Comparison of Local and Regional Alternatives

Technical Memorandum #6

Paradise Sewer Project

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1. Introduction

The Town of Paradise (Town) is implementing the Paradise Sewer Project (Project), which involves identifying and implementing a long-term solution for collection, treatment, and reuse/disposal of its wastewater. HDR is under contract to assist the Town with the first two phases of the Project—final selection of a wastewater alternative (Phase 1), and preparation of an Environmental Impact Report (EIR) covering the selected alternative (Phase 2). This technical memorandum (TM) is part of the Phase 1 effort.

The purpose of this TM #6 is to compare the wastewater treatment alternatives evaluated in previous TMs and to recommend which alternative(s) to carry forward into Phase 2. TM #4 – Local Wastewater Treatment and Disposal Alternatives analyzed alternatives for a local wastewater treatment plant (WWTP) and reuse/disposal in the Paradise area. TM #5 – Regional Alternative analyzed the alternative of piping Paradise wastewater via one of two routes to the City of Chico Water Pollution Control Plant (WPCP) for treatment and disposal, referred to as the regional alternative.

The alternatives carried forward from TM #4 and TM #5 for evaluation in this TM include the following (see Figure 1):

- Land application alternative (LAA; Alternative 1 from TM #4)
- Miocene Canal alternative (MCA; Alternative 4 from TM #4)
- Regional alternative (RA; Alternative A from TM #5)

This TM is organized as follows:

- Section 1: Introduction
- Section 2: Method of Comparison
- Section 3: Alternative Comparison, Ranking, and Recommendation

