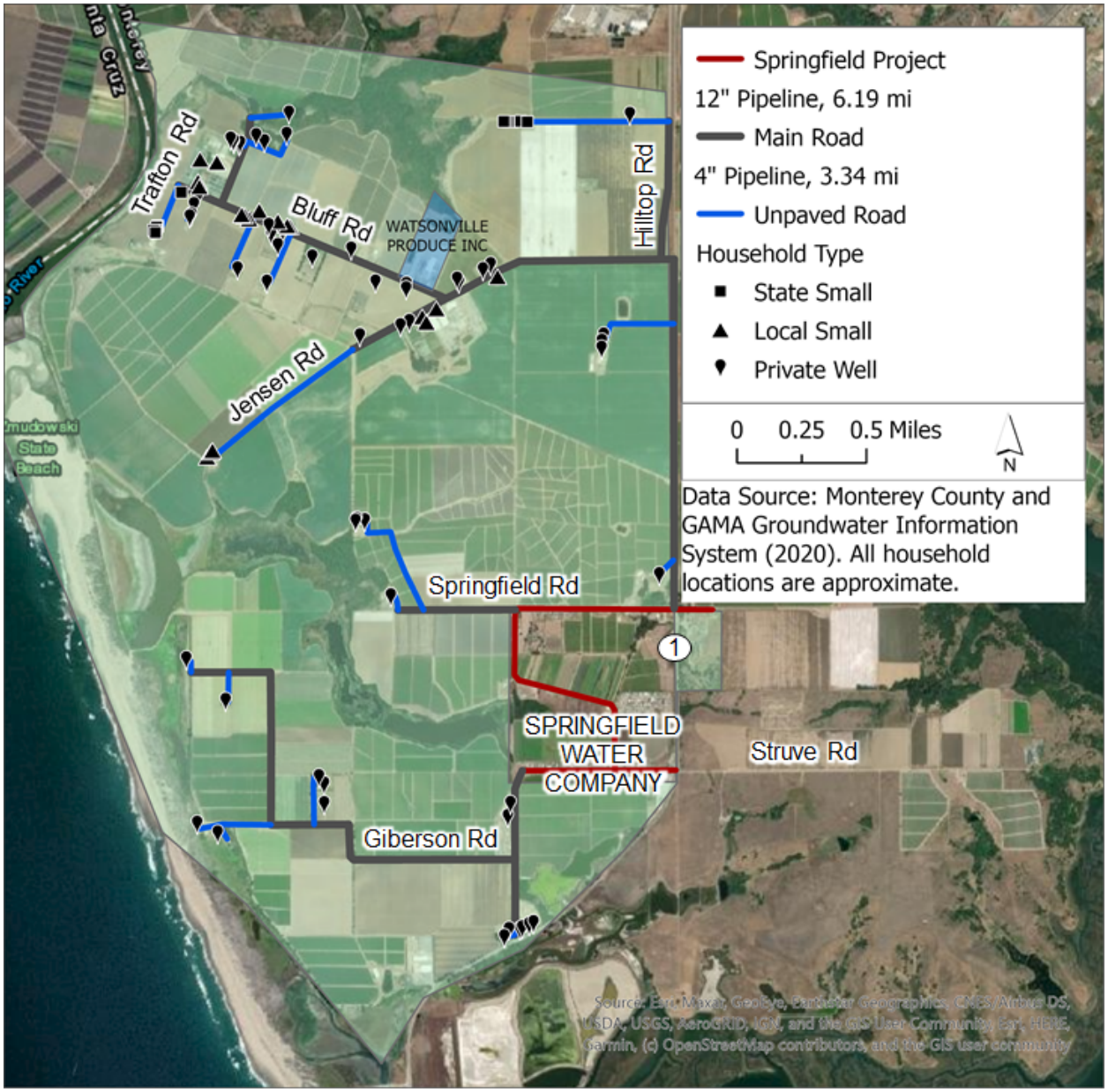
This study evaluated the technical practicality and associated initial costs (sometimes referred to as capital costs) as well as operation and maintenance (O&M) costs of potential long-term drinking water solutions summarized in Table ES-1, taking into consideration water quality and other local constraints. For the first two alternatives (physical consolidation and new community water system), households would be supplied with water from a piped community water system, which people sometimes call “city water”. A pipeline would be installed in the street in front of each property and households would become customers of Pajaro Sunny Mesa Community Services District or a new entity and pay a monthly water bill. Two different ways to connect households to city water (or in other words Physical consolidation) were considered. Both scenarios involved connecting to the Springfield Water System, with Scenario A involving the development of a new well and Scenario B connecting to the Sunny Mesa and Pajaro Systems to provide a second water source.

