Item: 4.17

Butte County Board of Supervisors
Agenda Transmittal

Subject: Approval of Projects for the Sustainable Groundwater Management Grant Program Surface Water Supply

Department: Department of Water & Resource Conservation

Meeting Date: May 27, 2025

Contact:
Christina Buck, Assistant Director, 5305523593

Department Summary:
The Department of Water and Resource Conservation is a sub-recipient of the Sustainable Groundwater Management Grant Program through the Vina Groundwater Sustainability Agency. A goal of the project under the grant program is to identify ways to use additional surface water in the Vina subbasin to reduce groundwater pumping and to complete feasibility analysis for two selected projects. The Department is the sub-recipient as the grant project considers the use of the County's State Water Project Table Water as a potential water source for local use. The Department retained Geosyntec and Water and Land Solutions, LLC., to complete a Surface Water Supply Feasibility Analysis. The first step of the process was the completion of a Fatal Flaw Analysis to help identify viable projects. The Fatal Flaw Analysis Report describes four potential projects and key considerations to help identify the two most viable projects to advance to feasibility analysis. The second step of the process includes a more thorough evaluation of the selected projects.

On April 2, 2025, the Butte County Water Commission discussed the four projects and voted 6-1 to recommend advancing the Feather River South Vina Extension and the Ridge to Valley projects for feasibility analysis for the use of additional surface water to reduce groundwater pumping. Consistent with Water Commission recommendation and discussion, the Department recommends the Board of Supervisors approve the two projects to advance to feasibility analysis.

Fiscal Impact:
The feasibility analysis is funded by the Sustainable Groundwater Management Grant Program.

Personnel Impact:
None.

Action Requested:
Approve the Feather River South Vina Extension and Ridge to Valley projects for feasibility analysis.

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MEMORANDUM

DATE: May 9, 2025

TO: Butte County Board of Supervisors

FROM: Christina Buck, Assistant Director

RE: Selection of Two Water Supply Projects for Feasibility Analysis

Background

The Vina Groundwater Sustainability Agency (GSA) received funding from the California Department of Water Resources through a Sustainable Groundwater Management Grant to identify ways to use additional surface water in the Vina Subbasin to reduce groundwater pumping, also called in-lieu recharge. Using more surface water to offset groundwater use is one component of the County's portfolio approach to reaching and maintaining sustainability in the Vina Subbasin, in combination with direct groundwater recharge and demand reduction. The Department of Water and Resource Conservation, through a contract with Geosyntec and Water and Land Solutions, LLC, is implementing the grant-funded Surface Water Supply Feasibility Analysis Project (Project) on behalf of the Vina GSA. This is due to the project's close connection to the County's Recharge Action Plan and because the key water supply being considered for multiple project options is the County's State Water Project Table A allocation from Lake Oroville.

Vina Subbasin Surface Water Supply Feasibility Analysis Project

The grant funds for the Project are sufficient for completing feasibility analysis for two water supply projects. In order to focus the bulk of the effort on the two most promising projects, the following approach is underway: 1. Develop a list of potential water supply projects under consideration, 2. Identify four projects of greatest interest and complete Fatal Flaw Analysis, 3. Select two of the four projects for completion of a Feasibility Analysis report.

The Project began with stakeholder meetings and research to develop a list of potential projects. On August 7, 2024, the Butte County Water Commission (Commission) discussed general priorities for water supply projects and formed an adhoc committee comprised of Commissioners Washington, Arvonen, and Raymond. Nine potential projects were presented to the Commission on December 4, 2024 and four projects were selected to proceed to fatal flaw analysis. The adhoc committee met on March 17, 2025 with other interested parties and the consultant team to discuss and provide feedback on initial findings of the draft Fatal Flaw Analysis. At its April 2, 2025 meeting, the Commission recommended two projects advance to feasibility analysis. The Butte County Board of Supervisors is being asked to make the final selection of the two projects to be evaluated by the feasibility analysis.

The Fatal Flaw Analysis report identifies potential challenges that could prevent a project from being implemented. It includes an intermediate level of project information to refine projects and eliminate the more constrained alternatives. The Feasibility Analysis report will describe in greater detail the critical facets of each project, provide reconnaissance-level designs, develop cost estimates to quantify a dollar per acre-foot cost-benefit ratio, and will be developed to assist with future grant applications for implementation.

Projects Considered

The attached Fatal Flaw Analysis (Attachment 1) describes the following four water supply projects and evaluates them for fatal flaws:

1. Feather River -- South Vina Extension
2. Ridge to Valley
3. Feather River -- Sacramento River Exchange
4. Feather River -- Butte Creek Diversion

Water Commission Recommendation

On April 2, 2025, the Commission considered the Draft Fatal Flaw Analysis and held a robust discussion. The Commission voted 6-1 in favor of recommending advancement of the Feather River - South Vina Extension (Project 1) and Ridge to Valley (Project 2) projects to feasibility analysis and noted that the other options would still be potentially viable upon additional grant funding and more information. Commission deliberation suggested additional discussion on Projects 3 and 4 occur with the adhoc committee.

Key Feedback from Water Commissioners:

Davin Arvonen: Made the motion to advance Project 1 and 2 to feasibility analysis and to note to the Board the other projects could still be viable given additional grant funding.

Donna Bayless: Voiced concern about economic sustainability related to agriculture and potential oversupply of agricultural acreage, opposing the Feather River -- South Vina Extension due to current market conditions.

Tovey Giezentanner: Strongly supported advancing projects 1 and 2, noting their simplicity, cost-effectiveness, and potential near-term implementation.

Fred Montgomery: Highlighted the importance of low-cost, effective solutions, expressing support for projects 1 and 2 as pragmatic approaches to reducing groundwater use.

Aimee Raymond: Expressed concerns about agricultural economic viability, particularly rice markets, but supported advancing the Feather River -- South Vina and Ridge to Valley projects to optimize conveyance and maximize local benefit. Also advocated for additional discussions related to the Feather-River – Sacramento River Exchange and alternative Butte Creek solutions.

Peter Rystrom: Asked a question about the cost of using surface water versus the cost of groundwater pumping and voted to advance the Feather River and Ridge to Valley projects to feasibility.

Ernie Washington: Emphasized the importance of economic viability, recommending the Feather River -- South Vina and Ridge to Valley projects as economically sensible, while noting regulatory complexities around Sacramento River diversions.

Public Comment Summary:

Comments included concerns from Butte Environmental Council and individuals advocating for additional considerations from the Integrated Water Resources Plan (2005) and potential alternatives for future exploration.

Marty Dunlap posed key questions summarized as follows: How much of the groundwater deficit can be resolved by each of the projects? What approaches will maximize the decrease of the groundwater deficit for the least cost and maintain long-term benefits for the Vina Subbasin and Butte County at large? What approaches will maintain a conveyance system that benefits the Vina Subbasin yet minimizes the likelihood that local groundwater will be incorporated into the statewide water management system?

The result of the feasibility analysis for the two selected projects is intended to answer these important questions.

Action Requested

Based on the detailed analysis and comprehensive Water Commission discussion, staff recommends the Board of Supervisors:

1. Approve the Feather River -- South Vina Extension and Ridge to Valley projects for advancement to feasibility analysis.
2. Provide direction to staff regarding any future exploration of the Feather River -- Sacramento River Exchange and alternative Butte Creek solutions.

Attachments

1. Vina Subbasin Surface Water Supply Feasibility Analysis Project - Fatal Flaw Analysis

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Vina Subbasin – Surface Water Supply Feasibility Analysis Project

Fatal Flaw Analysis

Introduction

Using surface water for irrigation—also referred to as in-lieu recharge—offsets groundwater pumping and can help ensure long-term sustainability in the Vina Subbasin. Maximizing the use of existing surface water rights is also a goal of the Butte County Recharge Action Plan. In-lieu recharge is one component of a portfolio approach to sustainability in the Vina Subbasin, in combination with direct recharge and demand reduction. This report outlines the findings of the Vina Subbasin Surface Water Supply Fatal Flaw Analysis and recommends two projects to proceed to feasibility analysis.

Background

The Vina Subbasin received funding from the California Department of Water Resources through a Sustainable Groundwater Management Grant to identify ways to use additional surface water in the subbasin to reduce groundwater pumping. This planning project is being implemented by the Butte County Department of Water and Resource Conservation through Geosyntec and Water and Land Solutions, LLC.

The Vina Subbasin Surface Water Supply Feasibility Analysis planning project began with stakeholder meetings and research to develop a list of potential projects. The Butte County led 2018 study, *Evaluation of Restoration and Recharge within the Butte County Groundwater Basins*, is the most recent work to describe project alternatives for in-lieu recharge project opportunities in the County. It frequently referenced and built off of options described in the County's 2005 *Integrated Water Resources Program* document. In addition, the 2023 Butte County Recharge Action Plan, Action 4 - Maximize Use of Existing and Underutilized Surface Water Supplies informed the development of the project list for this analysis. Nine potential projects were presented to the Butte County Water Commission on December 4, 2024 (Attachment A) and four potential projects were selected to proceed to fatal flaw analysis. At its

April 2, 2025, meeting, the Butte County Water Commission recommended projects 1 and 2, described below, to advance to feasibility analysis. The Butte County Board of Supervisors will make the final selection of two projects at their May 27, 2025 meeting.

This fatal flaw analysis identifies potential challenges that could prevent a project from being implemented. It includes an intermediate level of project information to refine projects and ultimately identify weaker alternatives. The current grant funds are sufficient to complete feasibility analysis for two projects. This stepwise approach ensures that current grant funds are spent on the two most promising project options. Feasibility analysis will go into greater detail on the critical facets of each project, provide reconnaissance-level designs, develop cost estimates to quantify a dollar per acre-foot cost-benefit ratio, and will be developed so as to be useable for future grant applications to move feasible projects toward implementation in the near term.