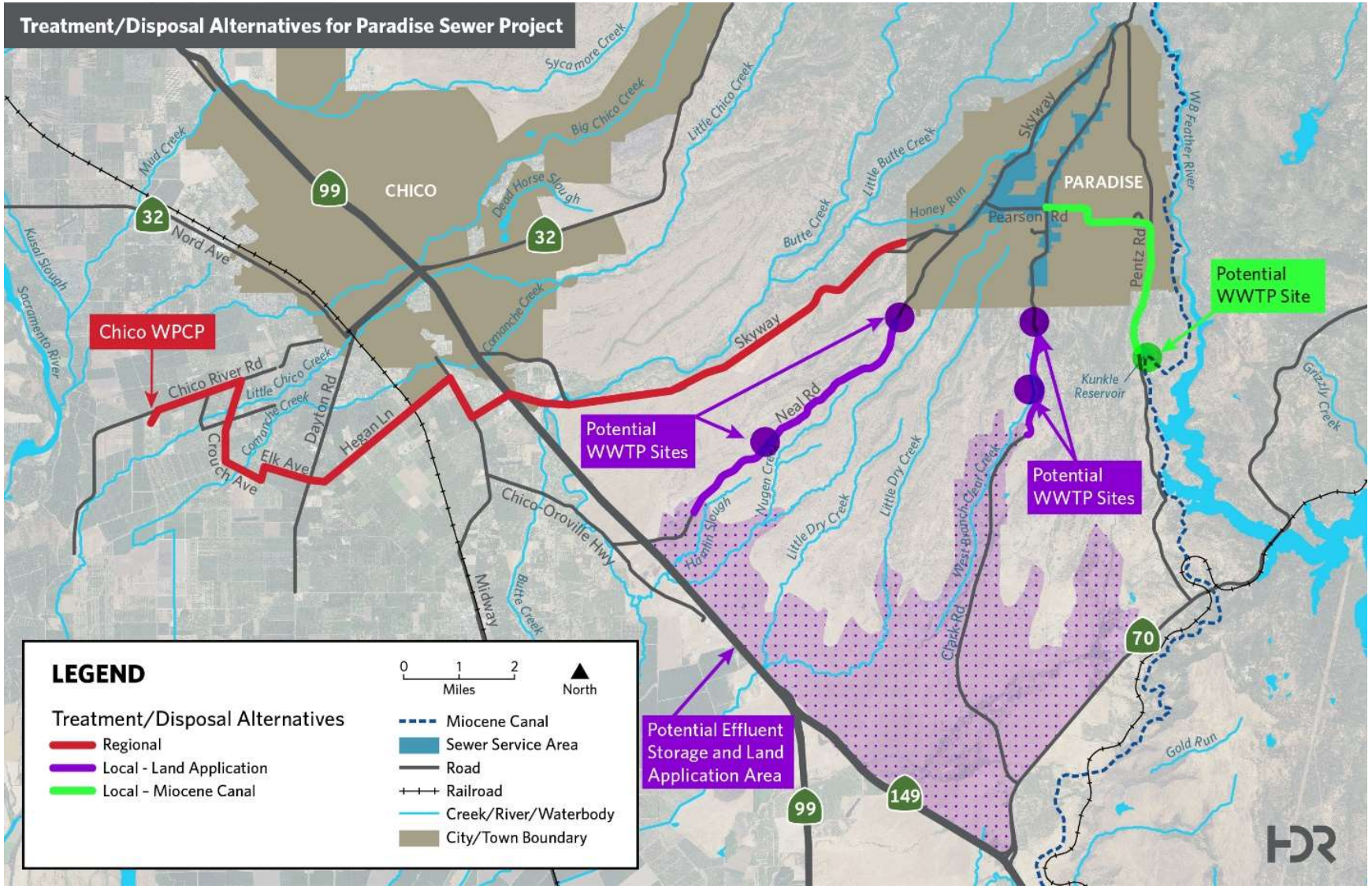

Figure 1. Treatment/Disposal Alternatives

2. Method of Comparison

The alternatives were scored and compared using a mathematical matrix (see Table 1 at the end of this TM). The matrix divides the scoring into five categories, each with their own criteria. The following categories and criteria were used:

- **Economic:** The economic category focuses on the initial and long-term (operational) costs of an alternative. The criteria are as follows:
    - **EC1, Net Present Value:** Total life cycle costs include capital costs, operations and maintenance (O&M) costs, connection fees (if applicable), ongoing user fees (if applicable), and salvage value, calculated as net present value.
    - **EC2, Capital Costs:** Capital costs include construction costs and soft costs associated with implementation.
- **Social:** Social considerations focus on impacts on people, including impacts on time, safety, recreation, property, and convenience. These impacts often arise in projects because of traffic disruption, diminished aesthetics, or service outages. The criteria are as follows:
    - **SO1, Construction Impacts on the Community:** Examples of construction impacts are traffic, noise, and dust generated by construction activities.
    - **SO2, Permanent Impacts on the Community:** Permanent impacts are from installed facilities and include issues such as visual, noise, and odor. Permanent impacts can also involve changes to public or recreational access.
    - **SO3, Ongoing Monitoring or Mitigation Required:** Likely monitoring and/or mitigation requirements are needed to offset impacts on the community.
- **Environmental:** Environmental impacts involve impacts on the natural environment, including air or water quality, habitat, species, ecosystem function, and human health. Ranking is based on the type or protection of the resource impacted, the level of impact, and the resulting effect on the review/permitting process. The criteria are as follows:
    - **EV1, Construction or Operational Impacts on Sensitive Resources:** Construction or operational impacts may be on specific sensitive environmental resources, such as vernal pools or cultural resources, or these impacts may be on overall water quality, air quality, or watershed protection.
    - **EV2, Environmental Permitting Requirements:** Scoring is based on the simplicity of environmental permitting (i.e., shorter time required to obtain the permit), the potential to avoid resources (and thus avoid permitting), and the predictability of obtaining an environmental permit (some agencies are more difficult and unpredictable when it comes to issuing a permit).
    - **EV3, Permanent Loss of Agricultural Land:** Butte County has an overall goal of maintaining agricultural land, as stated in the Butte County Code of Ordinances,

Chapter 35 – Protection of Agricultural Land. Some alternatives result in permanent loss of the ability to farm the land.

