DRAFT

TECHNICAL MEMORANDUM

Effluent Disposal Alternatives Evaluation – Los Olivos Wastewater Reclamation Program Project

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Executive Summary

This technical memorandum (TM) presents an analysis of treated wastewater effluent disposal alternatives conducted by Confluence Engineering Solutions, Inc. (ConfluenceES) and GSI Water Solutions, Inc. (GSI) for the Los Olivos Community Services District's (District) Los Olivos Wastewater Reclamation Program Project (LOWRPP).

The analysis includes an evaluation of multiple effluent disposal alternatives available to the District for the LOWRPP and provides a recommended alternative based on the evaluation criteria. Partial Reuse via Recycled Water Delivery is considered separately as a complement to any of the disposal alternatives. The following four effluent disposal alternatives were evaluated as part of this project:

- Percolation Ponds
- Percolation Chambers
- Shallow Aquifer Injection Wells
- Alamo Pintado Creek Outfall

Because the location for the LOWRPP has not yet been identified, this evaluation used the following criteria to compare the relative differences of each of the disposal alternatives and to develop the recommended alternative:

- Permitting Requirements
- Effluent Quality
- Social Considerations
- Footprint
- Water Resource Benefits
- Feasibility/Complexity/Reliability

- Monitoring Requirements
- Capital Costs
- Operations and Maintenance Costs

To provide a quantitative comparison of the disposal alternatives, ConfluenceES and GSI developed a ranking matrix that allowed each alternative to be scored relative to each of the identified criteria, with 1 representing the least favorable and 5 the most favorable. The total scores for each alternative were then calculated and used to develop overall rankings for each disposal alternative, as shown in Table ES-1.

Full Reuse of Recycled Water as the sole source of effluent disposal was not included in the scoring and ranking evaluation. It was determined that it would be challenging to rely upon Full Reuse of Recycled Water because the system would be entirely reliant on the ability to apply irrigation. While utilization of effluent from the LOWRPP for irrigation would provide significant benefits and correspond with potentially reduced treatment and permitting requirements, it would be difficult to rely upon delivery of recycled water as the only source of disposal. Partial Reuse of Recycled Water is recommended and described in the Partial Reuse of Recycled Water section of this TM.

Based on the results of the scoring and ranking evaluation, Percolation Ponds or Percolation Chambers are recommended as the preferred approach for effluent disposal. It is also recommended that the District continue to investigate opportunities for Partial Reuse of Recycled Water to complement a disposal alternative that can accommodate the full flow for the LOWRPP in the event that the irrigation customers, if identified, cannot always take delivery of the recycled water. This way, the effluent from the LOWRPP could be used for landscape and/or agriculture irrigation to reduce the quantity of effluent from the LOWRPP that will require disposal under normal conditions. Percolation Ponds or Percolation Chambers are recommended as the preferred approach for effluent disposal from the LOWRPP for the following reasons:

1. These disposal alternatives have the lowest permitting and effluent quality requirements of the primary disposal alternatives evaluated.
2. Visual social impacts of percolation ponds can be mitigated with percolation chambers, if desired.
3. There is limited construction or operational complexity associated with these disposal alternatives.
4. These alternatives are anticipated to have the lowest capital and operations & maintenance costs of the evaluated alternatives.

Additional detail regarding each of the disposal alternatives and the scoring and ranking evaluation is provided in the Disposal Alternatives Evaluation section of this TM.

Table ES-1. Effluent Disposal Alternative Scoring and Ranking

Disposal Alternative	Effluent Disposal Alternative	Permitting Requirements	Effluent Quality	Social Considerations	Footprint	Water Resource Benefits	Feasibility/ Complexity/ Reliability	Monitoring Requirements	Capital Cost	Operations & Maintenance Cost	Total Score	Ranking
Percolation ponds	An open, graded impoundment that is designed to dispose of treated effluent via percolation	5	5	2	2	3	4	4	5	4	**34**	1
Percolation chambers	Buried impoundments, either above or below ground surface that is designed to dispose of treated effluent via percolation	5	5	4	1	3	3	4	4	4	**33**	2
Shallow aquifer injection wells	Shallow aquifer injection wells (<100-150 feet deep) that inject treated effluent into the saturated portion of the upper aquifer	1	1	5	5	4	1	1	1	1	**20**	4
Alamo Pintado Creek outfall	Discharge outlet to Alamo Pintado Creek for disposal of treated effluent	2	2	3	4	3	2	2	3	2	**23**	3

Introduction

The unincorporated township of Los Olivos is located in the Santa Ynez Valley of Santa Barbara County, California. The community of Los Olivos has a total of 384 parcels with approximately 350 septic systems. In 1974, Santa Barbara County designated Los Olivos as a Special Problems Area due to nitrate contamination of the groundwater. Los Olivos is located within the Santa Ynez Uplands Groundwater Basin.

Based on various risk factors, it has been concluded that there are significant groundwater quality issues with the use of septic systems in the Los Olivos area contributing to the Special Problems Area designation. Properties in Los Olivos currently rely on individual septic systems for wastewater disposal and there is no sanitary sewer collection system or wastewater treatment plant in the community.

In 2018, Los Olivos voters formed the District to provide a funding mechanism for the development, building, and operation of facilities needed to collect, treat, reclaim, and dispose of sewage, wastewater, recycled water, and storm water in Los Olivos. Per Adopted Resolution 2019-04, the LOWRPP was implemented to define a strategy to provide economically viable wastewater treatment and reclamation solutions to the residents and property owners within the District that meets both public health needs and the regulatory requirements of the Regional Water Quality Board (RWQCB).