Projects Considered

At its December 4, 2024 meeting, the Butte County Water Commission selected four potential Vina Subbasin surface water projects to proceed to fatal flaw analysis. The four projects analyzed in this report include:

1. Feather River -- South Vina Extension
2. Ridge to Valley
3. Feather River -- Sacramento River Exchange
4. Feather River -- Butte Creek Diversion

Key Considerations

For each project, six key considerations were analyzed to identify fatal flaws that would prevent the project from being implemented. The six key considerations include:

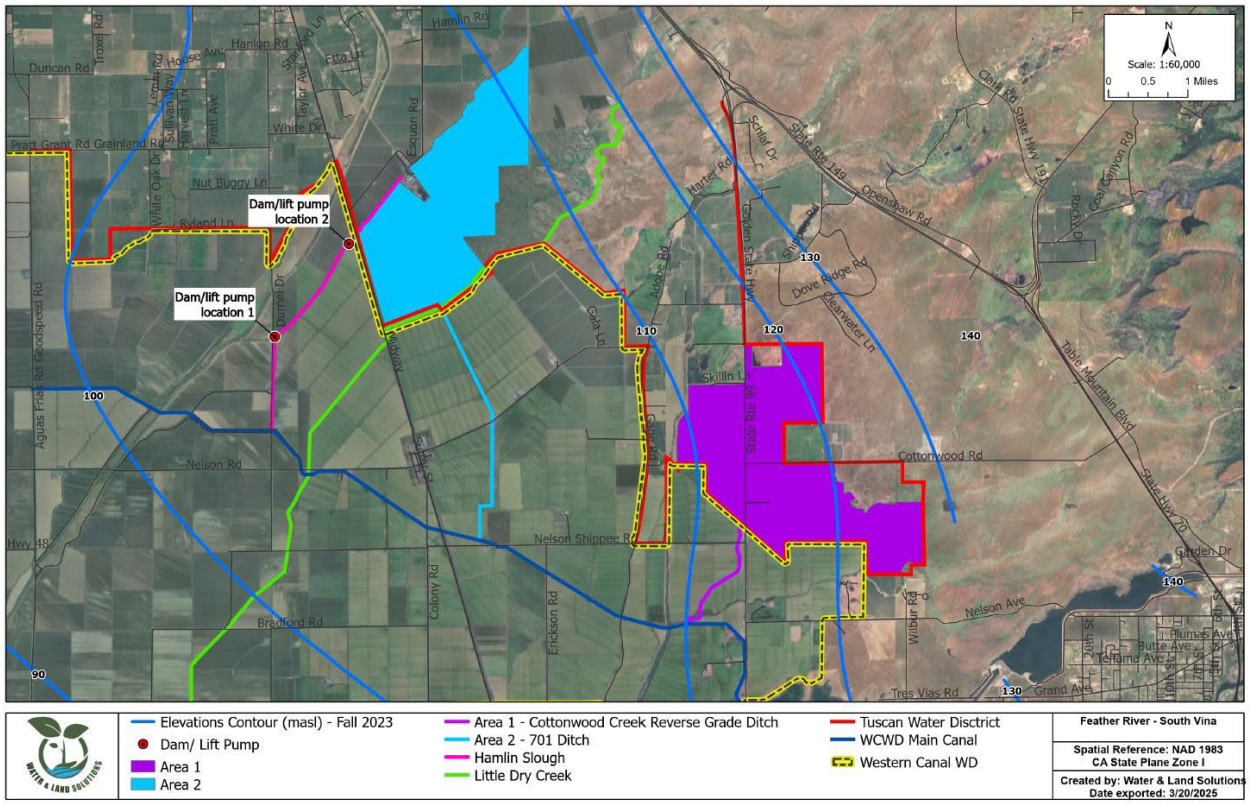
- Water availability
- Water right concerns
- Regulatory and legal aspects
- Environmental considerations
- Sustainability goals
- Costs and funding options

1. Feather River -- South Vina Extension

No Fatal Flaw Identified.

The water for this project would be sourced from the Feather River or Lake Oroville and conveyed through the Western Canal Water District's (WCWD) main canal into the southern Vina Subbasin. The water would be delivered to existing irrigated farmland south of Butte Creek using primarily existing ditches and extending them as needed. This approach minimizes the need for extensive new infrastructure by leveraging existing conveyance facilities, significantly reducing capital costs. Of the irrigated farmland south of Butte Creek and north of WCWD, two areas were selected for further analysis. These two areas are in rice production with existing on-farm ditches that can deliver surface water without the need for filtration. There are three potential options to deliver water to the north from the Western Canal: Hamlin Slough, 701 ditch, and Cottonwood Creek reverse grade ditch. Figure 1 shows areas that could potentially be irrigated through this project and existing conveyance to reach them.

Figure 1. Feather River -- South Vina project map



1.1. Water Availability

Area 1 mapped in Figure 1 includes 2,700 acres and Area 2 includes 2,300 acres. Given the acreage, irrigation demand for rice production, and other surface water already available to

these properties, this project presents a demand of 10,000-12,000 acre-feet/year of surface water that could be delivered through this project to offset groundwater pumping.

Up to 27,000 acre-feet of Butte County's State Water Project (SWP) Table A water is potentially available for new uses in Butte County each year, subject to SWP allocations. Table 1 below shows SWP water allocations since 2014 and compares the allocations to a benchmark of 10,000 acre-feet (AF). Due to the Area of Origin (AOO) settlement, Butte County's SWP Table A contract ensures a minimum of 3,000 acre-feet is available for local use, even in 0% allocation years. 190,125 AF of Table A water have been available to Butte County from 2014-2025, an average of 15,844 AF per year. The County currently leases its Table A water to south-of-delta contractors under agreements that expire in 2031. The agreements include provisions that the County can terminate the existing south-of-delta lease agreements if the water is put to use within the county.

Table 1. SWP Allocations for Butte County Table A water, 2014-2025

Year	AOO Allocation (%)	Allocation (AF)	Relative to 10,000 AF benchmark
2014	**11**	**3,000**	**<10,000**
2015	**22**	**6,000**	**<10,000**
2016	100	27,500	>10,000
2017	100	27,500	>10,000
2018	65	17,875	>10,000
2019	100	27,500	>10,000
2020	**22**	**6,000**	**<10,000**
2021	**11**	**3,000**	**<10,000**
2022	**11**	**3,000**	**<10,000**
2023	100	27,500	>10,000
2024	70	19,250	>10,000
2025*	80	22,000	>10,000

*Allocation as of May 1, 2025.

Water from WCWD could also be used for surface water deliveries, subject to availability, as the primary or supplemental source of water supply for this project. As shown in Table 1 above, Table A allocations may be insufficient to meet demand in some years. In those years, WCWD may have water available. However, over the last 10 years, Table A allocations have only dropped below 10,000 acre-feet in three years and WCWD also faced reductions in water supply in two of those three years. This suggests that water would be available to meet the full 10,000-12,000 AF demand of this project in roughly 8 in 10 years.

An analysis is needed to determine the amount of available capacity and the timing of such capacity in WCWD's main canal and in privately-owned ditches. Depending on the findings of

the capacity analysis, actions such as vegetation management and sediment removal may be needed to restore capacity.

1.2. Water Right Concerns

All of Butte County is within the SWP Place of Use, which enables any land within the county to legally receive SWP Table A water. Butte County serves as a water wholesaler when its Table A water is used in-county and therefore a water transfer is not required. WCWD's pre-1914 water right enables them to deliver water outside their boundary and their diversion agreement with the California Department of Water Resources (DWR) allows them to do so. If WCWD is delivering the water as is contemplated in this project, then it is considered a water delivery rather than a water transfer and is not subject to water transfer processes or requirements.

1.3. Regulatory and Legal Aspects

Regulatory and legal considerations in addition to water right concerns addressed above include landowner agreements and potentially California Environmental Quality Act (CEQA) or National Environmental Protection Act (NEPA) compliance if new conveyance is needed and state or federal funding is used. Agreements would be needed with landowners who own and use existing laterals off WCWD's main canal to determine the terms for access to the laterals. An agreement between WCWD and Vina Groundwater Sustainability Agency (GSA) would also be needed to facilitate this project and would include the cost of water, wheeling charges, provisions for an interruptible supply, and other terms. Vina GSA would in turn develop landowner agreements with those who will receive surface water deliveries under the project.

1.4. Environmental Considerations

If existing ditches are extended to deliver surface water into the southern Vina Subbasin, ground disturbing activities could have minimal impacts on terrestrial species. No impacts to fish were identified in this fatal flaw analysis. Groundwater dependent ecosystems are mapped in these areas and may benefit from the project through improved groundwater levels.

1.5. Sustainability Analysis

This project improves the sustainability of Vina Subbasin by reducing groundwater pumping in the subbasin and offsetting that groundwater use with surface water use. Monitoring wells in these areas show a trend of modest groundwater decline, indicating that reducing groundwater pumping in these areas would be beneficial for the subbasin. Dry wells have also been reported nearby, northwest of these areas. The farmland served by the project would become more climate resilient by limiting their groundwater use in normal and wet years, thereby ensuring sufficient groundwater is available in dry years. Because Butte County's Table A contract includes a minimum allocation of 3,000 acre-feet, lands served by this project would have at least some surface water available to them even in dry years.

1.6. Costs and Funding Options

Costs for the Feather River-South Vina project include one-time capital costs for infrastructure improvements such as additional pumps and extended ditches. Costs are not yet known at this stage but are expected to be less than $5 million.

The project also includes on-going costs such as the cost of water and wheeling charges, including operations and maintenance charges. If the surface water cost is greater than the cost to pump groundwater, participating landowners would likely require an incentive to use surface water. The cost of Butte County's Table A water to the State Water Project is currently about $96/AF and the County charges its existing south of delta lessees an additional service charge, currently about $80/AF. A surface water cost of $176/AF would almost certainly require a subsidy to incentivize landowner participation. WCWD's water cost has not been determined, but is anticipated to be lower than the current Table A water cost.

One-time capital costs and ongoing operational costs would be further developed in feasibility analysis. Potential grant funding for infrastructure is available through California's Prop 4 and federal WaterSMART programs. Feasibility analysis will consider these grant programs to identify aspects of project development likely to make them more competitive for upcoming grants.

1.6.1. Proposition 4 funding

California voters approved $10 billion in bonds through Proposition 4 the "Safe Drinking Water, Wildfire Prevention, Drought Preparedness, and Clean Air Bond Act of 2024" in November 2024. Funding for water infrastructure projects is a major component of the ballot measure, including the funding opportunities below that could be useful for Vina Subbasin projects.

- $100 million for Integrated Regional Water Management
- $386 million for Groundwater management
- $75 million for Regional conveyance projects and repairs

1.7. Conclusion

The Feather River – South Vina project option does not have any known fatal flaws that would prevent the project from being implemented. Groundwater pumping could be reduced by 10,000-12,000 acre-feet at a cost of less than $5 million.