- **Implementation:** Implementation issues relate to the ability to get a project approved for construction. The criteria are as follows:
    - **IM1, Obtaining Non-Environmental Permits or Regulatory Approvals:** This criterion considers how difficult it may be to obtain permits or agency approvals. Examples include an initial National Pollutant Discharge Elimination System permit, railroad or Caltrans crossing permits, and Cal Water approval of a Miocene Canal alternative.
    - **IM2, Obtaining Political Approvals:** This criterion considers how difficult it may be to obtain political approvals or to negotiate contracts between political bodies.
    - **IM3, Cooperation of Local Landowners:** This criterion considers the willingness of local agricultural landowners to use treated wastewater, or the willingness of local landowners to sell their land (i.e., willing sellers).
- **Operational:** Operational impacts inhibit the ease of operation and maintenance of the assets under consideration or can relate to challenges in meeting regulatory requirements. The criteria are as follows:
    - **OP1, Legal and Regulatory Requirements:** This criterion considers how stringent legal and regulatory requirements are (e.g., risk of future regulatory violations/fines) and the potential for future increases in regulatory requirements (e.g., National Pollutant Discharge Elimination System permit limits, waste discharge requirements).
    - **OP2, Technical Complexity:** This criterion considers the technical complexity of operation and maintenance (e.g., a complex wastewater treatment process).
    - **OP3, System Flexibility:** This criterion considers the flexibility to change operation of the system as conditions change. This can include the ability to respond in an emergency and weather-dependency. Flexibility can be provided through storage of wastewater, redundant facilities, or the ability to change/divert flows.

3. Alternative Comparison, Ranking, and Recommendation

Using the categories and criteria presented in Section 2, the alternatives were scored. The scores are shown in Table 1 at the end of this TM. The economic category was scored using the cost estimates prepared in TM #4 – Local Wastewater Treatment and Disposal Alternatives and TM #5 – Regional Alternative. The remaining four non-economic categories were scored based on the experience of the HDR project team using the scoring guidance shown in Table 1.

The weighting factors, the scoring in each of the five categories, and the recommended alternative(s) are described in the following sections.

3.1 Weighting Factors

In scoring and comparing alternatives, it is possible that not all categories, or criteria within a category, are considered to have equal weight in the overall decision-making process. Weighting factors are used to capture this potential difference. For the purposes of this analysis, equal weight was applied to each of the five categories (i.e., 20 points each, for a total of 100). Within each category, those 20 points were distributed among the two or three criteria. This distribution was done by the HDR project team based on their experience and the assumed contribution of each criterion to the overall category. For the non-economic categories, scores are multiplied by these weighting factors to create weighted scores. For the economic category with quantitative information, the weighted score is based on the formula in Table 1. The scores in each category are then added to create a total weighted score.

3.2 Economic Scores

As discussed in Section 3, the scores for the two economic criteria were taken directly from the cost estimates prepared in TM #4 and TM #5. Because a lower score in this case (i.e., lower cost) is positive, a formula was used to create the weighted score in the following manner:

- A value of 0 is assigned to the highest cost (score).
- A value of 10 is assigned to a cost of zero. In other words, the “ideal” alternative from an economic perspective would have zero cost.
- The formula then scales linearly between these two to arrive at a score between 0 and 10. These scores are multiplied by the weighting factors to get the weighted score.

Because the Miocene Canal alternative has the highest cost for both criteria, it has a weighted score of 0 for both. The scores for the other two alternatives were calculated as described above.

3.3 Social Scores

The scores in the social category are as follows:

- **SO1, Construction Impacts on the Community**
    - **LAA:** The land application alternative (LAA) scored lowest because of the extensive truck traffic that would be involved with hauling soil off-site during construction of the storage reservoir. It also would involve the construction of the local WWTP, which would be a lengthy process and would involve significant noise, dust, and visual impacts on neighbors in the area.
    - **MCA:** The Miocene Canal alternative (MCA) scored in the mid-range because Pentz Road, where the pipeline to the local WWTP would be built, is narrow and construction truck traffic would impact local access. It also would involve construction of a local WWTP, which would have less impact than the LAA due to its location near Kunkle Reservoir.