Since 2018, the District has completed multiple initiatives toward the development of the LOWRPP, including the following:

- LOWRPP Basis of Design Report
- 30% Design for LOWRPP Gravity Collection System and Treatment Plant
- 10 to 15% Design for LOWRPP Septic Tank Effluent Pumping (STEP) Collection System and Treatment estimate
- Installation of two groundwater monitoring wells

This TM presents an analysis of treated wastewater effluent disposal alternatives for the LOWRPP and it builds upon previously completed work for the LOWRPP.

Effluent Disposal Alternatives

For the Effluent Disposal Alternatives Evaluation, the following four effluent disposal alternatives were evaluated:

- Percolation Ponds
- Percolation Chambers
- Shallow Aquifer Injection Wells
- Alamo Pintado Creek Outfall

Partial Reuse of Recycled Water is described in a separate section as this practice can complement any of the disposal alternatives.

Information on each of these disposal alternatives relative to the scoring criteria and other considerations is provided in the following sections. This information is provided without knowing the location of the LOWRPP and thus provides only a comparison of each of the disposal alternatives relative to the other available alternatives. Due to the unknown location of the LOWRPP, site-specific details for each of the disposal alternatives were not evaluated. However, the information in this TM can assist in selection of the location for LOWRPP and can be readily applied to support the design of the LOWRPP disposal system.

Percolation Ponds

This alternative would include disposal of effluent from the LOWRPP to one or more dedicated percolation ponds. A percolation pond is an open, graded impoundment that is designed to temporarily contain the treated effluent flows as they migrate into the subsurface via percolation.

Permitting Requirements

Effluent disposal via percolation ponds would most likely be enrolled in the Regional Water Quality Control Board General Waste Discharge Requirements (WDR) for "Discharges From Domestic Wastewater Systems With Flows Greater Than 100,000 Gallons Per Day," Order No R3-2020-0020 (General Order). The LOWRPP is anticipated to be located in the Santa Ynez River Valley Ground Water Basin in the Santa Ynez Sub-Basin and would be required to meet the water quality of the General Permit and Water Quality Control Plan for the Central Coast Basin (Basin Plan).

Effluent Quality Requirements

Treated effluent will be required to comply with effluent limitations specified in Section V of the General Order. Because the LOWRPP Wastewater Treatment Plant is proposed to use membrane bioreactor (MBR) treatment technology, Table 5 in the General Order will apply (see Table 1 in this TM below). Because the proposed point of compliance is above ground and the discharge is located within a designated groundwater basin, Table 6 in the General Order will also apply (see Table 2 in this TM below).

Table 1. Secondary Treatment Effluent Limitations – Activated Sludge, Membrane Biological Reactor, Sequencing Batch Reactor, or Similar Systems (from General Order R3-2020-0020)

Constituent	Units	30-Day Average	7-Day Average	Sample Maximum
Biochemical Oxygen Demand, 5-Day	mg/L	30	45	Not Applicable
Total Suspended Solids	mg/L	30	45	Not Applicable
Settleable Solids	mL/L	0.1	0.3	0.5
pH	Not Applicable	Between 6.5 and 8.4	Not Applicable	Not Applicable

Table 2. Effluent Limitations for Designated Groundwater Basins, 25-Month Rolling Median in mg/L (from General Order R3-2020-0020)

Basin/Sub-Area	Total Dissolved Solids	Chloride	Sulfate	Boron	Sodium	Total Nitrogen
Santa Ynez	600	50	10	0.5	20	10

Salts are a potential issue and will need to be explored further with the Regional Water Quality Control Board (RWQCB). The Central Coast RWQCB Executive Officer may direct the development and implementation of a salt management plan and implementation of salt mitigation measures and/or treatment systems when one of following occurs:

i. If a Discharger does not treat the wastewater to the effluent limitations specified in Table 2.

ii. Wastewater System effluent data and groundwater quality data demonstrates negative impacts or trends towards negative impacts to groundwater.

Monitoring Requirements

The District would be required to comply with both the General Order and the Monitoring and Reporting Program (MRP). The MRP applies to the monitoring and reporting requirements for wastewater treatment and disposal systems (Wastewater Systems) enrolled in the General Order. The MRP will require monitoring and reporting of the water supply, influent and effluent, wastewater disposal, sludge-biosolids disposal, and possibly groundwater monitoring.

Effluent quality point of compliance is anticipated to be just prior to discharge into the ponds and be above ground. Since the point of compliance is just prior to discharge into the ponds, a groundwater monitoring requirement is not anticipated as long as effluent quality meets the effluent limits presented in Table 2. Influent and effluent monitoring and reports include flow monitoring and constituent monitoring by wastewater system type. In addition to the constituent monitoring, a percolation pond disposal system requires the following parameters to be monitored: freeboard, odors, dissolved oxygen, berm condition, sludge depth, and precipitation.

Social Considerations

Percolation ponds could have the largest visual impact of the various disposal alternatives evaluated in this report. Also, ponds may have a perception of nuisance odors. However, the effluent from the LOWRPP will be very high quality and have limited odor potential. Odor impacts can be mitigated by sizing the percolation pond such that there is limited standing water during dry weather flow operations and standing water only occurs during wet weather periods.

Footprint

A total of 1.2 acres would be required for a percolation pond disposal system with 100% redundancy. The minimum footprint of a percolation pond disposal system for the LOWRPP would require approximately 0.6 acres, which is a smaller footprint than percolation chambers but significantly more than the shallow well injection or creek discharge disposal alternatives. The minimum footprint area is calculated based on the assumption of a Maximum Daily Flow of 380,000 gpd (Phase III from the Basis of Design Report) and a conservative percolation rate of 2 ft/day. This percolation rate assumption was based on a survey of percolation tests performed for septic systems in the Los Olivos area, provided by the Santa Barbara County Department of Public Health, see Figure 1 below.