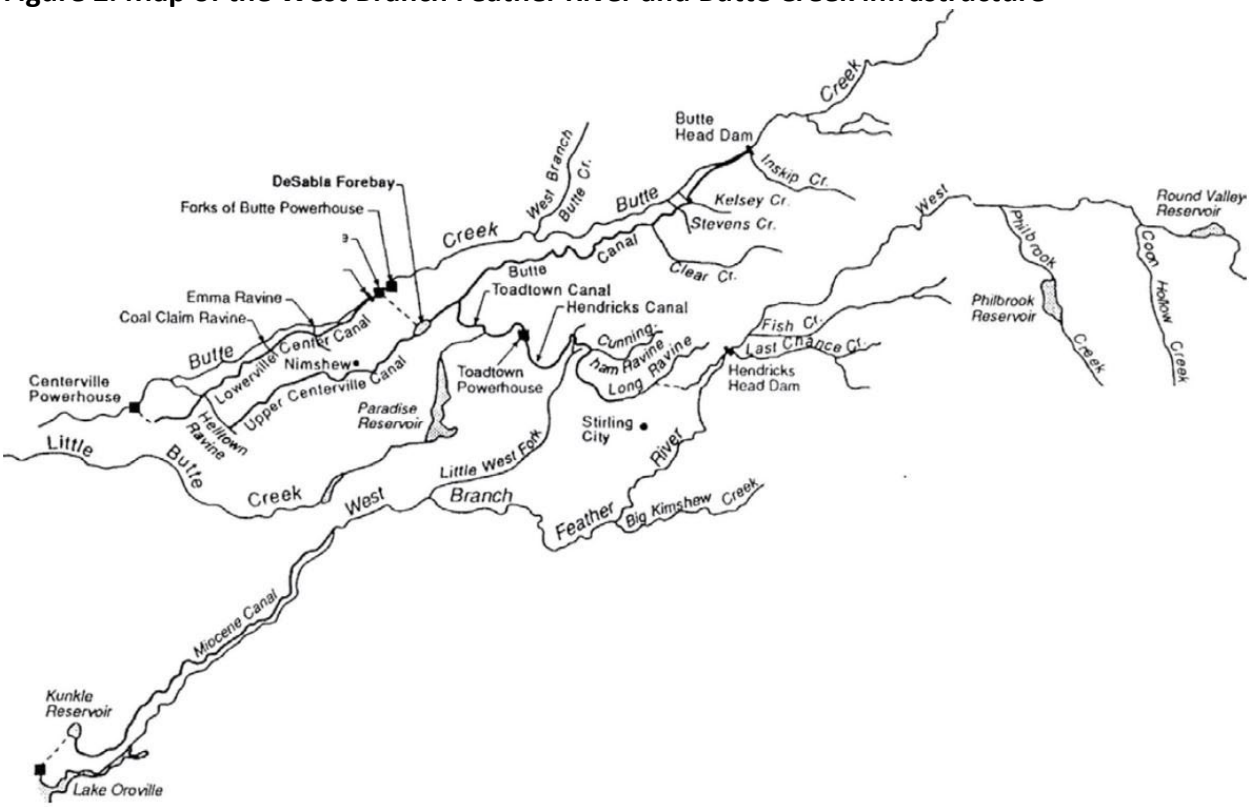
2. Ridge to Valley

No Fatal Flaw Identified.

This project option involves transferring surface water from Paradise irrigation District (PID) to the Vina Subbasin. Water stored in Paradise Lake or Magalia Reservoir would be released into

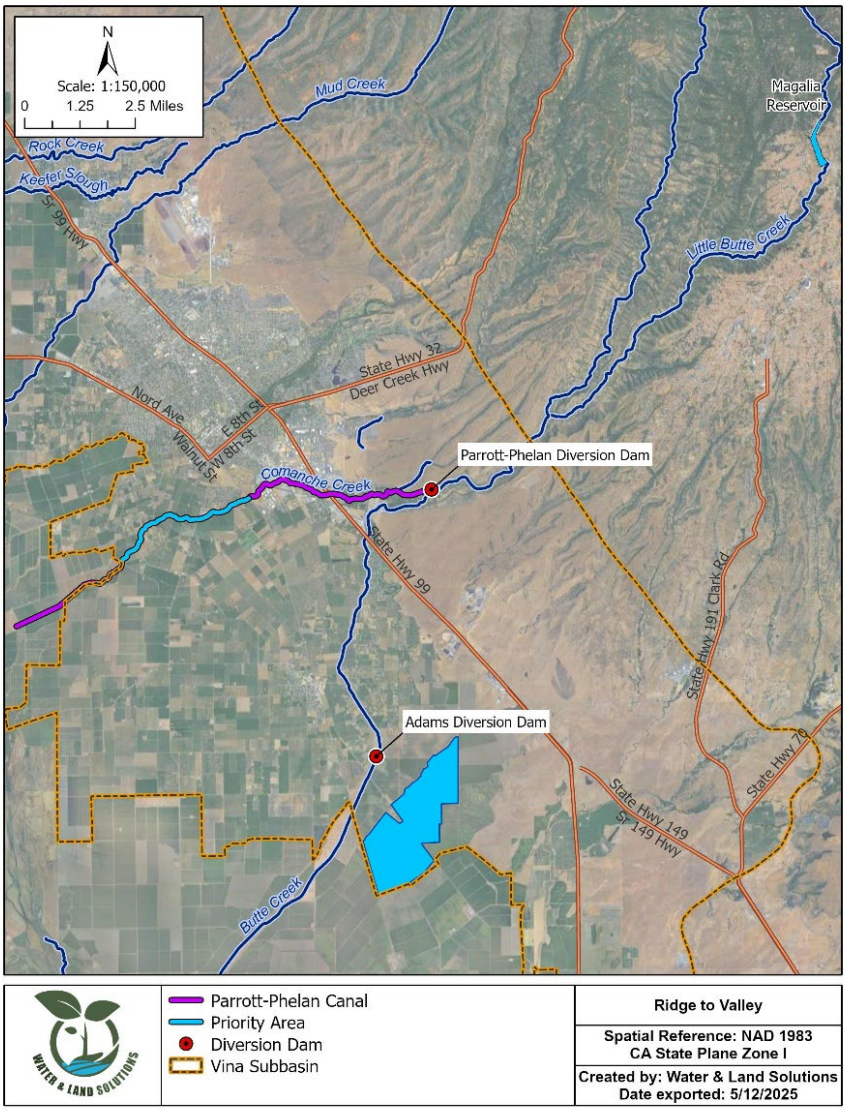
Little Butte Creek to reach downstream surface water users on Butte Creek. Figure 2 below shows Paradise Lake and Little Butte Creek.

Figure 2. Map of the West Branch Feather River and Butte Creek infrastructure



There are two options for delivery from Butte Creek. In Option A, water would be diverted at the Parrott-Phelan Diversion Dam into the Parrott-Phelan Canal and ultimately to farmland south and southwest of Chico. Under Option B, the water would continue further down Butte Creek to the Adams Diversion Dam for use on farmland at the southern edge of the Vina Subbasin, as shown in Figure 3 below.

Figure 3. Ridge to Valley project options map



Three additional alternatives involving PID were discussed but not found to be ready for implementation at this time. These include:

Paradise-Chico treated water intertie: This project involves delivering treated surface water to California Water Service Company (Cal Water) for urban use in Chico. This project is included in the 2022 Paradise Options Study and was discussed extensively between PID and Cal Water but ran into non-technical challenges for which conditions have not changed.

Paradise sewer project: The Town of Paradise was considering installing a pipeline to Chico to convey wastewater for treatment at Chico's water treatment plant, which may have provided an opportunity to co-locate the Paradise-Chico intertie discussed above. The Town of Paradise is now planning to treat wastewater on the ridge rather than developing a pipeline to Chico. If wastewater is treated in Paradise, it is unlikely that it can be discharged into a local waterbody

and there is not sufficient land within town to spread the treated wastewater for infiltration. As plans develop, Paradise may seek a partnership with Vina Subbasin for direct or in-lieu recharge using treated wastewater in the subbasin.

Kunkle Reservoir: Kunkle Reservoir is a small reservoir along Pentz Road, south of Paradise, that was fed by the Miocene Canal before it burned in the Camp Fire. If water could be conveyed to the reservoir, it could be delivered to the Lower Miocene Canal or to the Vina Subbasin.

2.1. Water Availability

Little Butte Creek water stored in Paradise Lake or Magalia Reservoir could be available for 1,000 – 2,000 acre-feet of water transfers in the near term. Upon completion of the Magalia Dam retrofit in 2028, up to 5,000 acre-feet may be available for water transfers.

At the Butte County Water Commission's February 5, 2025 meeting, Kevin Phillips, PID's General Manager, noted that PID does not expect to use their full water supply for the foreseeable future, due to a reduced population in Paradise coupled with modern construction and landscape standards to conserve water. Phillips indicated that PID wants to be at the table to discuss potential partnerships with the Vina Subbasin.

A planned repair of Magalia Dam, which will restore PID's reservoir capacity, could make additional water supplies available for transfer in the summer months. Current California Division of Dam Safety restrictions limit storage in Magalia Dam to 800 AF, compared to a design capacity of 2,250 AF. The estimated project cost is $69 million, with design costs fully funded and construction costs 60 percent funded. PID is confident the additional funding will be obtained to restore full capacity by 2028.

The Parrott-Phelan Canal (also known as Commanche Creek or Edgar Slough) has available capacity of 30 cubic feet per second (cfs), which could deliver approximately 9,000 acre-feet over the irrigation season to roughly 3,000 acres, if sufficient water supplies were available.

2.2. Water Right Concerns

PID has three water rights as shown in Table 2 below. PID could use their 1916 appropriative right to transfer water to downstream users on Butte Creek, which would require reservoir reoperation. The water transfer process is governed by the State Water Resources Control Board (State Water Board).

PID has never participated in a water transfer, though water transfers have been a topic of discussion since the 2022 Paradise Options Study. Conversations with the PID board of directors will be needed to familiarize the board with water transfers and habituate them to the project.

Table 2. Paradise Irrigation District water rights

Permit or Agreement Number	Source or Point of Diversion	Permitted Quantity	Availability Timeframe
Statement of Water Diversion and Use No. S008459 (Pre-1914 Appropriative Right)	Butte Creek at Magalia Dam	**8 cubic feet per second (cfs)** (Estimated at 2,500 AF/yr)	Year-round direct diversion, not storage. Must be used first in priority for PID supply.
Appropriative Water Right Permit 271 (Application A000476) (Priority of Right: 1916)	Paradise Lake and Magalia Res.	**9,500 AF total** (6,700 AF - Paradise Res.) (2,800 AF - Magalia Res)	Year-round diversion to storage in Paradise Lake and Magalia Reservoir
Appropriative Water Right Permit 16040 (Application 22061) (Priority of Right: 1965)	Paradise Lake	**8,800 AF**	Wet season diversion to storage in Paradise Lake (October 1 – May 31), Subject to Term 91

Source: Paradise Irrigation District Amended 2020 Urban Water Management Plan

2.3. Regulatory and Legal Aspects

One-year transfers of stored surface water to in-basin uses are exempt from CEQA. Water transfer proponents must provide information to State Water Board staff to demonstrate that the transfer will not result in injury to other water users and will not have an unreasonable effect on fish or wildlife. A water transfer would require posting information to the State Water Board's website and obtaining approval by the State Water Board.

If Option A is selected, new distribution will be needed to serve farmland near the Parrott-Phelan Canal. This new infrastructure may require easements and environmental review under CEQA or NEPA.

2.4. Environmental Considerations

There may be positive benefits for salmon in Butte Creek from additional flows in the creek—particularly in May and June. If 1,500 acre-feet of water stored in Magalia Reservoir was delivered steadily over 150 days during the irrigation season, flows in Butte Creek would increase by 5 cfs. Additional water in the creek may help returning salmon migrate over barriers such as the Lahar formation on Butte Creek near Highway 99. Option A's diversion is upstream of the Lahar formation and would not provide additional benefits for fish passage, but Option B's point of diversion is downstream from the Lahar formation.

2.5. Sustainability Analysis

This project option has potential to increase sustainability for salmon through increased in-stream flows in Butte Creek, particularly in hotter, drier summers. Given the reduced water demand in Paradise and long-term reduction in demand compared to pre-fire levels from changes in household water use, surface water supplies from PID are reliable into the future.

Option A – delivering water southwest of Chico – reduces groundwater pumping for irrigation, which supports the sustainability of domestic and public supply wells in the area.