- **RA:** The regional alternative (RA) scored higher because Skyway is a wider road that would allow for regional pipeline construction near the shoulder and would involve less impact on traffic. Construction would likely generate less noise and dust than the other alternatives.

- **SO2, Permanent Impacts on the Community**
  - **LAA:** The LAA scored in the mid-range because the storage reservoir and land application could provide more green vegetation and could improve the visual impacts of the land application area, but the local WWTP would have permanent visual, noise, and potentially odor impacts.
  - **MCA:** The MCA scored slightly lower than the LAA because of those same local WWTP impacts.
  - **RA:** The RA scored higher because it doesn't have the impacts of a local WWTP. However, there is the potential for odor impacts from the long force main and its ultimate discharge at the Chico WPCP (although most of those impacts can be mitigated).

- **SO3, Ongoing Monitoring or Mitigation Required**
  - **LAA:** The LAA scored lowest because of the extensive, ongoing monitoring required for both the local WWTP and a land application system, including monitoring wells, farmers' proper handling of runoff, and impacts on groundwater.
  - **MCA:** The MCA scored higher than the LAA because monitoring would be required for only the WWTP effluent and in the canal.
  - **RA:** The RA scored highest because ongoing monitoring would primarily be handled by the Chico WPCP as part of its own ongoing operation.

3.4 Environmental Scores

The scores in the environmental category are as follows:

- **EV1, Construction or Operational Impacts on Sensitive Resources**
  - **LAA:** The LAA scored lowest because of the potential impacts on vernal pools in the land application area (those impacts can be mitigated, but with significant effort and cost).
  - **MCA:** The MCA scored in the mid-range because it has the potential for some impacts on habitat along the Miocene Canal, or in Kunkle Reservoir if discharge were to occur there.
  - **RA:** The RA scored highest because it would involve little impact on sensitive resources as the pipeline would be installed in already disturbed areas.

- **EV2, Environmental Permitting Requirements**
    - **LAA:** The LAA scored very low because it would have extensive environmental permitting requirements associated with the land discharge.
    - **MCA:** The MCA scored in the mid-range. Permitting would be challenging, in particular getting state agencies to approve the resulting impacts on the Miocene Canal; however, permitting would be less challenging than for the LAA.
    - **RA:** The RA scored in the high range. With little impact on sensitive resources, the RA permitting should be fairly straightforward.
- **EV3, Permanent Loss of Agricultural Land**
    - **LAA:** The LAA scored low because it would take approximately 150 acres of land out of agricultural use for the storage reservoir. This impact would be partially offset by the agricultural land receiving recycled water being put to a (potentially) higher-value agricultural use.
    - **MCA:** The MCA scored at the top because it would not result in the loss of any agricultural land.
    - **RA:** The RA also scored high but has some potential for small loss of agricultural land along the regional pipeline route, where it may cross some agricultural parcels.

3.5 Implementation Scores

The scores in the implementation category are as follows:

- **IM1, Obtaining Non-Environmental Permits or Regulatory Approvals**
    - **LAA:** The LAA scored low because it would involve obtaining a waste discharge permit (also known as Waste Discharge Requirements) from the Central Valley Regional Water Quality Control Board (Regional Board), and the Regional Board staff has voiced a strong preference for a regional solution.
    - **MCA:** The MCA also scored low because it would involve getting several state agencies to approve the discharge of advanced treated wastewater with downstream municipal (drinking water) uses (although these systems are becoming more common in California).
    - **RA:** The RA scored high because, although it would involve obtaining permits from CalTrans and the Union Pacific Railroad (which are time-consuming to obtain), these permits are ultimately achievable. The RA also scored high because of the communication with Regional Board staff who indicated their strong preference and funding support for a regional solution.