For the other three alternatives (replace existing domestic wells, wellhead treatment, and point-of-use/point-of-entry [POU/POE] treatment), households would continue to receive water from domestic wells, which are smaller wells on their property or small wells that are shared with other households through state or local small water systems.

Table ES-1. Summary of alternatives considered.

Name	Description	Water Supply
Physical Consolidation	*Connect to the Springfield Project operated by the Pajaro Sunny Mesa Community Services District (CSD)*. The Pajaro Sunny Mesa CSD would be responsible for operating and maintaining the water system. In addition to the Springfield Project well, an additional water source would also be needed for backup or emergency purposes. The new water source could be a new backup well (Scenario A) constructed at a location with potentially good water quality near or within the project area or water from the Pajaro Water System (Scenario B) if the Pajaro Water System is connected to the Sunny Mesa Water System and the Sunny Mesa Water System is connected to the project area. Households could either destroy their wells or keep their wells for non-potable use and install and maintain backflow preventers on them to prevent contaminated water from the wells from entering the water system. A map showing how the project area could be consolidated with the Springfield Water System is shown in Figure ES-2.	Community Piped Water System
New Community Water System	*Develop a new community water system that could be owned and operated by an existing system*. Locations for two new wells would need to be identified in an area with potentially good water quality. For this option, piping would be installed in the street. A new entity or an existing entity, such as Pajaro Sunny Mesa CSD, would be responsible for operating and maintaining the water system.	Community Piped Water System
Replace Existing Domestic Well(s)	*Replace existing wells with new, better constructed wells likely to produce better water quality*. The property owner would be responsible for ongoing operation and maintenance of the new well.	Domestic Well
Wellhead Treatment	*Install treatment systems that remove contaminants to safe levels and that treat all water produced from a well for one or more households.* This option would use water treatment equipment including filters to remove the contaminants so that the water would satisfy drinking water standards.	Domestic Well
Point of Use/Point of Entry Treatment	*Install treatment systems that remove contaminants to safe levels that treat water at the location of consumption (normally the kitchen sink) and/or just prior to entering homes.*	Domestic Well

Figure ES-2. Map of potential physical consolidation with the Springfield Project.



Benefits and disadvantages or challenges for each alternative are summarized in Table ES-2. It is important to note that POU/POE treatment is not certified by the State of California to treat well water with extremely high nitrate concentrations, and therefore it will not be an adequate solution for the majority of households. Also, replacing private wells may not address water quality issues because it is possible that a new well could also be subject to contamination and/or seawater intrusion.

Cost estimates per household have been developed for each alternative and are shown in both Table ES-2 and Table ES-3. Table ES-3 shows total costs over a 20-year period that account for both initial and long-term O&M costs in present-day dollars. By combining initial capital costs and O&M costs, total costs across alternatives can be compared.

Table ES-3 O&M costs assume water used for indoor and outdoor purposes is treated, except for the POU/POE alternative where only water used indoors is treated. Based on quotes from two treatment equipment vendors (A and B), wellhead treatment was estimated to be the most expensive alternative. Physical consolidation with an existing water system and development of a new community water system appear to be the most cost competitive, especially when considering that POU/POE treatment only treats water used for indoor consumption whereas these options provide water for indoor and outdoor use.

The different alternatives are not expected to have the same level of grant funding from the state, which is another important consideration related to cost. Table ES-2, which summarizes initial capital costs and O&M costs on a household basis, has been color coded to reflect anticipated grant funding.

Table ES-2. Summary of the benefits, challenges, and costs per household for each alternative.

	Costs anticipated to be grant funded for the community.
	Costs anticipated to be grant funded for households that qualify based on ability to pay.[1]
	It is uncertain which O&M costs may be eligible for state funding.