Another potential benefit specific to Option A is the opportunity to utilize excess winter flows. These excess flows could be diverted through the Parrott-Phelan Canal during periods of high runoff and directed onto fallowed farmland, enabling groundwater recharge through intentional spreading. Such managed recharge practices could further support the subbasin's sustainability goals by increasing groundwater storage and improving drought resiliency.

2.6. Costs and Funding Options

Costs vary between Option A and Option B. Option A includes additional costs for distribution pipelines to serve farmland, whereas Option B would use existing on-farm distribution systems. Option A would also require on-farm irrigation system improvements for orchards to be able to use surface water, such as booster pumps and filters. The 2018 Evaluation of Restoration and Recharge within the Butte County Groundwater Subbasins report estimates the cost to install irrigation equipment to use surface water in an existing orchard is $86,580 for a 100-acre walnut farm. This cost of $865.80 per acre over 3,000 acres amounts to $2.6 million for on-farm improvements, according to the 2018 estimate. Based on the 2018 cost estimate, price increases since 2018, and additional infrastructure for pumping and distribution, costs for Option A are preliminarily estimated to be $5 million. Option B would have minimal, if any, cost.

Wheeling charges to compensate the operators of the Parrott-Phelan canal for additional operations and maintenance costs would be included in the long-term implementation costs of the project. One-time capital costs and ongoing operational costs would be further developed in feasibility analysis. As discussed in Section 1.6, grant funding may be available for infrastructure for this project.

2.7. Conclusion

The Ridge to Valley project option does not have any known fatal flaws that would prevent the project from being implemented. Paradise Irrigation District has indicated that up to 5,000 acre-feet may be available for transfer to reduce groundwater pumping, and the preliminary project cost is estimated to be up to $5 million.

3. Feather River -- Sacramento River Exchange

No Fatal Flaw Identified.

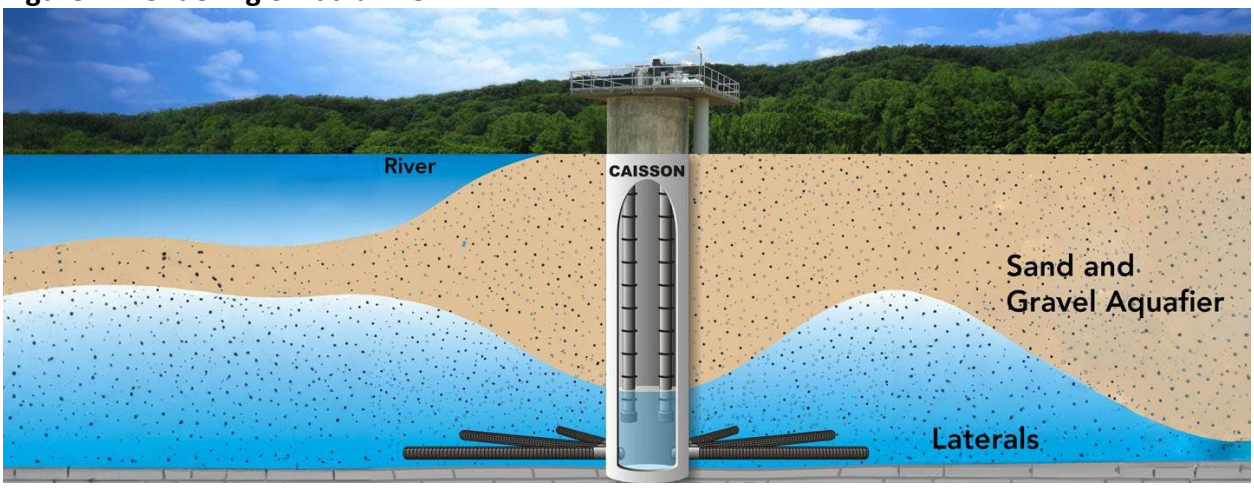
The Feather River – Sacramento River Exchange project involves sourcing water from the Feather River or Lake Oroville by diverting an equal amount from the Sacramento River for irrigation in northern Vina Subbasin. This exchange would occur between Butte County—or another existing Feather River water right holder—and a Sacramento River Settlement Contractor (SRSC) south of the confluence of the Sacramento and Feather River. The exchange

would require the SWP to release an amount of water into the Feather River from Lake Oroville in exchange for a like amount of water provided by the SRSC from Lake Shasta for diversion from the Sacramento River in the Vina Subbasin.

Given the Sacramento River's location along the western edge of the subbasin, this approach moves an existing surface water right closer to groundwater users in Vina Subbasin. An exchange would leverage existing surface water rights in Butte County that are outside of the Vina Subbasin, without the need for new major water conveyance. Existing ditches along farmland north of Chico may be useable to distribute water to farmland, and at least some new pipelines or canals would also be needed.

To reduce environmental impacts, permitting limitations, and maintenance challenges, the project team analyzed the use of a radial collector well to divert the water rather than a traditional surface water diversion on the river. Radial collector wells, also known as Ranney collector wells, are sited near a river or stream with collector shafts that radiate through different locations in the subsurface to collect water that is interconnected to the nearby river. A rendering of a radial well is shown in Figure 4 below. Large radial wells can divert 40 cfs, which means each radial well could serve 3,000 acres with 10,000+ acre-feet of water per year.

Figure 4. Rendering of radial well



Source: Granite Construction

3.1. Water Availability

Table A water that could be exchanged to be diverted off the Sacramento River is discussed further in Section 1.1. The exchange involves a SRSC and an SWP contractor and water availability would be subject to SWP and CVP allocations. SRSCs are water districts and individuals that hold senior water rights on the Sacramento River that pre-date the Central Valley Project (CVP) who subsequently signed CVP settlement contracts with the U. S. Bureau of Reclamation (USBR).

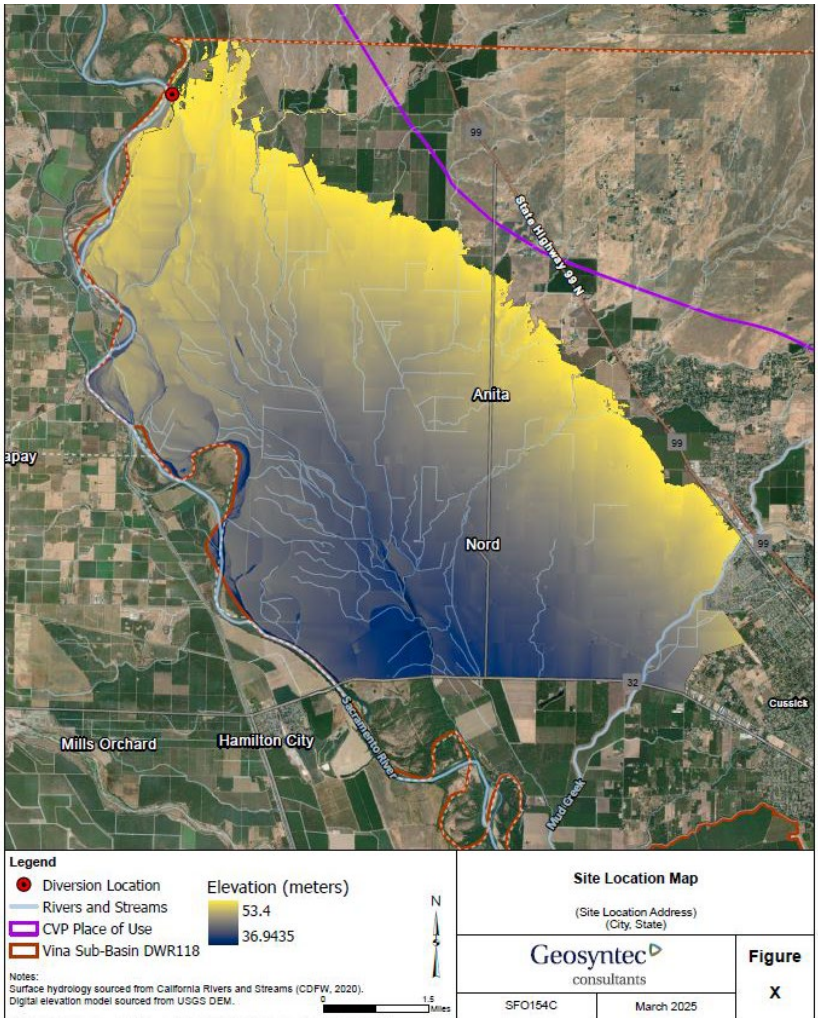
Alternatively, water supplies from Feather River diverters (such as Butte Water District or Western Canal Water District) could also be used, with an estimated 25,000 AF available from these districts. Table A and other Feather River water sources could potentially combine to 50,000 AF of exchange water. A local water district would most likely be interested in an agreement between one and five years that would vary based on water availability. Although these water rights holders can transfer water south of the Delta (SOD) for a higher price per acre-foot, transfers through the Delta are increasingly complicated and less reliable. Having a local market for the water with consistent demand every year may be an attractive option.

There are also landowners in the northern Vina Subbasin with riparian water rights. Riparian water rights may only be utilized on the specific parcels associated with those rights and may have been severed over time. Analysis would need to be conducted with these landowners to determine the extent of legal riparian water rights.

Figure 5 below illustrates a conceptual diversion point off the Sacramento River. The total shaded area on the map encompasses approximately 30,00 acres. Given that each radial well is estimated to serve roughly 3,000 acres, approximately 10% of the northern Vina Subbasin could potentially be served by a single radial well. Acres selected to be served by a radial well could be based on a number of factors including a radial well location with suitable soils, a stable riverbank without erosion, avoidance of impacts to GDEs, existing opportunities for distribution, etc.

Engineering considerations should also include opportunities for gravity-fed water distribution, minimizing the need for pumping infrastructure and operations. Areas shaded in yellow on the map are at or below the elevation of that specific diversion point. Areas in blue are significantly lower in elevation than the diversion elevation. The eastern boundary of the shaded area has an average fall of 1% per mile.