- **IM2, Obtaining Political Approvals**
    - **LAA:** The LAA scored highest because it would primarily involve Butte County as the other political entity, and its primary involvement would be in approving the change in land use for the land where the storage reservoir would be built, which should not be controversial.
    - **MCA:** The MCA scored a little lower because it would require CalWater (owner of the terminal reservoir at the end of the Miocene Canal) to agree to the introduction of advanced treated wastewater into the system.
    - **RA:** The RA also scored a little lower than the LAA because it would involve approval of railroad and CalTrans permits along with the complexity of two political bodies, the Paradise Town Council and the Chico City Council, coming to agreement on a complex arrangement. However, strong support for the RA by both political bodies would help mitigate those complexities.
- **IM3, Cooperation of Local Landowners**
    - **LAA:** The LAA scored low because of the large number of landowners with which permanent agreements would be needed in four locations—the WWTP site, the pipeline route, the storage reservoir site, and land application parcels.
    - **MCA:** The MCA also scored low because local landowners taking water from the Miocene Canal would likely have a relatively large supply of fresh water available to them under an arrangement with PG&E. It is questionable whether they would support adding a small amount of advanced treated wastewater into the canal.
    - **RA:** The RA scored high but does face some challenges related to obtaining easements from landowners along the regional pipeline route.

3.6 Operational Scores

The scores in the operational category are as follows:

- **OP1, Legal and Regulatory Requirements**
    - **LAA:** The LAA scored highest because it was felt that land application systems would not be as susceptible to increased requirements in the future.
    - **MCA:** The MCA scored low because it would feed into a (potential) domestic water system, which would make it subject to additional operational constraints and requirements.
    - **RA:** The RA scored relatively high. The Chico WPCP discharges to the Sacramento River, where it has the benefit of significant dilution. However, the Chico WPCP could still face increasing discharge requirements in the future.

- **OP2, Technical Complexity**
    - **LAA:** The LAA scored in the mid-range because of the need to operate a local WWTP and a weather-dependent land application system.
    - **MCA:** The MCA scored low because of the technical complexity of its advanced treatment requirements to allow for discharge into the Miocene Canal.
    - **RA:** The RA scored high because the Chico WPCP is a less complex plant to operate than the MCA would be, and the City of Chico has years of experience in operating and maintaining it.
- **OP3, System Flexibility**
    - **LAA:** The LAA scored high because it would have a large amount of effluent storage and numerous alternative land application locations. Because the LAA would involve construction of a local WWTP, the ability to handle septage could be incorporated if the Town desires.
    - **MCA:** The MCA scored low because it would have little or no storage in the event of a WWTP upset and no alternative discharge location. Because the MCA would involve construction of a local WWTP, the ability to handle septage could be incorporated if the Town desires.
    - **RA:** The RA scored in the mid-range because it would have no storage and would be dependent on a regional pipeline. Both issues could be mitigated by providing an oversized wet well at the upstream pump station and by providing dual force mains. These items will be studied further in Phase 2. RA also can't handle septage because no local WWTP would be built.

3.7 Comparison and Recommendation

As shown in Table 1 and Figure 2, the regional alternative has the highest weighted score (748), which is 46 percent higher than the land application alternative (with a score of 514) and 96 percent higher than the Miocene Canal alternative (with a score of 381). As shown in Figure 3, in four of the five categories (the exception is the operational category), the regional alternative scored higher than the land application and Miocene Canal alternatives. In the operational category, the regional alternative scored only slightly lower than the land application alternative. This would indicate that even if the category weighting factors were changed, the regional alternative would still rank highest.

The HDR project team recommends that the regional alternative be carried forward into Phase 2 as the recommended project, for the following reasons:

- **Economic**: Lowest capital and net present value costs.
- **Social**: Lowest community impacts during and after construction.
- **Environmental**: Least probable environmental impacts.
- **Implementation**: Fewest permits needed. Central Valley Regional Board support.
- **Operational**: Least complicated to operate. Benefits from experienced Chico staff.