Multiple percolation ponds utilized in a lead/lag operation could be constructed to increase infiltration rates by allowing each pond to dry out in between disposal operation periods and also allow for pond maintenance. Incorporating additional ponds for operational flexibility and redundancy would increase the footprint for the percolation pond alternative. Additionally, the ponds must have the capacity to handle stormwater flow while maintaining freeboard requirements. The final footprint will be determined by percolation rates at the LOWRPP disposal site location and level of redundancy/operational flexibility incorporated into the design.

Water Resource Benefits

With the exception for limited evaporative losses, a high percentage of the wastewater discharged into the ponds will percolate down and recharge the sediments of the shallow aquifer in the area beneath and adjacent to the disposal site.

Feasibility/Complexity/Reliability

Available land area that is suitable for pond construction and located with sufficient setbacks is required. The pond construction, operation, and maintenance are not complex. This type of wastewater disposal is used in several nearby Wastewater Treatment Facilities and is commonly used nationwide for wastewater disposal.

Capital Cost

The (2) 0.6 acre percolation ponds (100% redundancy) are estimated to cost $700,000 to build, see Table 3 below. This estimate is based on analog grading operations for pad clearing and berm building in San Luis

Obispo County in 2022, factored for the size and labor type required. Delivery piping and valving are similar in cost as other disposal alternatives and are not included.

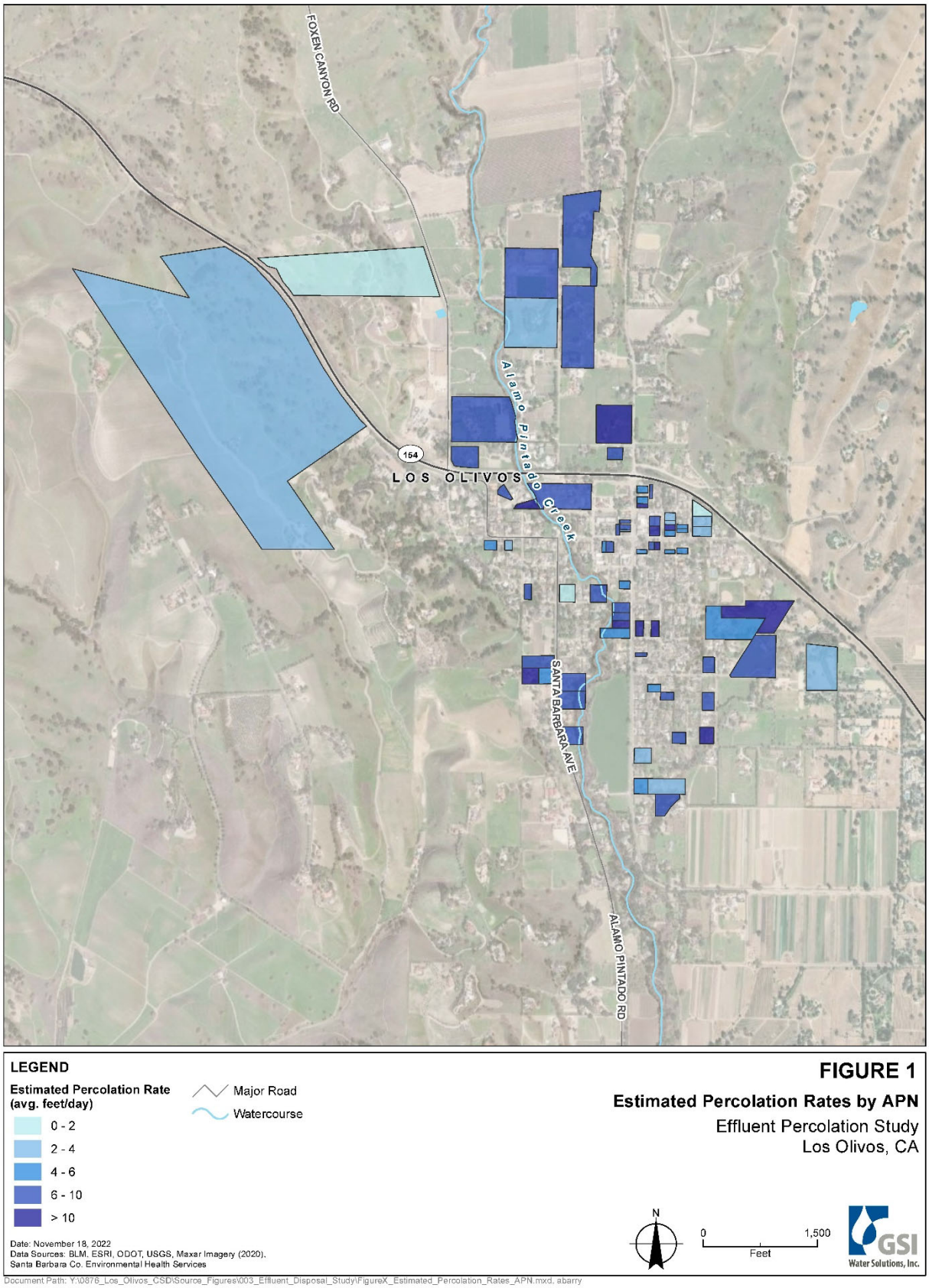

Figure 1. Estimated Percolation Rates by APN

Table 3. Percolation Pond Area and Cost Estimate

Maximum Daily Flow (gpd)	380,000
Perc Rate (ft/day)	2
Minimum Percolation Pond Area (acres)	0.60
Percolation Ponds w/ 100% Redundancy (acres)	**1.2**
Pond Area (square feet)	26,136
Berm Ht (ft)	4
Perimeter (ft)	905
Top Width (ft)	3
Slope	2:1
Analog Pad Grading With Berms SLO County – 2022	
Pad Grading –Area (acres)	0.25
Pad Grading Cost	$115,173
Analog Factor	2.40
Prevailing Wage Factor	1.25
Percolation Pond Cost Each	$350,000
Percolation Pond Cost w/100% Redundancy	**$700,000**