Alternative	Benefits	Disadvantages and Challenges	System type[2]	Annual O&M per house ($/yr)[3]	Monthly O&M per house ($/month)[3]	Capital Costs per house ($)
Physical consolidation (Connect to Springfield Project)	•Operated by an experienced utility, which will likely improve long-term sustainability. •Storage, booster pumps and one well would be shared with an existing system. •Low estimated O&M costs •Scenario B would regionally consolidate the project area with two additional systems, increasing the reliability of each system. •Scenario B would be more reliable in the long term, because it would rely on more inland wells less vulnerable to seawater intrusion.	•High initial construction costs •Capital cost uncertainties associated with pipelines crossing highways, private land, and protected habitat. •Scenario A would rely only on wells near the coast that could have water quality degrade in the future from seawater intrusion. •Scenario B is dependent on the completion of a consolidation project between Sunny Mesa and Pajaro Water Systems that is without a start date.	CWS	Based on PSMCSD Water Rates[4] (See Table ES-4 for examples)		Scenario A: 154,000; Scenario B: 149,000[6] (Community Infrastructure) Lateral Pipe Installation & Well Destruction: 21,000 Lateral Pipe Installation & Well Isolation: 10,000 + premise plumbing modifications [7]
New CWS	•Another experienced water utility may be able to operate the system, which would likely improve long-term sustainability. •Water quality monitored and reported to the state •Low to moderate estimated O&M costs	•High initial construction costs •Likely only eligible for state funding if physical consolidation is not feasible •If another experienced water utility is not able to operate the system, it would likely be difficult and time consuming to develop a new and sustainable utility. •Requires the development of a new permit or modifying an existing permit that may delay implementation	CWS	Based on PSMCSD Water Rates[4] (See Table ES-4 for examples)		233,000[6] (Community Infrastructure) Lateral Pipe Installation & Well Destruction: 21,000 Lateral Pipe Installation & Well Isolation: 10,000 + premise plumbing modifications[7]
Replace private wells	•Does not require new community-level water infrastructure •Low estimated O&M costs	• Each well owner will be responsible for maintaining their well and water system •Water quality in replacement wells could degrade in the future •Replacement wells with good water quality will likely be infeasible in some portions of the project area	PW	692	58	166,000
			LSWS	294	25	63,000
			SSWS	154	13	37,000
Wellhead treatment	•Can treat other contaminants that may reach wells in the future	•High estimated O&M costs •Requires frequent disposal of waste from treatment systems •Could be difficult to maintain many individual decentralized treatment systems that require substantial O&M costs and support	PW[5]	86,200	7,180	165,000
			LSWS[5]	39,700	3,310	142,000
			SSWS[5]	37,100	3,090	78,900
			PW[5]	13,300	1,110	707,000
			LSWS[5]	12,400	1,030	307,000
			SSWS[5]	10,200	850	165,000

POU/POE	•Low capital costs	•Not an allowable option for compliance ofSSWS and LSWS in Monterey County •Infeasible for 12 of 15 households that need treatment due to high nitrate •Could be difficult to maintain many individual decentralized treatment systems that require substantial O&M costs and support •Growth of microorganisms in granular activated carbon (GAC) filters is a potential concern	PW	9,210 indoor only	770 indoor only	70,500[8]

[1] The State Water Board Division of Financial Assistance (DFA) is in the process of updating their funding policy for work on private property and has provided preliminary guidance with implications for this project (Email Correspondence from the Assistant Deputy Director, DFA, on 10/14/2021). In the updated funding policy, funding eligibility for work on private property will normally be determined on a community basis meaning that most households in this project would be eligible since the area is classified as a disadvantaged community (DAC). There may be some exceptions, such as very costly work on private property or in cases where block group income data is not representative of individual households in the project area. In these cases, funding eligibility would be based on the property owner's ability to pay. DFA is working to formalize this guidance into a written policy and CWC is seeking confirmation whether this policy applies to all costs on private property (lateral, well destruction and backflow preventer, and what the criteria may be identifying exceptions where ability-to-pay information is required).

[2] Community Water System (CWS), Private Well (PW), Local Small Water System (LSWS), State Small Water System (SSWS). For cost estimation, it is assumed that each PW, LSWS and SSWS serve an average of 1.3, 3.4 and 6.5 households respectively based on the average number of households each type of system serves in the area.

[3] O&M costs assume 150 gallons per person per day water use for indoor and outdoor purposes except where indoor only use is noted. Indoor water use only assumes 55 gallons per person per day.

[4] Pajaro Sunny Mesa Community Services District. "Exhibit "A" Pajaro/Sunny Mesa Community Services District Rate Schedule. Effective Date July 1, 2021. http://pajarosunnymesa.com/uploads/Rate%20Schedule%207-2021%20to%206-2022.pdf".