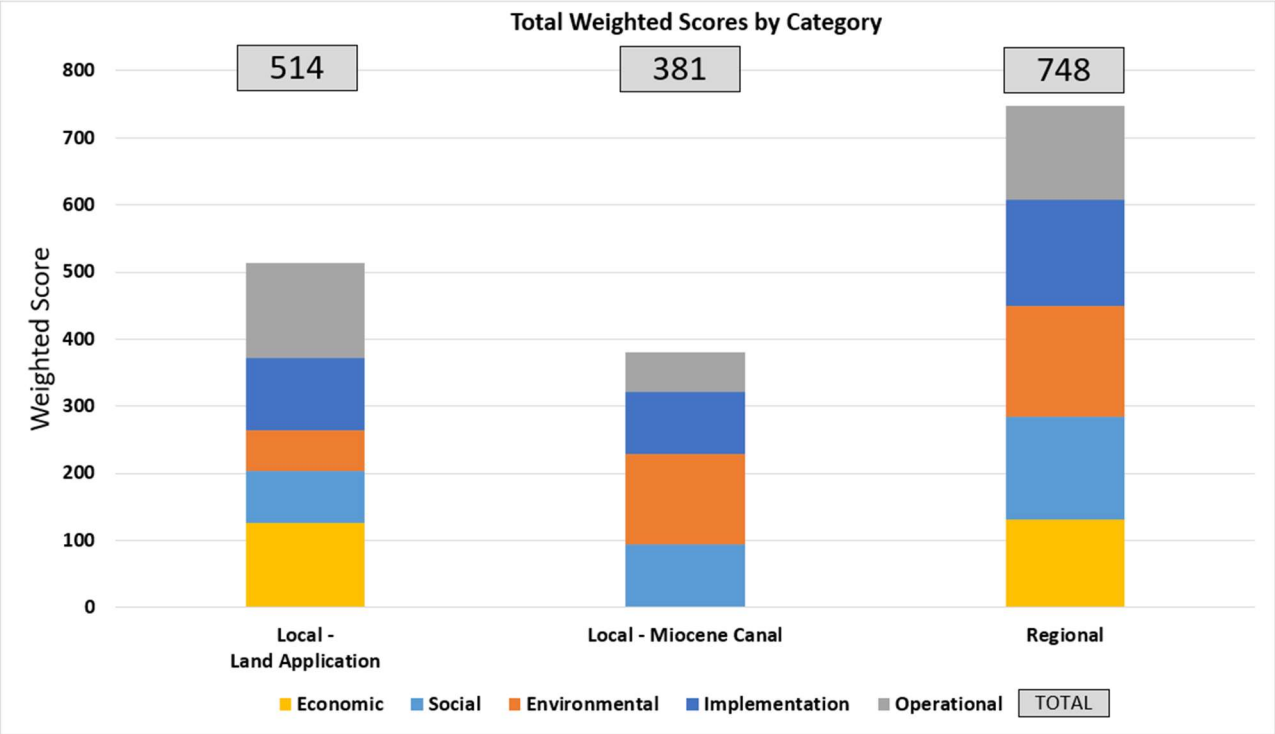

Figure 2. Comparison of Alternative Weighted Scores

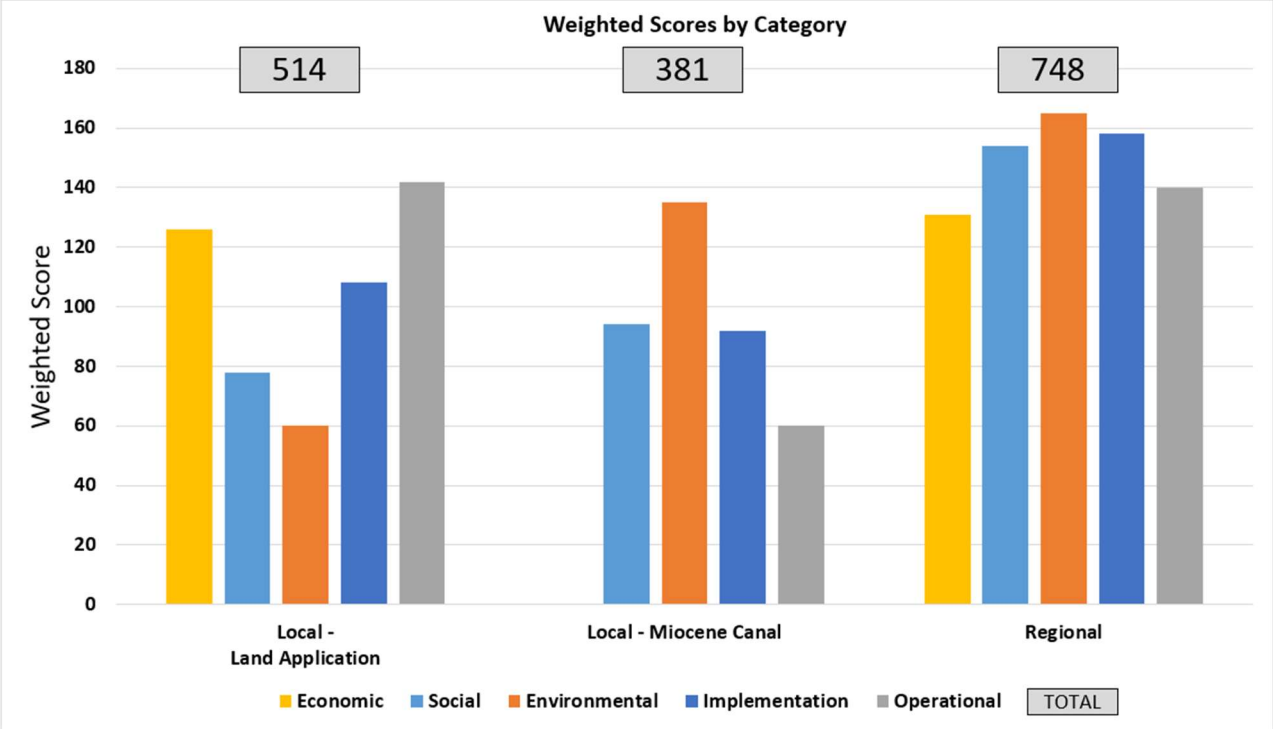

Figure 3. Comparison of Alternative Weighted Scores by Category

Table 1. Alternative Comparison Matrix

Category	Criteria ID	Criteria	Description	Scoring Guidance	Weight	Score			Weighted Score		
						Local - Land Application	Local - Miocene Canal	Regional	Local - Land Application	Local - Miocene Canal	Regional
Economic	EC1	Net Present Value	The present value (in $ million) of the capital, O&M, and salvage costs associated with implementing each alternative.	Scores are created by linearly scaling between "0" for the highest cost and "10" for zero cost.	10	$70.7	$233.8	$65.3	70	0	72
						7.0	0.0	7.2			
	EC2	Capital Costs	The capital costs (in $ million) associated with implementing each alternative. Does not include collection system cost.	Scores are created by linearly scaling between "0" for the highest cost and "10" for zero cost.	10	$69.0	$157.7	$65.2	56	0	59
						5.6	0.0	5.9			
				Total Economic Weight	**20**	**Economic Subtotal**			**126**	**0**	**131**
Social	SO1	Construction Impacts on the Community	Impacts on the community during construction (e.g., traffic, noise, dust)	**10** – No significant impacts **5** – Moderate impacts **1** – High impacts **0** – Extreme impacts	6	3	5	7	18	30	42
	SO2	Permanent Impacts on the Community	Permanent impacts on the community from installed facilities (e.g., visual, noise, odor). Change in public/recreational access.	**10** – No signficant impacts **5** – Moderate impacts **1** – High impacts **0** – Extreme impacts	8	6	5	8	48	40	64
	SO3	Ongoing Monitoring or Mitigation Required	Likely ongoing monitoring and/or mitigation requirements to offset impacts to the community	**10** – No ongoing monitoring/mitigation **5** – Moderate ongoing and/or compensatory monitoring/ mitigation **1** – High ongoing and/or compensatory monitoring/mitigation **0** – Extreme ongoing and/or compensatory monitoring/ mitigation	6	2	4	8	12	24	48
				Total Social Weight	**20**	**Social Subtotal**			**78**	**94**	**154**