Operations & Maintenance

Ponds and the facilities must be fenced off from public access and proper signage must be posted. Percolation ponds require algae and weed removal to maintain percolation rates and may require mosquito abatement programs. To ensure the integrity of the berms, rodents, weeds, and erosion must be controlled. Dissolved Oxygen in the pond must be maintained to at least 1.0 mg/L, surface aerators are commonly used for this purpose.

Percolation Chambers

This alternative would include disposal of effluent from the LOWRPP to percolation chambers. Percolation chambers are a wastewater disposal system consisting of trenches with one or more distribution pipes and open-bottomed plastic chambers, installed in appropriate soils. These chambers receive wastewater flow and transmit it into soil for disposal. A typical percolation chamber consists of several high-density polyethylene arch-shaped, injection-molded chamber segments. Percolation chambers are a variation of leach lines and typically are quicker to install, use less gravel, and potentially require less area. An example of a percolation chamber under construction is provided in Figure 2 below.

Figure 2. Percolation Chamber Installation, Broderson Effluent Disposal, Los Osos, CA

Seepage pits are another form of disposal that can provide footprint benefits. This disposal technique would be operated with effluent limits equal to the Santa Ynez Sub-basin groundwater quality objectives. In discussions with the representatives from the RWQCB it was described that seepage pits could potentially provide for increased percolation rates because of the potential ability to penetrate shallow confining clay layers and discharge into higher conductivity materials below. In general, each seepage pit would be a 4-6 ft diameter cylindrical excavation, the depth varying depending on soil conditions and depth to groundwater but typically 30-40 ft deep. Each seepage pit is gravel filled and has a centrally located, perforated four-inch diameter pipe that extends from the inlet to the bottom of the pit. When soil testing indicates that multiple seepage pits are necessary in order to provide adequate percolation capacity, it is important that the wastewater flow to each pit start at a equalization tank (dosing tank) and dosed evenly across all seepage pits. Additionally, seepage pits must not connect directly to the saturated portion of the aquifer or they are regulated as injection wells, see Shallow Aquifer Injection Wells section, and thus can only be drilled to a certain depth depending on the groundwater level in the area around the LOWRPP.

Permitting Requirements

The permitting requirements for percolation chambers are anticipated to be the same as for percolation ponds. For details regarding the effluent disposal requirements for percolation chambers see the Percolation Ponds section of this TM.

Effluent Quality Requirements

The effluent quality requirements for percolation chambers are anticipated to be the same as for percolation ponds. For details regarding the effluent disposal requirements for percolation chambers see the Percolation Ponds section of this TM.

Monitoring Requirements

The monitoring requirements for percolation chambers are anticipated to be similar to percolation ponds. The General Monitoring and Reporting Program is anticipated to require monitoring and reporting of the water supply, influent and effluent, wastewater disposal, and sludge-biosolids disposal. Since the point of compliance is near surface, a groundwater monitoring requirement is not anticipated.

Social Considerations

Percolation chambers have a low visual impact. The surface above the chambers can be landscaped. The Los Osos Water Recycling Facility utilizes percolation chambers for wastewater disposal and after replanting with native vegetation the disposal area is virtually indistinguishable from the surrounding undisturbed area, see

Figure 3,

Figure 4, and Figure 5 below. By constructing the disposal area underground, percolation chambers remove concerns about odors and mosquitos and can be compatible with multiple neighboring land uses. Additionally, the disposal area could also be utilized for community benefit (e.g., park, recreation, etc.).

Figure 3. Broderson Effluent Disposal before Revegetation, Los Osos, CA

Figure 4. Broderson Effluent Disposal after Revegetation, Los Osos, CA

Figure 5. Broderson Effluent Disposal Aerial View, Los Osos, CA

Footprint

Percolation chambers require the largest area of all the disposal alternatives. The percolation chamber is estimated to have a minimum footprint of approximately 3.83 acres, including 100% redundancy. The minimum footprint area estimate is based on the analog Broderson Effluent Disposal System in Los Osos with the assumption of a Maximum Daily Flow of 380,000 gpd (Phase II from the Basis of Design Report). If percolation chambers are selected, consultation with manufacturer and coordination with the RWQCB is recommended in order to establish actual application rates for this disposal alternative. Through consultation there may be an opportunity to reduce the footprint required for the percolation chamber disposal alternative.

Water Resource Benefits

With the exception of potential losses to evapotranspiration from the overlying vegetation, a high percentage of the wastewater discharged into the percolation chambers will percolate down and recharge the perched or upper aquifer in the area around the disposal site.

Feasibility/Complexity/Reliability

Available land area that is suitable for percolation chamber construction and located with sufficient setbacks is required. The percolation chamber construction, operation, and maintenance are not complex. This type of wastewater disposal is used in several nearby WWTPs and is commonly used nation-wide for wastewater disposal.

Capital Cost

The 3.83-acre effluent disposal system with percolation chambers, including 100% redundancy, is estimated to cost approximately $1,154,635 to build, see Table 4 below. This estimate is based on the construction cost for the Broderson Effluent Disposal System in Los Osos in 2014. The costs were escalated using the Caltrans Cost Index and scaled for the smaller sized system. Delivery piping and valving are similar in cost as other alternatives and not included.