Figure 5. Map showing farmland areas with lower elevation than a specified diversion point on the Sacramento River in northern Vina Subbasin

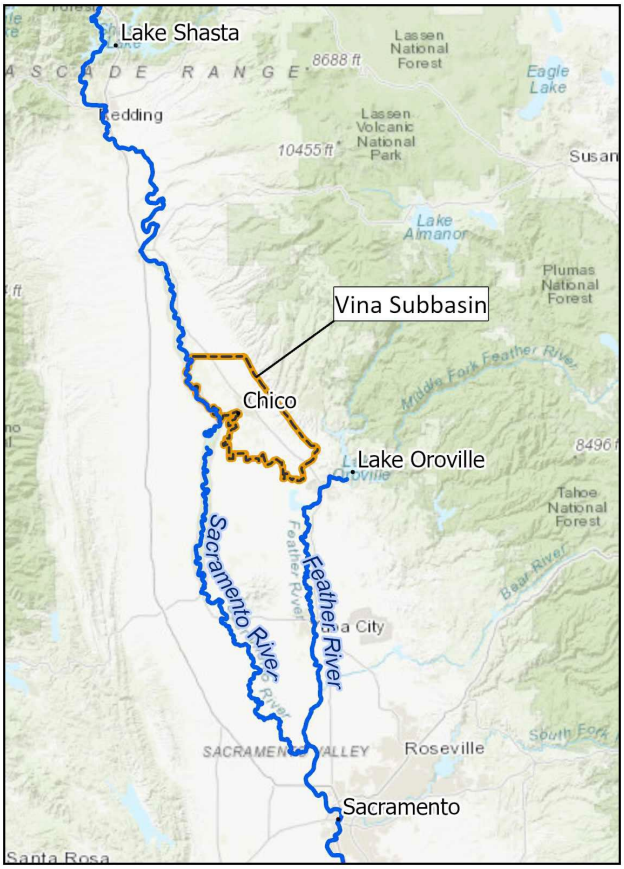


3.2. Water Right Concerns

An exchange of Table A water to the Sacramento River would require approval from DWR. Article 56.F of Butte County's SWP contract enables a balanced, bona fide exchange such as this where like amounts of water are released from the SWP to the Sac River Settlement Contractor downstream and from the CVP to the SWP users in Vina Subbasin. Figure 6 shows the vicinity of the exchange including key features of the CVP and SWP.

As shown in Figure 5 above, the potential project area is within the CVP Place of Use. Since all of Butte County is within the SWP Place of Use, lands that would receive exchanged water in northern Vina Subbasin are within both the CVP and SWP places of use and therefore the exchange would not require approval from the State Water Board. USBR would be involved in the exchange as the operator of the CVP.

Figure 6. Sacramento River exchange project vicinity map



An appropriate SRSC would need to be identified to facilitate the exchange, and discussions can be initiated if the project proceeds to feasibility analysis. Pleasant Grove Verona Mutual Water Company, Natomas Mutual Water Company, or Conaway Preservation Group are all SRSCs downstream of the confluence of the Feather River and Sacramento River that could potentially facilitate the exchange.

3.3. Regulatory and Legal Aspects

The radial well avoids permitting a diversion on the river and additional permitting for long-term operations and maintenance of the diversion. Consultation and potentially permitting may still be needed with California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the U.S. Army Corps of Engineers. These agencies are responsible for ensuring that impacts to fish in the river and infrastructure on the river are minimized. CEQA analysis is required for the exchange through DWR and NEPA may be required by USBR.

Butte County currently restricts placement of groundwater wells close to the Sacramento River. A waiver may be needed to permit the radial well. Butte County Environmental Health should be consulted to discuss well permitting considerations.

Easements may be needed for extensive new conveyance and distribution. An easement or fee title acquisition would be needed for the pump house above the radial well. CEQA environmental review would likely be needed for new conveyance and distribution.

3.4. Environmental Considerations

Radial collector wells have the benefit of reducing habitat impacts associated with the physical construction of a diversion point in a river with species of concern. Environmental considerations related to the change in water availability to the Sacramento and Feather Rivers would still need to be vetted with USFWS, CDFW, NMFS, and SWRCB. The Sacramento River Basin is home to multiple fish identified as threatened or endangered under the Endangered Species Act (ESA), including Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead trout, and Southern Distinct Population Segment green sturgeon. Any project option that proposes to alter the habitat of these species through changes in water availability or physical changes to the river itself will require analyses to ensure avoidance of project impacts on these species. If project impacts are unavoidable, mitigation measures will be required.

Lake Shasta is operated with consideration for protecting the cold-water pool in the reservoir to benefit listed species in the Sacramento River with cold water releases. Cold-water pool operations may be prioritized over the fulfillment of an exchange. Additional discussion with USBR staff would be needed to verify the reliability in frequency and amount of water delivered by the proposed exchange.

If new conveyance and distribution pipelines or canals are needed to deliver water to the irrigated farmland in the service area, ground disturbing activities could have minimal impacts on terrestrial species.

3.5. Sustainability Analysis

Diversion through a radial well rather than direct diversion was selected for the proposed project due to the difficulties and expense of developing and maintaining a diversion on the river. A direct diversion from the Sacramento River involves an extensive permitting and mitigation process including consultation with multiple fish agencies. A diversion would need to have an advanced fish screen on the diversion, which increases the cost of the structure. Long-term operation and maintenance of a diversion on the river is also considerably more complex for a direct diversion. The riverbank where the diversion's intake is located can become eroded away, a gravel bar can develop and impede operations, or the river channel can shift away from the diversion and leave it stranded. To fix any of these challenges would require additional work in the river, which would require additional permits. Diverters operating existing diversions on the Sacramento River face uncertainty and complexity in maintaining them.

3.6. Costs and Funding Options

The 2018 Evaluation of Restoration and Recharge within the Butte County Groundwater Subbasins report estimates the cost of installing two radial collector wells along the Sacramento River with a pipeline to Chico to be $28 million. The cost estimate is seven years old as of the writing of this report and costs would be significantly higher today. In addition, laterals for water distribution and on-farm irrigation system improvements would further increase the cost of the current project proposal compared to the 2018 cost estimate. The 2018 report estimates the cost to install irrigation equipment to use surface water in an existing orchard is $86,580 for a 100-acre walnut farm. This cost of $865.80 per acre over 3,000 acres amounts to $2.6 million for on-farm improvements. One-time capital costs and ongoing operational costs would be further developed in feasibility analysis.

Without an updated cost estimate, $15 million per radial well is used in this report for illustrative purposes. A $15 million radial well serving 3,000 acres equates to $5,000/acre. Infrastructure costs of $5,000 per acre are well beyond what landowners would reasonably invest to develop a second source of water supply. Significant grant funding would be required to offset infrastructure costs for landowners, or the project would be infeasible. Potential grant funding may be available through California's Prop 4 and federal WaterSMART programs, as discussed further in Section 1.6.

In addition to capital costs, water costs would need to be considered in a feasibility analysis. The $176/AF cost of Butte County's Table A water (see Section 1.6) is likely greater than the cost to pump groundwater in the northern Vina Subbasin, which means the water cost would need to be subsidized to incentivize landowners to use surface water instead of groundwater. If the new diversion could also deliver riparian rights, this water would not have an acre-foot cost in addition to pumping costs from the radial well.

3.7. Conclusion

The Feather River -- Sacramento River project option does not have any known fatal flaws that would prevent the project from being implemented. If more than one radial well is developed, up to 27,000 acre-feet of groundwater pumping can be offset by surface water use. Cost estimates would need to be developed to better understand current costs, and each radial well is anticipated to cost more than $15 million.

4. Feather River -- Butte Creek Diversion

Fatal Flaw Identified.

This project proposes importing additional water from the Feather River system for re-diversion off Butte Creek. Existing water rights on Butte Creek are fully maximized under almost any conditions during the irrigation season. Butte Creek is also a critically important salmon run in California and additional diversions under current conditions may interfere with salmon

restoration requirements. Additional diversions from Butte Creek may be possible if supplementary water is imported to the creek. This would provide multiple benefits, such as water supplies for agricultural users in the Vina Subbasin and additional flows to support salmon.

Water from existing water rights held on the Feather River or stored in Lake Oroville could be imported to Butte Creek through Pacific Gas & Electric's (PG&E) canals—or potentially a new canal—for diversion off Butte Creek. PG&E's Hendricks Canal has moved water from the West Branch Feather River (WBFR) to Butte creek for 100 years. No other existing infrastructure was identified that could move water from the Feather River to Butte Creek. For this analysis, the focus is on using existing infrastructure i.e. the Hendricks Canal. Options for new infrastructure to deliver water from the Feather River system into Butte Creek are explored further in the *Integrated Water Resources Program* report prepared for the Butte County Department of Water and Resource Conservation in May 2005.

The Hendricks Canal is a 9-mile canal constructed in the early 1900s of mostly earthen ditch with several flume and tunnel sections. The canal is owned by PG&E and it conveys water from the WBFR to Butte Creek via Toadtown powerhouse and then into the Toadtown Canal, eventually reaching the DeSabla Forebay, as shown in Figure 7.

Figure 7. Map of DeSabla-Centerville project

4.1. Water Availability

One source of water that could be diverted from the WBFR to Butte Creek is Butte County's Table A water, which is discussed further in Section 1.1. The current capacity of the Hendricks Canal is reduced from a design capacity of 125 cfs when the canal was built. Table 3 below shows flows imported from the Hendricks Canal via Toadtown Canal into Butte Creek. Maximum flow reported during the irrigation season last year was 86 cfs. Recorded flows were below 70 cfs for 143 of the 200 days shown in Table 3, indicating there may be available capacity throughout the irrigation season. However, according to PG&E, the Hendricks Canal is fully allocated for PG&E operations.

Table 3. Water imported to Butte Creek, April – October 2024

Flow (CFS)	Number of Days
0-10	16
11-20	22
21-30	12
31-40	10
41-50	11
51-60	9
61-70	63
71-80	51
81-90	6
>90	0

Source: https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=BBW

As noted above, no other existing means of transferring water from WBFR to Butte Creek have been identified, making it infeasible to move more water into Butte Creek without using the Hendricks Canal. This constitutes a fatal flaw hindering further analysis of this project at this time.

4.2. Water Right Concerns

As noted in Section 1.2, Butte County's Table A water can be legally delivered anywhere within the county. Butte Creek is an adjudicated stream with a watermaster. Any changes in Butte Creek diversion would be subject to additional oversight from the watermaster. The Butte Creek adjudication addresses "imported water", meaning the existing diversions from WBFR into Butte Creek. Additional water imported to the creek would need to be protected from diversion by existing users with rights to "imported water."

4.3. Regulatory and Legal Aspects

CEQA permitting would likely be required for major upgrades to the Hendricks Canal. If existing Butte Creek diverters in the Vina Subbasin use the additional imported water envisioned in this project, it is not anticipated that additional conveyance or distribution would be needed to deliver the water to irrigated agricultural lands.

4.4. Environmental Considerations

For more than 100 years, summer flows in Butte Creek have been augmented by storage releases from PG&E's DeSabla-Centerville Hydroelectric Project, including an inter-basin diversion from the WBFR. This has created favorable conditions for Central Valley spring-run Chinook salmon, a threatened species under the federal and state Endangered Species Act. The Butte Creek population of Central Valley spring-run Chinook salmon is now the largest naturally spawning population remaining in the Central Valley.

Additional flows in Butte Creek during the summer months are assumed to be beneficial, particularly in improving fish passage over the Lahar Formation. It is also assumed to be infeasible to divert more water from Butte Creek during the summer months without harming salmon or injuring other Butte Creek water rights holders, unless additional water is imported into the creek.

In discussions related to this project, fishery interests have raised concerns with importation of additional surface water from the WBFR to Butte Creek, as the comingling of foreign water may confuse spawning signals for salmon. Central Valley Constant Fractional Marking/Tagging Program (CFM) data do not support a hypothesis of a straying problem from the Feather River to Butte Creek. In the last five years for which data are available (2016-2020), there were zero Feather River hatchery fish recorded in Butte Creek. Further, salmon migrating up the Sacramento River from the Pacific Ocean reach the Feather River before they reach Butte Creek. Straying salmon originating from the Feather River would have to pass this larger, stronger waterbody and continue to Butte Creek.