Environmental	EV1	Construction or Operational Impacts on Sensitive Resources	Construction or operational impacts to specific sensitive environmental resources (e.g., vernal pools, cultural resources), or on overall water quality, air quality, or watershed protection.	**10** – No impact on endangered or threatened species **5** – Minimal impact on endangered or threatened species. Impact can be mitigated with off-site efforts **1** – Moderate impact on endangered or threatened species **0** – Significant impact on endangered or threatened species. Off-site mitigation not possible or not sufficent.	10	4	6	8	40	60	80
	EV2	Environmental Permitting Requirements	Ranking based on simplicity of permitting (i.e., shorter time required to obtain the permit), potential to avoid resources (and thus avoid permitting), and the predictability of obtaining a permit (some agencies are more difficult and unpredictable when it comes to issuing a permit).	**10** – Very simple to permit or avoid resources **5** – Some permitting, but obtainable in reasonable time **1** – Extensive permitting, obtainable in an extended time **0** – Difficult to impossible to permit	5	1	5	8	5	25	40
	EV3	Permanent Loss of Agricultural Land	Butte County has an overall goal of maintaining agricultural land, and some alternatives result in permanent loss of the ability to farm the land.	**10** – No permanent loss of ag land **5** – Moderate loss of ag land **1** – Significant loss of ag land **0** – Unacceptable loss of ag land	5	3	10	9	15	50	45
				Total Environmental Weight	**20**	**Environmental Subtotal**			**60**	**135**	**165**
Implementation	IM1	Obtaining Non-Environmental Permits or Regulatory Approvals	Difficulty in obtaining non-environmental permits or agency approvals (e.g., an initial NPDES permit, railroad or CalTrans crossing permits, CalWater approval of Miocene Canal alternative)	**10** – Very simple to obtain permits/approvals **5** – Significant permits/approvals, but obtainable in a reasonable time **1** – Extensive permits/approvals, obtainable in an extended time **0** – Difficult to impossible to permit	6	3	3	9	18	18	54
	IM2	Obtaining Political Approvals	Difficulty in obtaining political approvals or negotiating contracts	**10** – Strong support from involved parties involving positive negotiations **5** – Medium support involving extended negotiations **1** – Reluctance from one or more involved parties **0** – One or more parties refuse to participate	8	9	7	7	72	56	56