Table 4. Percolation Chamber Area and Cost Estimate

Broderson Effluent Disposal Analog, w/100% Redundancy	
Broderson Max Daily Flow (gpd)	800,000
Broderson Acres	8.06
Los Olivos Max Daily Flow (gpd)	380,000
Analog Factor	0.475
Perc. Chamber Area Req. (acres)	3.83
Broderson Effluent Disposal System 2014 (incl. 100% redundancy=8 acres)	$1,653,612.00
Los Olivos Perc Chamber Cost 2014$	$785,466
Caltrans Cost Index 2022	94.48
Caltrans Cost Index 2014	64.08
Cost Factor	1.47
Percolation Pond Cost	**$1,154,635**

Operations & Maintenance

Percolation chambers typically require minimal maintenance. However, percolation rates should be monitored to provide early detection of significant reductions in percolation rates. Additionally, it may be beneficial to pressure dose and alternate which chambers are utilized for disposal to allow the chambers to dry out between uses to prevent biological growth and creating the potential for fouling and reduced percolation rates. The final footprint will be determined by percolation rates at the LOWRPP disposal site location and level of redundancy/operational flexibility incorporated into the design.

Shallow Aquifer Injection Wells

This alternative would include disposal of effluent from the LOWRPP through shallow aquifer wells (<100-150 feet deep) that inject treated effluent into the saturated portion of the upper aquifer. The injection facility would include the injection wells and also electrical controls equipment for control and monitoring of well operations.

Permitting Requirements

During discussions with the RWQCB, it was identified that injection wells discharging into the saturated zone of the aquifer would be considered an Indirect Potable Reuse (IPR) Groundwater Replenishment Reuse Project (GRRP). This type of subsurface application is described by Title 22 of the California Code of Regulations (CCR) Article 5.2 Indirect Potable Reuse: Groundwater Replenishment - Subsurface Application. GRRPs are regulated by the State Water Recourses Control Board –Division of Drinking Water (DDW) and the RWQCB.

GRRPs that utilize subsurface application (i.e., injection) are required to use Full Advanced Treatment, which includes Reverse Osmosis (RO) and Advanced Oxidation (AOP) processes and meet the criteria of CCR Title 22 Section 60320.201. Additional key considerations of Article 5.2 include:

- **Response Retention Time.** The recycled municipal wastewater shall be retained underground for a minimum period of time necessary to allow sufficient response time to identify treatment failures and implement actions. The response time shall be no less than two months. The response time is calculated by analytical or groundwater modeling and assigned a corresponding safety factor. The response time is verified with tracer studies.
- **Recycled Municipal Wastewater Contribution (RWC).** This regulation is established to ensure the treatment process can reliably achieve Total Organic Carbon (TOC) concentrations of no greater than 0.5

mg/L. The RWC is the quantity of recycled wastewater divided by the sum of the quantity of recycled wastewater and dilution water. The initial maximum RWC which may be up to 1.0, will be based on, but not limited to, DDW's review of the engineering report, information obtained as a result of the public hearings(s), and a project sponsors demonstration that the treatment processes will reliably achieve TOC concentrations no greater than 0.5 mg/L. Assuming the recycled water is Fully Advanced Treated, the TOC concentration would likely be zero or near zero and RWC contribution requirement could be as low as 0 (zero).

- **Total Organic Carbon (TOC).** TOC monitoring is required and TOC shall not be greater than 0.5 mg/L.
- **Pathogenic Microorganism Control.** The GRRP treatment system must achieve 12-log enteric virus reduction, 10-log Giardia cyst reduction, and 10-log Cryptosporidium oocyst reduction. The treatment train shall consist of at least three separate treatment processes. For each pathogen, a separate treatment process may be credited with no less than 1.0-log reduction. For each month retained underground the reduced wastewater will be credited with a 1.0-log virus reduction based on the method used to demonstrate retention. Tracer studies retention times receive more credit, modeled retention times receive less credit.
- **Monitoring Well Requirements.** 2 monitoring wells downgradient of each injection well are required.

A Title 22 Engineering Report is required to demonstrate compliance with the CCR and specifically Article 5.2 of Title 22. The Title 22 Engineering Report would likely include the following sections: Project Facilities, Source Wastewater, Full Advanced Treatment Recycled Water Quality, Pathogenic Microorganism Control, Response Retention Time, Geologic Setting, Injection & Monitoring Wells, Groundwater Recharge Impacts, Proposed Monitoring and Reporting, and an Operations and Contingency Plan.

Effluent Quality Requirements

The water quality objectives for a GRRP would be designed to exceed the requirements set forth by the CCR Title 22 Criteria which include a total nitrogen limit, TOC limit, Primary and Secondary MCLs, lead and copper Action Levels, and DDW notification levels (NLs). GRRP water quality objectives are summarized in Table 5. The Fully Advanced Treated water that is injected via the injection wells would also need to meet the Basin Plan objectives for the Santa Ynez sub-area set by the Central Coast RWQCB, see Table 6 below. For constituents that also have Primary MCLs, Secondary MCLs, or NLs, the more stringent threshold will set the purified water quality objective.