4.5. Sustainability Analysis

Existing diversions through the Hendricks Canal into Butte Creek are critical for salmon survival. Additional flows could further support fish in hotter, drier summers.

The future of the Hendricks Canal and the DeSabla-Centerville project are uncertain. In 2007, PG&E filed an application for a new Federal Energy Regulatory Commission (FERC) license. Their application included plans for a fish ladder and canal fish screen on the Hendricks Dam facilities. In February 2017, PG&E announced that it would withdraw its application for a new FERC license. In May 2017, PG&E proposed a schedule to move forward with the sale of the Project to a new, undisclosed owner. FERC indicated that if negotiations did not result in a sale of the DeSabla-Centerville project, FERC would initiate an "orphaned project" proceeding which could result in decommissioning. If the project is decommissioned at any time in the future, actions

must be taken to ensure salmon continue to be supported by diversions from WBFR into Butte Creek. New diversions to provide surface water supplies for irrigation in Vina Subbasin may not be supported.

4.6. Costs and Funding Options

Cost estimates to restore capacity in the Hendricks Canal are not available from PG&E. PG&E staff and PG&E's online documents library were consulted for information on the nature of capacity reductions on the Hendricks Canal, extraordinary maintenance work needed to restore capacity, and cost estimates for the extraordinary maintenance. However, PG&E does not share non-public data related to the design, operation, or costs of PG&E facilities unless a transaction or regulatory proceeding necessitates or requires a disclosure.

In the absence of cost estimates from PG&E for the Hendricks Canal, costs for the Miocene Canal can be used as a proxy. Although the terrain and design characteristics between the two canals differ, the scale of the costs are likely comparable. The cost to restore the Miocene Canal after the Camp Fire was estimated at $40-$60 million. Annual maintenance costs for the Miocene Canal were estimated at $1-$2 million. If the Hendricks Canal was used to deliver irrigation water to the Vina Subbasin, water users would be responsible for some portion of the canal's maintenance costs.

4.7. Conclusion

The Feather River -- Butte Creek project evaluated existing infrastructure to move additional water into Butte Creek. PG&E has indicated that the existing infrastructure (Hendricks Canal) is fully allocated for PG&E's operations. PG&E also indicated they are unwilling to share information about the DeSabla-Centerville project. Groundwater pumping cannot be offset by surface water supplies in this scenario, since PG&E has indicated it cannot deliver additional surface water for irrigation. Further feasibility analysis of this project would require a willingness from PG&E to explore possibilities and provide information. An unwilling partner is a fatal flaw.

Recommendations

The fatal flaw analysis indicates the following:

a. The Feather River -- South Vina Extension, Ridge to Valley, and Feather River -- Sacramento River projects do not have known fatal flaws.
b. The two least expensive options for bringing additional surface water into the Vina Subbasin are the Feather River -- South Vina Extension and Ridge to Valley project options.
c. The Feather River -- South Vina Extension and Ridge to Valley projects should proceed to feasibility analysis, considering their potential water availability, regulatory and legal aspects, environmental benefits, long-term sustainability and funding opportunities.

d. The Feather River—Butte Creek project was found to have a fatal flaw at this time. However, due to the importance of Butte Creek's salmon fishery and water supplies, it will be important to continue to track developments by PG&E or others that may affect the Butte Creek system.

Attachment A.

Memorandum to the Butte County Water Commission, December 4, 2025 (revised April 29, 2025)

Attachment A.

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Memorandum

To: Butte County Water Commission
From: Jenny Scheer and Maddie Munson, Water & Land Solutions, LLC (WLS)
Date: December 4, 2024, Revised April 29, 2025
RE: Vina Subbasin – Surface Water Supply Feasibility Analysis project

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The Vina Subbasin Surface Water Supply Feasibility Analysis project (Project) evaluates the potential for expanded surface water use for irrigation to reduce groundwater pumping in the Vina Subbasin. The role of the Water Commission at its December 4, 2024 meeting is to review the potential surface water supply projects and recommend up to four projects to proceed to fatal flaw analysis. The projects selected should be those that are optimal considering factors like site suitability, water availability, legal aspects, and sustainability goals. The ultimate goal of this Project is to identify two potential surface water supply projects and develop feasibility studies for those projects. In Spring 2025, fatal flaw analyses will be presented to the Butte County Water Commission for selection of two potential projects to proceed to feasibility studies. This Project is funded by the Sustainable Groundwater Management Grant received from the California Department of Water Resources and is implemented by Butte County through Geosyntec/Water and Land Solutions, LLC.

Fatal flaw analysis – A fatal flaw analysis identifies potential challenges that could prevent a project from being implemented. In this context, it includes an intermediate level of project information to eliminate weaker alternatives and refine the two strongest projects ultimately selected for feasibility studies. The fatal flaw analysis report will evaluate water conveyance, place of use options, environmental concerns, financing options, and water right concerns.

Feasibility study – A feasibility study aims to objectively and rationally uncover the strengths and weaknesses of a proposed venture. In this context, the feasibility studies will address critical facets of each project, provide reconnaissance-level project designs, develop cost estimates to quantify a dollar per acre-foot cost-benefit ratio for each project, and will be developed so as to be useable for future grant applications.

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Project Descriptions (revised April 29, 2025)

The Project began with stakeholder meetings and research to develop a list of potential projects. The Butte County led 2018 study, *Evaluation of Restoration and Recharge within the Butte County Groundwater Basins*, is the most recent work to describe project alternatives for in-lieu recharge project opportunities in the County. It frequently referenced and built off of options described in the County's 2005 *Integrated Water Resources Program* document. In addition, the 2023 Butte County Recharge Action Plan, Action 4 - Maximize Use of Existing and Underutilized Surface Water Supplies informed the development of the project list for this analysis. Nine potential projects are described below for the Commission's consideration.

1. **Sacramento/ Feather River exchange –** Unused water from water rights held on the Feather River or stored in Lake Oroville could be purchased and exchanged for diversion off the Sacramento River. Options to be explored with the State Water Resources Control Board (SWRCB) could include permanent transfer of rights, short-term transfers, and long-term transfers. Such an exchange would leverage existing surface water rights in Butte County that are outside of the Vina Subbasin, without the need for new major water conveyance.

   An exchange would require approvals from the SWRCB, California Department of Water Resources (DWR), and the U.S. Bureau of Reclamation (USBR), at a minimum. In addition, approvals from USBR, California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the U.S. Army Corps of Engineers would likely be needed for new diversion facilities on the Sacramento River.

   Potential existing water sources include Butte County's Table A contract or surplus water supplies from South Feather Water and Power Agency (SFWPA), Paradise Irrigation District (PID), or another local irrigation district such as Western Canal Water District (WCWD) or one of the Joint Districts (especially Biggs-West Gridley Water District, Butte Water District, or Richvale Irrigation District in Butte County). A long-term transfer agreement may be of interest for Table A water, whereas local water districts with excess water would most likely be interested in a shorter term agreement of between one and five years. Although these water rights holders can transfer water south of the Delta (SOD) for a higher price per acre-foot, transfers through the Delta are increasingly complicated and less frequent.

   New pipelines to deliver water from the Sacramento River to farmland in the northern part of the Vina Subbasin would be needed, and on-farm improvements may be required for farmers to incorporate this water source into their irrigation systems. Permitting and construction of new diversions would be costly and time consuming, but

given the number of local water rights holders with surplus water supplies totaling tens of thousands of acre-feet, this option provides great potential.

Recommendation: Proceed to fatal flaw analysis

2. **Feather River/ Butte Creek exchange –** Excess water from water rights held on the Feather River or stored in Lake Oroville could be imported to Butte Creek through Pacific Gas & Electric's (PG&E) canals—or potentially a new canal—for diversion off Butte Creek.

   Water is already imported from the West Branch of the Feather River to Butte Creek, providing critical flows in the summer months. Without these flows, California's last, best run of spring run Chinook salmon may be in peril. Additional flows in upper Butte Creek could potentially increase salmon survival. However, fisheries interests have raised concerns with importation of additional surface water from the Feather River to Butte Creek, as the comingling of foreign water may confuse spawning signals for salmon. Consultation or approval would be needed form the SWRCB, DWR, and CDFW. In addition, there is some degree of uncertainty about the reliability of future flows on Butte Creek.

   Existing conveyance and distribution systems—such as those owned by Durham Mutual Water Company (MWC), Rancho Esquon, or the Parrott-Phelan Canal—would be utilized, reducing the need for capital investment. Potential water sources are the same as those discussed in Project 1 above, and could include permanent transfer of rights, short-term transfers, and long-term transfers.

   Recommendation: Proceed to fatal flaw analysis

3. **Feather River-South Vina extension –** This project proposes transferring water from water rights held on the Feather River or stored in Lake Oroville through Western Canal and new pipelines to target areas in the Vina Subbasin. This approach minimizes the need for extensive new infrastructure by leveraging existing conveyance facilities, significantly reducing capital costs compared to other projects. New pipelines to deliver water from Western Canal to farmland in the southern part of the Vina Subbasin would be needed, and on-farm improvements may be required for farmers to incorporate this water source into their irrigation systems.

   Recommendation: Proceed to fatal flaw analysis

4. **Maximize existing Butte Creek water rights –** Delivery of existing water rights on Butte Creek could be maximized for agricultural irrigation. Water right holders include Durham MWC, Dayton Mutual Water Company, and Ranch Esquon. However, based on initial discussions with stakeholders, most existing water rights on Butte Creek are maximized

given water availability, and additional flow in Butte Creek from imported water would be needed to increase water deliveries from the creek.

Durham MWC encompasses lands that have converted to low-volume irrigation—such as micro sprinklers or drip irrigation—and no longer use surface water. To resume surface water deliveries to these properties, on-farm infrastructure such as booster pumps and filters would be needed. However, Durham MWC operates on a rotational basis, meaning each property only has access to surface water every 12 days or so. Orchards set up with low-volume irrigation need to be irrigated more frequently than once every 12 days, so some portion of groundwater use would continue.

Dayton Mutual Water Company holds promise, with 9-10 cfs currently unused that can be conveyed through the Parrot-Phelan canal. If 10 cfs was applied for irrigation for 120 days, it could reduce groundwater pumping by 2,380 acre-feet. To make use of this unused surface water, on-farm irrigation equipment like filters and potentially a reservoir and/or booster pump would be needed.

Recommendation: Proceed to fatal flaw analysis

5. **Oroville-Chico Pipeline –** Excess water from water rights held on the Feather River or stored in Lake Oroville (including but not limited to Table A) could be delivered to the Vina Subbasin through a new, dedicated pipeline or canal. Assuming the ultimate use of the surface water is on lands not currently in irrigation districts, extensive new distribution pipelines would also need to be built. On-farm improvements may be required by farmers to incorporate this water source into their irrigation systems. Water sources are the same as those discussed in Project 1 above.