	IM3	Cooperation of Local Landowners	Willingness of local agricultural landowners to use treated wastewater, or willingness of local landowners to sell their land (i.e., “willing sellers”)	**10** – Land owners eager to use recycle water or sell land, or no land owners involved **5** – Several land owners resistant **1** – Numerous land owners resistant **0** – Land owners likely to actively fight the project	6	3	3	8	18	18	48
				Total Implemenation Weight	**20**	**Implementation Subtotal**			**108**	**92**	**158**
Operational	OP1	Legal and Regulatory Requirements	Stringent legal and regulatory requirements (e.g., risk of future regulatory violations/fines). Potential for future increases in regulatory requirements (e.g., NPDES dischage permit limits).	**10** – Project can readily meet future requirements **5** – Project somewhat succeptable to future requirements **1** – Project very succeptable to future regulatory requirements **0** – Project likely not able to meet future regulatory requirements	8	8	3	7	64	24	56
	OP2	Technical Complexity	Complexity of operation and maintentance. Often relates to the technical complexity of a treatment facility.	**10** – Simple to operate and maintain **5** – Complex to operate and maintain **1** – Complex technologies requiring specially trained staff **0** – Very complex with high likelihood of O&M issues	6	5	2	9	30	12	54
	OP3	System Flexibility	Increases options for Operations to maintain system service, or for Maintenance to maintain assets. Improves system ability to adapt to changing demand and future expansion. Removes system bottlenecks.	**10** – Numerous alternate operating modes **5** – Provides redundancy or an alternate operating mode **1** – Limited flexibility in responding to changes **0** – No flexibility in responding to changes	6	8	4	5	48	24	30
				Total Operational Weight	**20**	**Operational Subtotal**			**142**	**60**	**140**

Total Weighting Factors	100

	Local - Land Application	Local - Miocene Canal	Regional
Total Weighted Score	514	381	**748**