Table 5. GRRP Water Quality Objectives

Regulation	Parameter	Constituent	Article 5.2 Section	Reference
Title 22	Primary Drinking Water Standards	MCL, Inorganic Chemicals	60320.212	Table 64431-A
		MCL, Radionuclide Chemicals		Table 64442 Table 64443
		MCL, Organic Chemicals		Table 64444-A
		MCL, Disinfection Byproducts		Table 64533-A
		Action Level, Lead & Copper		
	Secondary Drinking Water Standards	Secondary MCL Constituents		Table 64449-A, Table 64449-B
	Additional Chemical & Contaminant Monitoring	Notification Level Contaminants	60320.220	
	Pathogens	Enteric virus, Giardia, Cryptosporidium	60320.208	
	Total Organic Carbon	TOC	60320.218	
	Total Nitrogen		60320.210	
Basin Plan	Water Quality Objectives			

Table 6. Central Coast Basin Plan Median Groundwater Objectives (mg/L)

Basin/Sub Area	TDS	Cl	SO4	B	Na	N
Santa Ynez River Valley Santa Ynez	600	50	10	0.5	20	1

Additionally, if the Fully Advanced Treatment Process is unable to meet the treatment requirements the LOWRPP must be able to stop delivery of the treated water to the injection wells and divert back to the headworks or earlier portion of the treatment process. If there was an extended period time where the Advanced Treatment Process was not functioning properly, the LOWRPP may need an alternate method of disposal that it could achieve without Full Advanced Treatment. It is possible that with the Injection Well disposal alternative the LOWRPP might be required to have an additional back-up disposal method (e.g., perc pond, creek outfall, etc.) to ensure that it can continuously dispose of treated effluent.

Due to the requirement to utilize RO as a component of the Full Advanced Treatment process, the LOWRP would generate a RO concentrate waste stream equaling approximately 15 to 30% of the influent or feed water flow rate to the RO system. This RO concentrate waste stream would include concentrated dissolved solids and pathogens and likely requires hauling or pumping to an ocean outfall for disposal.

Monitoring Requirements

The monitoring and reporting requirements would require demonstration of compliance with the Title 22 requirements for groundwater replenishment with recycled water, the SWRCB Amended Recycled Water Policy

and the Water Quality Control Plan for the Central Coastal Basin. Monitoring can be continuous, daily, weekly, monthly, quarterly semi-annual, or annual. Self-monitoring reports must be submitted to the Division of Drinking Water (DDW) monthly.

It is anticipated that the monitoring requirements Shallow Aquifer Injection Wells would include:

Influent Water Quality

- Flowrate
- BOD
- TSS
- Total Nitrogen

Effluent Water Quality

- Flowrate - Continuous
- pH - Continuous
- Turbidity - Continuous
- Temperature
- Coliform
- TDS
- Total Organic Carbon (TOC)
- Total Nitrogen
- Inorganics with Primary MCLs
- Volatile Organic Chemicals (VOCs) with Primary MCLs
- Synthetic Organic Chemicals with Primary MCLs
- Disinfection Byproducts with Primary MCLs
- Radionuclides with Primary MCLs
- Action Levels (Copper & Lead)
- Acute Contaminants
- Constituents with Secondary MCLs
- Notifications and Response Level Constituents
- Remaining Priority Pollutants
- Constituents of Emerging Concern

Groundwater Monitoring

Groundwater monitoring will be required for the on-going assessment of groundwater quality and to determine any impacts from the recharge of the recycled water by the LOWRPP. Groundwater monitoring must comply with Title 22 Section 60320.226. Should any of the groundwater monitoring results exceed the MCL for a specific contaminant, a second sample shall be analyzed for the contaminant within 48 hours of being notified by the laboratory. If the second sample exceeds MCL, within 24 hours of being notified by the laboratory, the District would be required to notify DDW and the RWQCB and discontinue injection of the recycled water. Recycled water injection can recommence once corrective actions have been taken or evidence is provided to DDW and RWQCB that the contamination was not a result of the Project.

To perform the groundwater monitoring additional monitoring wells would be required. The criteria for the monitoring wells are outlined below, see Title 22 Section 60320.226 for additional information.

- **Upgradient Well.** 30-day minimum upgradient of potable extraction wells.
- **Downgradient Well.** 2 weeks to 6 months downgradient of the injection wells.

Social Considerations

Injection wells and associated monitoring wells would have a low visual impact and footprint and would have limited social considerations.

Footprint

Injection wells and the associated monitoring wells would have a very small footprint relative to the other disposal alternatives.

Water Resource Benefits

The ability to target the specific location of the injected water in the groundwater basin would improve the capability to utilize this disposal alternative to provide water resources benefits.

Feasibility/Complexity/Reliability

This disposal alternative has a high level of complexity due to the additional treatment processes required, monitoring requirements, concentrate disposal and the need for an alternate disposal method in the event that the Advanced Treatment process cannot meet the require specifications.

Capital Cost

Approximately $300,000 per injection well; likely 3 wells needed; delivery pipeline and valving similar in cost as most other alternatives.

Operations & Maintenance Cost

Regular maintenance, including periodic backwashing and well rehabilitation will be required to maintain the capacity of the injection wells. Additionally, for shallow injection well disposal there are additional treatment, RO concentrate disposal and groundwater monitoring requirements that contribute to significantly higher O&M costs relative to the other disposal alternatives.

A preliminary cost estimate for RO concentrate disposal was developed to assist the District in better understanding the potential costs associated with this alternative. The costs estimate below was developed utilizing discharge costs from South San Luis Obispo County Sanitation District, located in Oceano, California and waste hauling costs from a recent project in San Luis Obispo County.