[5] Costs for offsite disposal are the largest component of O&M costs for Vendors A and B and may be avoidable if the Central Coast RWQCB allows onsite disposal of brine.

[6] These capital costs are associated with work not performed on private property such as installation of water mains. Such costs would be eligible for grant funding for all households regardless of economic status. Scenario A involves developing a new well to provide a second water source whereas Scenario B would connect the project area to the Sunny Mesa and Pajaro Systems if they consolidate in addition to connecting to the Springfield Project instead of developing a new well.

[7] These capital costs are associated with work performed on private property such as constructing a service line, demolition of an old well, or the installation of a backflow prevention device. When determining eligibility for state funding for these costs, a property owner's ability to pay for these costs themselves would be considered. If a property owner chooses to keep their well for outdoor water use, they would be responsible for the installation and maintenance of a backflow preventer to keep the well isolated from the public water system as well as any plumbing on their premises needed to avoid blending water from their private well with water from the community water system. The costs shown assume the work is performed by a contractor. If an owner obtains a simple Monterey County construction permit, which costs approximately $240, and installs the service line themselves, the assumed $6,500 cost for service line construction may be substantially reduced. The cost shown for lateral installation and well destruction does not include the full cost of destroying one well, because some wells serve multiple households. The cost shown represents the cost of destroying the approximately 50 wells in the project area divided among the 88 households.

[8] POU/POE capital costs include site assessments, technical oversight, diagnostic water quality sampling, an allowance for improvements to existing wells and storage tanks, project management, and replacement at 10 years.

Table ES-3. Comparisons of initial capital, 20-year O&M, and 20-year total costs per household for each alternative.

Alternative	Capital costs ($/household)[b]	20-year O&M costs ($/household)	20-year total cost ($/household)
Replace Private Well	37,800 to 166,000[a]	15,900 to 27,100[a]	53,700 to 193,000[a]
Consolidation: Scenario A	176,000	27,800	203,800
Consolidation: Scenario B	170,000	27,800	197,800
New CWS	254,000	27,800	281,800
Wellhead Treatment Vendor A	78,900 to 166,000[a]	1,070,000	541,000 to 1,240,000[a]
Wellhead Treatment Vendor B	165,000 to 707,000[a]	127,000 to 166,000[a]	292,000 to 872,000[a]
PW - POU/POE	70,540	112,000 to 115000[a]	182,000 to 185,000[a]

[a]For domestic well solutions, the cost per household will depend on how many houses share a well. For those solutions, a range of costs is provided, with the low end of the range being the cost per household for households in a state small water system serving approximately 6 or 7 households and the high end of the range being the per-household cost for a well serving just one property. [b]A 5% discount rate is assumed when calculating total 20-year costs.

The O&M costs shown in Table ES-3 were calculated using average household water consumption estimates in California and assume an occupancy of 4.7 residents per household, which leads to conservative (i.e., elevated) estimates for daily household water consumption of 705 gal per day per household. This level of water consumption is compared in Table ES-4 with several other possible scenarios assuming indoor water use only as well as average historical indoor and outdoor water consumption in nearby water systems and for individual households. When using the Pajaro Sunny Mesa Community Services District (CSD) water rate structure, monthly water bills would range between $23 and $116 per month per household for these different water consumption levels. Since the O&M costs for physical consolidation and a new CWS shown in Table ES-3 were determined using Pajaro Sunny Mesa CSD water rates and a daily household water consumption of 705 gal per household per day, O&M costs in Table ES-3 are likely conservative. Depending on the water use habits of residents, the number of residents per household, and the extent of landscaping/irrigation demands, water demand and bills could be substantially less in the project area.

Table ES-4. Potential household (HH) water bills for physical consolidation and new CWS alternatives assuming different water consumption scenarios and Pajaro Sunny Mesa CSD's current water rates.