   Prior iterations of this project have been considered over the years, however, they were grander in scale and the Sustainable Groundwater Management Act (SGMA) provides additional motivation for such a project. The recently formed Tuscan Water District could provide the governance and organization needed for end users. Nonetheless, this is likely the most capital intensive of the projects considered.

   Recommendation: Do Not proceed to fatal flaw analysis

6. **West Branch-Chico Intertie** – Treated water from Paradise Irrigation District's water treatment plant in Magalia could be delivered to the city of Chico via a new pipeline, which could potentially be constructed concurrently with the Paradise Sewer Project, if it proceeds. This option requires retrofits to Magalia Dam and spillway (estimated at $163 million) and may require expansion or modification of PID's water treatment plant to deliver water to the city during normal and wet years. The cost of the Chico intertie is estimated at $372 million.

According to the 2022 Paradise Options Study, Paradise has 3,000 to 5,000 acre-feet of water available for transfer each year. The Vina GSP anticipates 27,500 acre-feet of urban and industrial water use through 2070, indicating sufficient urban water demand in the city of Chico to make use of available surface water from Paradise Irrigation District, PG&E's Miocene Canal water right, or other potential supplies in the Paradise area.

By adding a surface water source to Chico's water supply portfolio, this project improves water supply reliability and resiliency for the city of over 100,000 people. California Water Service (Cal Water) is the water purveyor in Chico and would need to be engaged in the project if its proceeds to fatal flaw analysis. Paradise Irrigation District has indicated they are not interested in pursuing this project at this time.

Recommendation: Do Not proceed to fatal flaw analysis

7. **Other local creeks –** Water right permits could be sought for other local creeks, including Pine Creek, Mud Creek, Rock Creek, Dry Creek, Big Chico Creek, Little Chico Creek, and Hamlin Slough. However, only Big Chico Creek is perennial, and all other creeks are ephemeral or seasonal with limited, if any, flow during the irrigation season. Given the timing and infrequency of flows, direct recharge from these creeks is most suitable.

   Recommendation: Do Not proceed to fatal flaw analysis

8. **Sacramento River riparian rights –** Landowners in the Vina Subbasin who are adjacent to the Sacramento River and are not currently exercising their riparian Sacramento River water rights could begin exercising those rights instead of pumping groundwater. Diversion infrastructure to remove water from the Sacramento River may need to be constructed or upgraded and on-farm improvements may be required for farmers to incorporate this water source into their irrigation systems. However, riparian rights can be significantly limited. Diversions may only be applied to lands contiguous to the river and past sales of land—even if a ranch has since been reunited—can sever parcels from riparian water access. Given the expense of new diversions and the relatively small amount of acreage that can be served by riparian water, this project option is not preferred.

   Recommendation: Do Not proceed to fatal flaw analysis

9. **New water right application –** A new water right application could theoretically be sought for Butte Creek, the Feather River, or the Sacramento River. Developing a new water right would also require new diversions, conveyance, and distribution systems to deliver the water. However, given the timing of this project with its focus on irrigation supplies from roughly April to October, none of those waterbodies are deemed to regularly have available water supplies in those months. The waterbodies are all part of

the larger Sacramento-San Joaquin Delta watershed, which is effectively viewed as fully appropriated in the summer months in all but the wettest of years. Applying for a new water right is not considered to be a viable option, and certainly not a preferred alternative to the projects recommended for fatal flaw analysis.

Recommendation: Do Not proceed to fatal flaw analysis

Project	Water Source	Partners/ Responsible Agencies	Diversion/ Conveyance	Distribution	Cost	Potential Volume (AFY)	Timeline	Challenges
1. Sacramento/ Feather River exchange	Feather River water right diverted from Sac River	USBR, DWR, SWRCB, Landowners, TWD	New diversion on Sac River	Extensive new pipelines or canals needed to deliver the water to farmland in North Vina.	Mid	30,000	Slow	Requires SWRCB, USBR, and DWR approval. New pipelines would require easements.
2. Feather River/ Butte Creek exchange	Feather River water right diverted into Butte Creek	SWRCB, CDFW, Butte Creek Watermaster, Friends of Butte Creek, USFWS, TWD	Use existing diversion points. May require increasing capacity and new pipelines.	Use existing infrastructure of water rights holders such as Durham MWC, Parrott-Phelan Canal, WCWD, or Rancho Esquon	Low	30,000	Slow	Impact to salmon from moving water between watersheds. Butte Creek projects uncertain due to concern about SWRCB intervention. Limitations of PG&E canal capacity.
3. Feather River - South Vina extension	Table A, Miocene, WCWD, Joint Districts, SFWPA, PID	WCWD, TWD	Use existing WCWD canals plus new pipelines/canals to convey water	New pipelines or canals needed to deliver the water to farmland in the southern portion of Vina Subbasin.	Mid	30,000	Mid	Easements
4. Maximize existing Butte Creek water rights	Durham MWC, Dayton MWC	Butte Creek Watermaster, SWRCB, Rancho Esquon	Use existing diversions	Use existing on-farm and district distribution	Low	2,380	Fast	Most existing rights are fully exercised. Environmental interests would want any currently unused supply to remain in the creek.
5. Oroville - Chico pipeline	Feather River water right conveyed to farmland for irrigation or to city of Chico for municipal use	Butte County, WCWD, Joint Districts, SFWPA, PID, TWD, Cal Water, City of Chico	Minimum 10 miles of conveyance	Extensive new pipelines or canals needed to deliver water to farmland in South Vina.	High	30,000	Slow	Easements

6. Paradise - Chico Intertie	PID, Miocene, other water sources for municipal use	PID, Cal Water, City of Chico	New pipeline from the ridge to Chico	Use existing Cal Water delivery system in Chico.	High	3,000-5,000	Slow	PID would need to fix Magalia Dam and may need to increase treated water capacity. PID indicated they are not interested in this project at this time.
7. Other local creeks	Pine, Mud, Rock, Dry, Big Chico, Little Chico, Hamlin Slough	SWRCB	New diversions would be needed	New distribution would be needed	Mid	0	Mid	Mostly ephemeral or seasonal and do not have water in them during the irrigation season. Big Chico Creek flows year-round.
8. Sacramento River riparian rights	Sacramento River	Landowners	New diversion on Sac River	New pipelines needed to deliver the water to irrigated farmland	Mid	1,800	Slow	Riparian rights severed in some instances, which reduces acreage that can be served per diversion.
9. New water right application	Butte Creek, Feather River, Sacramento River	SWRCB	New diversion(s)	New pipelines needed to deliver the water to irrigated farmland	Mid	0	Slow	Waterbodies are fully appropriated during the irrigation season in all but the wettest years

AFY – Acre-feet per year
Cal Water – California Water Service
CDFW – California Department of Fish and Wildlife
DWR – California Department of Water Resources
MWC – Mutual Water Company
PID – Paradise Irrigation District
PG&E – Pacifica Gas & Electric
Sac – Sacramento
SFWPA – South Feather Water and Power Agency
SOD – South of Delta
SWRCB – State Water Resources Control Board
TWD – Tuscan Water District
USBR – U.S. Bureau of Reclamation
USFWS – U.S. Fish and Wildlife Service
WCWD – Western Canal Water District

Revised December 3, 2024

Vina Subbasin
Surface Water Supply Project

Butte County Board of Supervisors

May 27, 2025

Jenny Scheer

Water and Land Solutions, LLC

Project Timeline

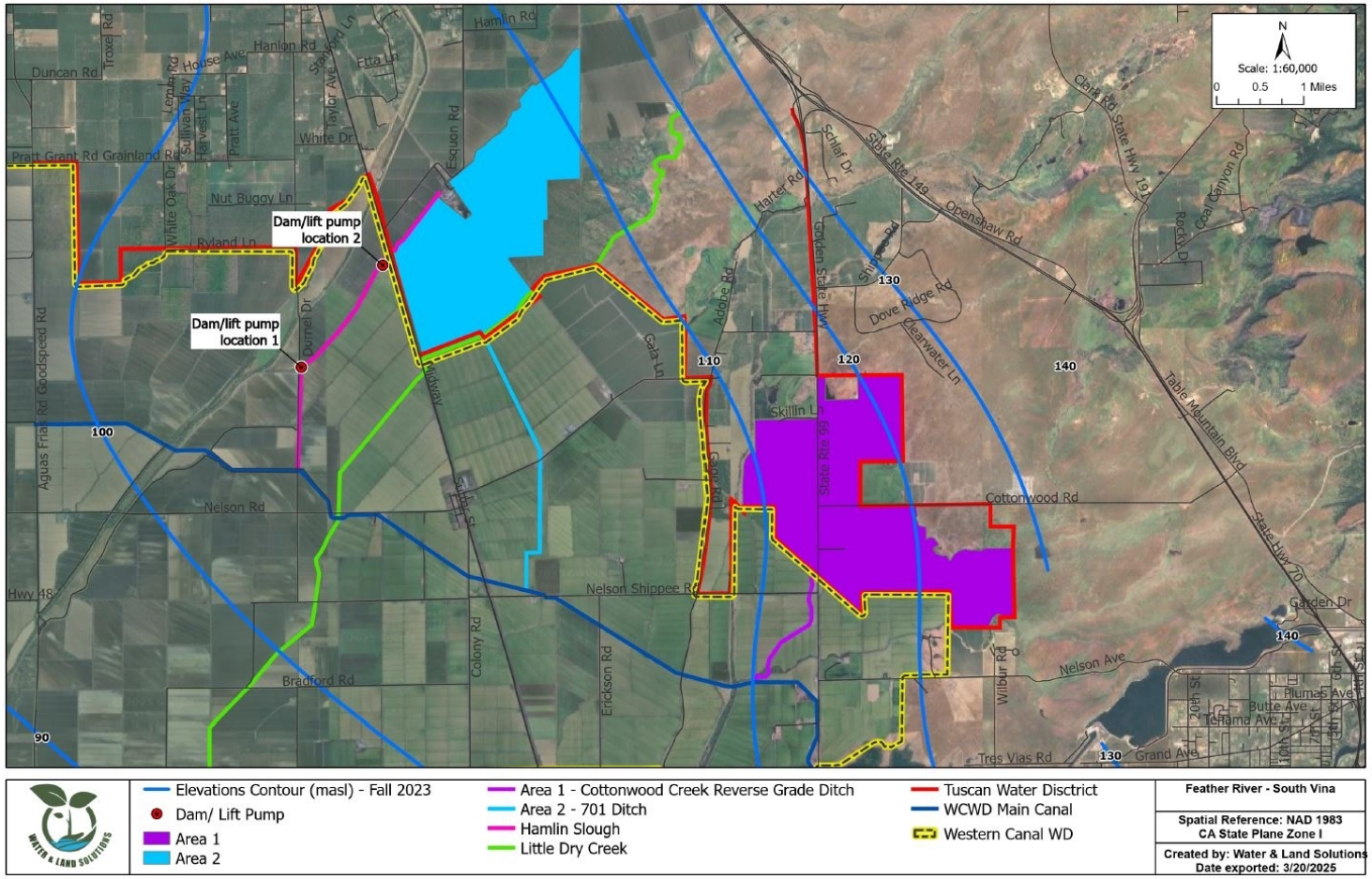
- August 7, 2024 – Butte County Water Commission meets, discusses priorities, and forms ad-hoc
- December 4, 2024 – 9 projects presented to Water Commission, Commission selects 4 projects for fatal flaw analysis
- April 2, 2025 – Water Commission recommends 2 projects to proceed to feasibility analysis
- **May 27, 2025 – Butte County Board of Supervisors select 2 projects to proceed to feasibility analysis**
- October 1, 2025 – Feasibility Analysis report presented to the Water Commission