Table 7. RO Concentrate Disposal Cost Estimate

Maximum Daily Flow (gpd)	380,000
RO Recovery (%)	85%
RO Concentrate Produced (gpd)	57,000
Discharge Costs	
Brine Discharge Costs ($/gal)	$0.11
Disposal Costs ($/day)	$6,270
Hauling Costs	
Hauling Truck Volume (gal)	4,000
Haul Trips (Trips per day)	8
Haul Trip Duration (hr)	3
Hauling Hours (hr/day)	24
Hauling Costs ($/hr)	$221
Hauling Costs ($/day)	$5,315
Total Disposal Costs ($/day)	**$11,585**

Alamo Pintado Creek Outfall

This alternative would include disposal of effluent from the LOWRPP to Alamo Pintado Creek where it will flow downstream and/or percolate into the creek bed. The creek outfall facility will likely consist of the outfall structure which includes a flow dissipater and armored creek bank. The facility will also likely include temperature measurement upstream & downstream, flow measurement, and also electrical controls equipment for control and monitoring of outfall operations.

Permitting Requirements

Discharge into Alamo Pintado Creek is considered a discharge of pollutants through a point source to surface waters of the United States. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

The NPDES Program is a federal program which has been delegated to the State of California for implementation through the State Water Resources Control Board (State Water Board) and the nine RQWCBs. In California, NPDES permits are also referred to as waste discharge requirements (WDRs) that regulate discharges to waters of the United States.

NPDES permits contain effluent limits that limit the pollutants discharged and require monitoring & reporting to ensure that the discharge meets the effluent limits. NPDES permits are approved by the United States Environmental Protection Agency (EPA) and significant violations of effluent quality or monitoring/reporting are subject to federal Mandatory Minimum Penalties (MMP) of $3,000 for each violation. NPDES permits are reviewed by the RWQCB every 5 years for renewal, although NPDES permits can be administratively extended if the facility reapplies more than 180 days before the permit expires

Technical studies are likely to be required for Creek Outfall alternative to support the County's Land Use Permitting process. For the Creek Outfall these are likely to include:

- **Jurisdictional Delineation (JD) -** The purpose of the JD is to determine the extent of State and federal jurisdictional waters within the project area potentially subject to regulation by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA), RWQCB under Section 401 of the

CWA and Porter Cologne Water Quality Control Act, and California Department of Fish and Wildlife (CDFW) under Section 1602 of the California Fish and Game Code (FGC), respectively.

- **Biological Resource Assessment (BRA) -** The purpose of the BRA is to address potential project-related impacts on designated critical habitats and/or any special status species protected under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA), CDFW and/or California Native Plant Society (CNPS).

Effluent Quality Requirements

Effluent limits can be technology-based limits which are based on the technology available to control the pollutants or water quality-based limits which are limits that are protective of the water quality standards of the receiving water. For new facilities since there is no effluent data, the RWQCB will consider similar discharge types in the area.

For water quality-based limits, the RWQCB selects standards based on the Beneficial Uses assigned to the receiving water body in the Basin Plan. In addition, if the receiving water body is listed in the Federal 303(d) list as an impaired water body, then Total Maximum Daily Loads (TMDLs) will be also be considered. An individual NPDES permit would include annual monitoring requirements for priority pollutants to allow for a more robust set of data to inform development of water quality-based effluent limits in future permit renewals.

Alamo Pintado Creek has the following Beneficial Uses Listed in the Basin Plan: MUN, AGR, IND, GWR, REC1, REC2, WILD, WARM, COMM. Of these beneficial uses, MUN & GWR will likely have the most stringent requirements. MUN is municipal and domestic supply. MUN requires discharges to meet drinking water standards (Title 22 CCR). GWR is groundwater recharge and may require salts and nutrient regulation standards. WARM is warm freshwater habitat and this beneficial use could be used to apply temperature limits on the discharge.

Alamo Pintado Creek is not listed on the impaired waterbody federal 303(d) list, however, Alamo Pintado Creek flows into the Santa Ynez River. The Santa Ynez River is listed on the 303(d) list as Category 5: standards are not met, TMDL required but not yet completed. The TMDLs that are required but not yet completed are as follows, with listed scheduled completion dates: Nitrate (2018), Dissolved Oxygen (2018), Temperature (2023), Toxicity (2023), Chloride (2027). E Coli (2027), Fecal Coliform (2027), Sedimentation/Siltation (2027), Sodium (2027), TDS (2027) and pH (2027). As such, there are no TMDLs for Alamo Pintado Creek but the future TMDLs associated with the Santa Ynez River may affect effluent quality requirements for a Creek Outfall for the LOWRPP.

Sources of Applicable Water Quality Objectives

- Water Quality Control Plan for the Central Coast Basin, Region 3 Water Board
- Title 22 Drinking Water Standards, California Code of Regulations (Due to MUN in Basin Plan)
- California Toxics Rule (CTR)

Technology based effluent limits are estimated below and are based on the Waste Discharge Requirements in General Order R3-2020-0020. In addition, the Monthly average percent removal for BOD & TSS shall not be less than 85 percent.

Table 8. Secondary Treatment Effluent Limitations – Activated Sludge, Membrane Biological Reactor, Sequencing Batch Reactor, or Similar Systems

Constituent	Units	30-Day Average	7-Day Average	Sample Maximum
Biochemical Oxygen Demand, 5-Day	mg/L	30	45	Not Applicable
Total Suspended Solids	mg/L	30	45	Not Applicable
Settleable Solids	mg/L	0.1	0.3	0.5
pH	Not Applicable	Between 6.5 and 8.4	Not Applicable	Not Applicable

Additional technology based effluent limits are presented in Table 9 below for reference. These limits are for two similar NPDES permitted wastewater discharges to a creek: San Luis Obispo (R3-2014-0033); and Lompoc (R3-2011-0211).