Water Consumption Scenario	ADD (gpcd)	Residents / HH	Daily HH Use (gal/day/HH)	Monthly Bill ($/month)
Average Indoor+Outdoor Use in California[1]	150	4.7	705	186
Average Indoor Only Use in California[2]	55	4.7	259	86
Sunny Mesa Average (2019-2020)[3]	Unknown		281	91
2020 Average for example households in the Sunny Mesa Water System[4]				
Family of 4 w/ Landscaping	92	4	369	116
Family of 4 w/ Minimal Landscaping	61	4	246	88
Family of 2 w/ Landscaping	160	2	320	104
Family of 1 w/ Minimal Landscaping	25	1	25	23

[1]SWRCB. "Initial Statement of Reasons 1,2,3-Trichloropropane Maximum Contaminant Level Regulations. Title 22, California Code of Regulations", Last updated 2/17/19. Water bills calculated assuming the Pajaro Sunny Mesa CSD, "Rate Schedule" Accessed 7/6/21, http://pajarosunnymesa.com/uploads/Rate%20Schedule%207-2021%20to%206-2022.pdf. [2]SWRCB California Water Board, "Fast Facts on the Water Conservation Legislation" Accessed 5/28/21, https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/Files/PDFs/Water-Conservation-Legislation-Fact-Sheet_a_y19.pdf. Water bills calculated assuming the Pajaro Sunny Mesa CSD, "Rate Schedule". [3]Water consumption and bills based on personal communication between Kyle Shimabuku (Corona Environmental Consulting) and Judy Vazquez-Varela with Pajaro Sunny Mesa CSD, on July 6th, 2021. [4]Water consumption and water bills based on personal communication between Heather Lukacs (CWC) and Judy Vazquez-Varela with Pajaro Sunny Mesa CSD, on June 15th, 2021.

Summary of the Alternatives Evaluation

Cost and non-cost considerations from Table ES-2 were used to develop criteria to evaluate and rank each alternative. The criteria include funding availability, long-term sustainability/reliability, implementation challenges and considerations, the schedule to implement the alternatives, and the alternative's ability to address water quality issues for all homes in the project area. Also, combinations of alternatives were considered and ranked alongside the standalone alternatives. The combinations of alternatives that were considered include:

- Consolidation or new CWS and replacing existing wells
- Consolidation or new CWS and wellhead treatment
- Consolidation or new CWS and POU/POE treatment
- Consolidation or new CWS and no intervention for wells that are in compliance

Consolidation or a new CWS were considered in combination with other alternatives because the physical consolidation and new CWS solutions had the highest and second highest overall rankings, respectively. These combinations were considered to evaluate whether it may be possible to reduce consolidation or new CWS costs by providing a different solution or no intervention (if water quality standards are currently met) for households that are far away from others. A summary of this ranking is provided in Table ES-5.

Table ES-5. Summary of the alternatives evaluation

	Non-Treatment Alternative			Treatment Alternatives		Combination of Alternatives			
Criteria	**Physical Consolidation with Springfield**	**New Community Water System**	**Replacing Existing Wells**	**Wellhead Treatment**	**POU/POE Treatment**	**Consolidation or New CWS and Replacing Existing Wells**	**Consolidation or New CWS and Wellhead Treatment**	**Consolidation or New CWS and POU/POE Treatment**	**Consolidation or New CWS and No Intervention for some wells in compliance**
Grant funding to cover all homes									
Capital cost									
Annual operations and maintenance cost									
Estimated monthly water rate charged to households									
Schedule to implement, including estimated timeline for relevant permits									
Implementation challenges and considerations									
Long-term sustainability / reliability									
Addresses all homes									
Recommended for further consideration	Yes	Yes	No	No	No	No	No	No	Yes
Notes	Recommended alternative	Second choice alternative	Cannot reliably provide safe water to all homes in the project area	Cost prohibitive	Cannot provide safe water to all homes in the project area; grant eligibility depends on income; O&M costs are high	Less sustainable than physical consolidation only and limited opportunities to reduce consolidation costs with a new well	Unable to decrease costs relative to physical consolidation alone. Also has other drawbacks.	Not a long-term solution and may not be grant eligible	Needs further investigation. Could reduce capital and O&M costs, but may be less resilient/sustainable than providing a connection to a community water system for all households.