Key Considerations

- 15,000-25,000 AF goal for surface water projects
- How best to increase surface water use in the subbasin
- Fatal flaw analysis:

1. Water availability
2. Water right concerns
3. Legal and regulatory aspects
4. Environmental considerations
5. Sustainability goals
6. Costs and Funding options

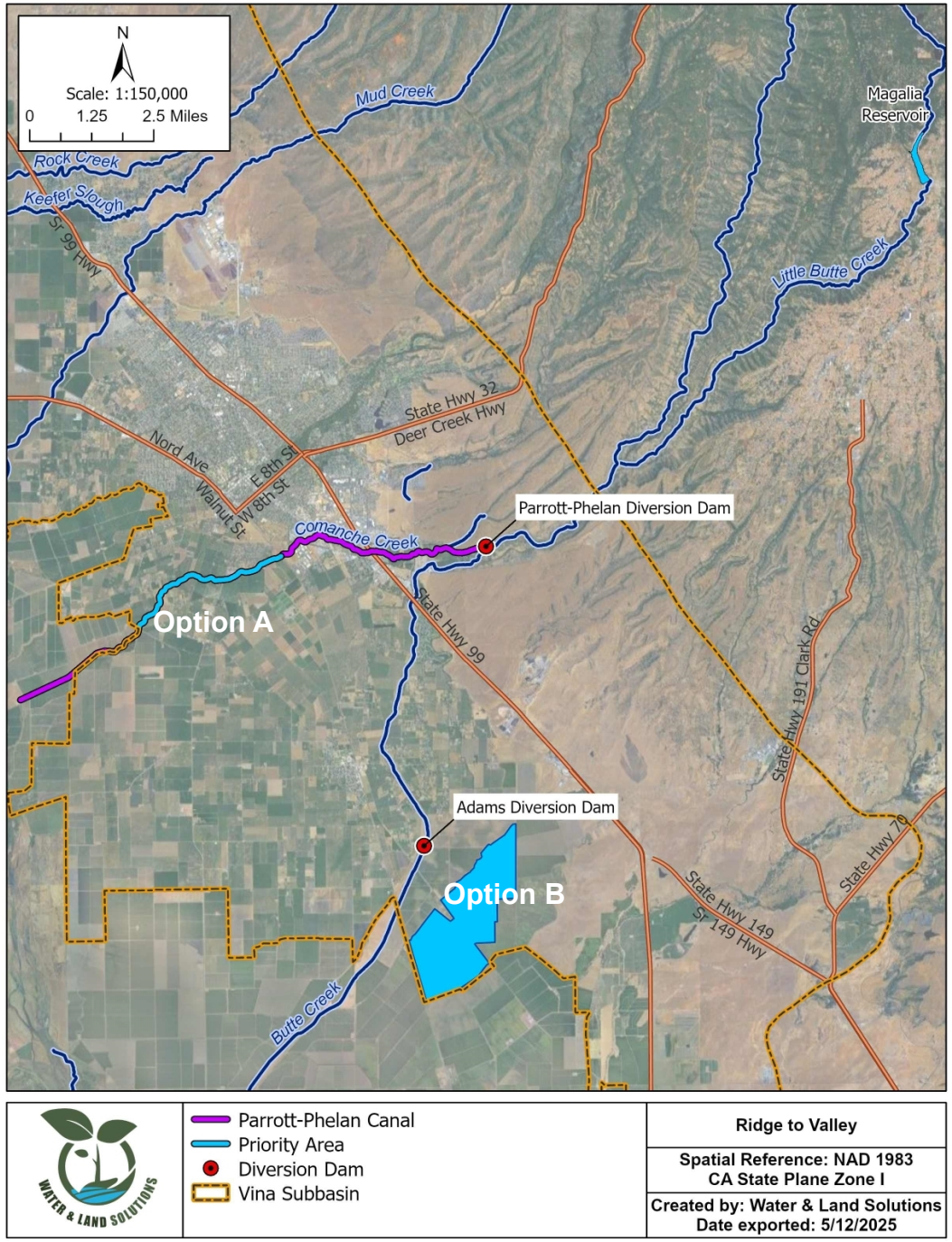
1. Feather River – South Vina



No Fatal Flaw

Water Commission recommendation: Advance to feasibility analysis

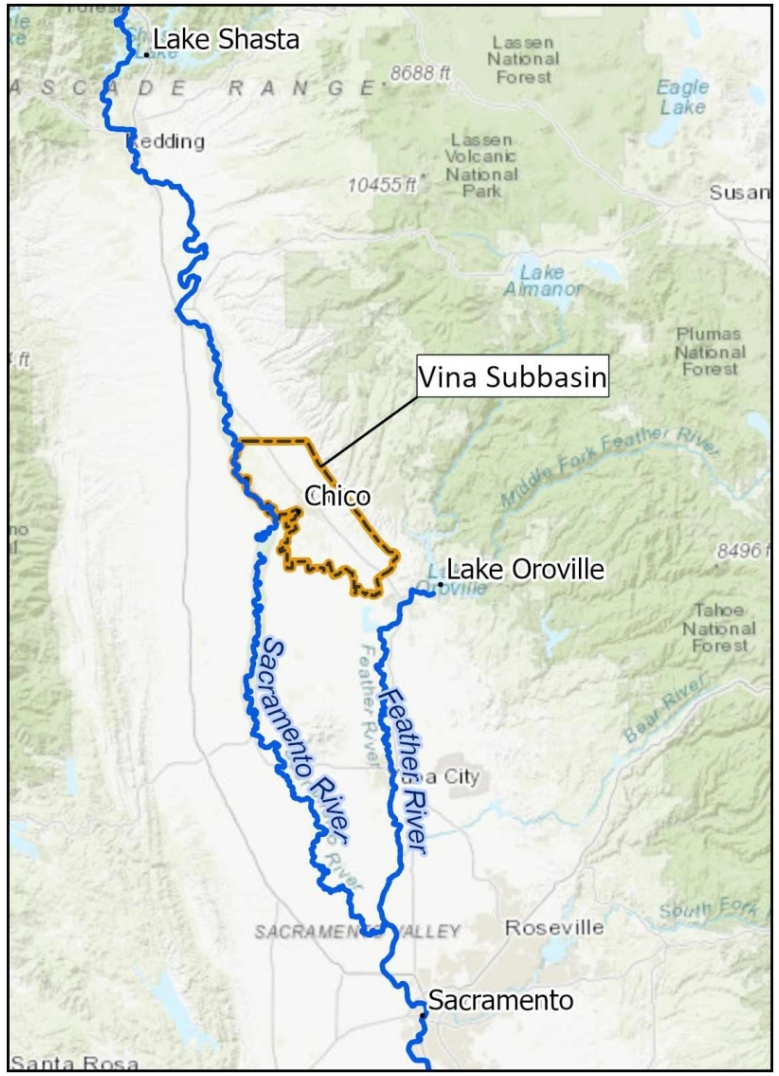
2. Ridge to Valley



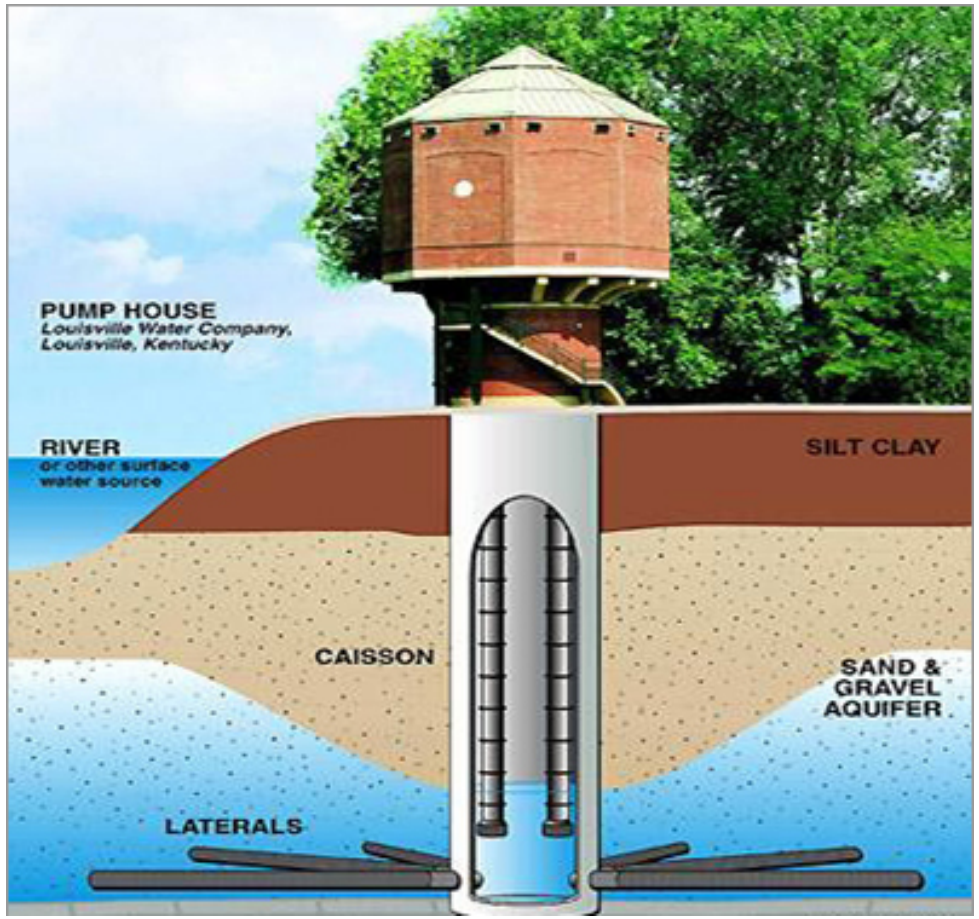
No Fatal Flaw

Water Commission recommendation: Advance to feasibility

3. Feather River -- Sacramento exchange



Radial well



No Fatal Flaw

4. Feather River -- Butte Creek diversion

Fatal Flaws Identified

Summary

Project Option	Acre-feet	Preliminary Capital Cost Estimate	Fatal Flaw Findings	Water Commission Recommendation
1. Feather River--South Vina extension	10,000-12,000	<$5 million	No fatal flaw	Proceed to feasibility analysis
2. Ridge to Valley	Up to 5,000	Up to $5 million	No fatal flaw	Proceed to feasibility analysis
3. Feather River--Sacramento River exchange	12,000	>$15 million	No fatal flaw	Convene additional discussions
4. Feather River--Butte Creek diversion	0	N/A	Fatal flaws	Convene additional discussions