Key	
	Favorable
	Somewhat favorable
	Less favorable
	Not favorable

Recommended Alternatives for Further Consideration

When considering all of the criteria, the recommended alternative for further consideration is physical consolidation with the Springfield Project. This alternative is ranked above a new CWS because the capital cost is lower, the ongoing cost to residents is the same, and combining with an existing community water system is likely to be more sustainable because infrastructure and technical and managerial capacity would be shared with that system. Also, state grant funding would likely only be available for a new CWS if physical consolidation is not feasible. Both physical consolidation Scenarios A and B should be considered further, though Scenario B is the prefered option. Scenario B ranks better as a long-term and reliable solution as the project area would also be consolidated with systems that have groundwater sources that are further inland and may be less vulnerable to seawater intrusion. However, Scenario B depends on the completion of a consolidation project between the Sunny Mesa and Pajaro Systems, which does not have a start date. Therefore, Scenario A should be considered alongside Scenario B in the event that Scenario B cannot be pursued because, for instance, consolidation between the Sunny Mesa and Pajaro Systems is determined to be infeasible or its implementation timeline is substantially delayed. Also, the ability to implement either scenario is contingent on the successful completion of the Springfield Project. If for some reason this alternative is not viable or is delayed substantially, then the new CWS alternative can be pursued.

It may be advantageous for households to use grant funding that may be available to destroy existing domestic wells if physical consolidation is pursued as it would prevent surface water contamination of the aquifer from the well, avoid well maintenance costs, and potentially provide benefits to the community such as supporting aquifer management to limit seawater intrusion. However, property owners can decide to continue to use their well for irrigation and connect to the Springfield Project for indoor water use. For property owners to continue to use domestic wells for irrigation, a backflow preventer would need to be installed that is estimated to cost $2,340[1]. Modifications to premise plumbing needed to separate outdoor water piping from interior use water piping might incur additional costs that the property owner may need to cover. In addition, the backflow preventer would need to be tested annually, which currently costs $90 per year. When deciding to keep or destroy domestic wells, community members should consider the age of their well, as domestic wells can have an average useful life of 30 to 50 years[2]. Shallow domestic wells in the area may experience sea water intrusion in the future.

Although the other standalone alternatives each have advantages with respect to one or more of the criteria, they are ranked less favorable or unfavorable with respect to their ability to provide a solution for all households, reliably and sustainably provide safe water, and/or provide an affordable solution. Since these criteria are critical, these alternatives on their own are not recommended. In addition, combining these alternatives with physical consolidation or development of a new CWS are not recommended for many of the same reasons they are not recommended as a standalone alternative. Additionally, the combination of alternatives may not be able to meaningfully reduce the costs of consolidation with the Springfield Project or the development of a new community water system.

[1]Based on the California Water Board, "2021 Drinking Water Needs Assessment" Accessed 8/10/21, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2021_needs_assessment.pdf. It also includes the 1.3 regional multiplier and a 20% contingency.

[2]Re/Max Executive Realty, "Well Inspections: Buying a Home with a Well", Accessed 5/28/21, https://www.maxrealestateexposure.com/buying-home-with-well/

It may be possible to reduce the capital costs of one of these community water system-based alternatives by not providing an intervention for groups of households that are (i) geographically distant from other households and (ii) served by wells with adequate water quality. Due to the limited availability of water quality data for the wells serving the geographically distant households, it is currently not possible to estimate the location and number of households that could be excluded from the project. Therefore, it is recommended that the water quality in the wells that serve these households be further investigated before this alternative is deemed to be a viable option. Also, even if water quality standards are currently being met, water quality at these wells could change and fall out of compliance with drinking water standards in the future due to seawater intrusion or contaminant plume migration, which should be considered before pursuing this option.

Next Phase of Work

This Final Report is the final deliverable in the phased process to produce a completed project deliverable. A summary of the phases of work is shown in Table ES-6. Prior to this Final Report, Corona Environmental Consulting developed an Public Draft Report, and Administrative Draft Report, and an Overview of Alternatives. The Public Draft Report, Administrative Draft Report, and Overview of Alternatives were reviewed by representatives from the SWRCB, Monterey County Environmental Health Bureau, and Pajaro Sunny Mesa Community Services District (CSD). The Public Draft was also made available to community members for comment. Key findings were also presented at community meetings, during which community members asked questions and provided input. This Final Report incorporates revisions to the PublicDraft Report based on input from stakeholders and community members. Findings from this final deliverable will be presented to community members.

Table ES-6. Project steps and timeline.

Task	Feb	Mar	Apr	May	Jun/Jul	Aug/Sep	Oct/Nov
Scope of Work							
Overview of Alternatives Draft Report							
Administrative Draft Report							
Public Draft Report							
Final Report							

indicates deliverable

indicates community meeting

indicates community comment

State Water Resources Control Board, Monterey County and Pajaro Sunny Mesa Community Services District review and comment