Table 9. Reference Technology-Based Effluent Limits Summary

Constituent	Units	2014 SLO Permit	2011 Lompoc Permit
BOD	mg/L	10 Mo. Avg, 50 Max Daily	10 Mo. Avg, 20 Max Daily
TSS	mg/L	10 Mo. Avg, 75 Max Daily	10 Mo. Avg, 20 Max Daily
Oil & Grease	mg/L	5 Mo. Avg, 10 Max Daily	5 Mo. Avg, 10 Max Daily
Settleable Solids	mL/L	0.1 Mo. Avg	0.1 Mo. Avg, 0.3 Max Daily
Turbidity	NTU	—	10 Mo. Avg, 20 Max Daily
pH	s.u.	6.5–8.3	6.5–8.3
Flow	MGD	Average Daily	Monthly Average

Additionally, the water quality based effluent limits presented in Table 10 below are from the San Luis Obispo (R3-2014-0033) and Lompoc (R3-2011-0211) NPDES Permits. The constituents receiving water quality-based effluent limits in an NPDES permit are determined through a Reasonable Potential Analysis (RPA), which compares anticipated LOWRPP effluent maximum concentrations to the applicable water quality standards. Therefore, the water quality based effluent limits for a future Alamo Pintado Creek discharge will not be the same. Also, the toxicity limits and monitoring requirements will soon change. The new provisions use a data analysis approach that is known as the Test of Significant Toxicity (TST). SWB has adopted these new toxicity provisions and they will go into effect for all NPDES permits upon USEPA approval (expected early 2023). More information can be found at the California State Water Resources Control Board website under Statewide Toxicity Provisions.

Table 10. Reference Water Quality Based Effluent Limits Summary

Constituent	Units	2014 SLO Permit	2011 Lompoc Permit
Un-ionized Ammonia	mg/L	—	0.025 Avg Weekly
Nitrate, Total (as N)	mg/L	10 Mo. Avg	10 Max Daily
Bis (2-ethylhexyl) Phthalate	µg/L	—	1.8 Mo. Avg, 3.6 Max Daily
Aluminum	mg/L	—	1.0 Mo Avg
Toxicity	Not Applicable	EPA-821-R-02-012	EPA-821-R-02-012
Fecal Coliform	MPN/100mL	Required	Required
Salinity - TDS	mg/L	—	1,100 Annual Mean
Salinity - Sodium	mg/L	—	270 Annual Mean
Salinity - Chloride	mg/L	—	250 Annual Mean
Chlorodibromomethane	µg/L	0.4 Mo. Avg, 1.0 Max Daily	—
Dichlorobromomethane	µg/L	0.56 Mo. Avg, 1.0 Max Daily	—
N-Nitrosodiummethylamine	µg/L	0.00069 Mo. Avg, 0.00014 Max Daily	—
Dissolved Oxygen	mg/L	4.0 Instantaneous	—
Chlorine Residual	mg/L	ND Max Daily	—

Alamo Pintado Creek is designated as warm freshwater habitat (WARM) in Table 2.1 of the Basin Plan and the creek is not listed on the 303d list for temperature. The RWQCB does not have an evaluation guideline to interpret the warm freshwater habitat beneficial use. Therefore, the temperature limits of the discharge are not clearly defined.

Temperature limits might be applied by using the WARM narrative objective which states "At no time or place shall the temperature of any water be increased by more than 5 degrees Fahrenheit (F) above natural receiving temperature." In this scenario, the permit could require both receiving water monitoring and effluent monitoring and limit the effluent temperature to within 5 degrees F of the upstream receiving water temperature. This could be applied as a seasonal limit (e.g., no limit unless there is water in the creek upstream).

Alternatively, the Basin Plan narrative objective for all surface water which states: "Natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses." In this scenario, the RWQCB would identify resident fish species present in the receiving water and a corresponding temperature threshold for those species and use those as a maximum temperature for receiving water.

Monitoring Requirements

Monitoring requirements for the Creek Discharge alternative are anticipated to include:

- Influent Water Quality
- Effluent Water Quality (including CTR & Title 22 constituents), Flow, & Toxicity
- Receiving Water Quality, Flow, & Temperature
- Biosolids
- Groundwater monitoring may be required at the discretion of the RWQCB

- Self-monitoring reports (SMRs) of the monitoring results will be required. The Discharger shall electronically submit SMRs using the CIWQS Program website.

Social Considerations

It is difficult to determine social considerations for the Creek Discharge alternatives given that the location for the LOWRPP is not selected at this point. This alternative would likely enhance flow in Alamo Pintado Creek, however, the stretch of Alamo Pintado Creek in close proximity to the community of Los Olivos typically does not have flow in it most of the year. Implementing the Creek Discharge disposal alternative would likely induce flow in the portion of Alamo Pintado Creek downstream of the discharge location which could provide aesthetic benefits but could also create the potential habitat for mosquito breeding and/or other habitat-forming conditions.

Footprint

The Creek Discharge alternative would have a relatively small footprint and likely consist of a creek outfall structure including an armored bank for dispersion and protection against erosion.

Water Resource Benefits

With the exception of evaporation and evapotranspiration losses, a high percentage of the wastewater discharged to the creek would likely percolate down and augment existing groundwater supplies. Creek discharge would likely benefit riparian habitat in close proximity of the discharge location by providing a year-round source of water.

Feasibility/Complexity/Reliability

This type of discharge is relatively common in areas where there is not sufficient available space to dispose of the wastewater via percolation and there are benefits because the disposal is not limited by percolation rates of the percolation facilities. However, there is increased complexity with this type of disposal due to the need to protection the discharge infrastructure from being damaged by erosion during high flow events in the creek.

Capital Cost

The capital costs to install an outfall structure are site site-specific. More detailed site-specific information is needed to produce an estimate of cost. The outfall structure would likely consist of a flow dissipater, armored creek bank, temperature measurement upstream & downstream, and flow measurement. The construction activities would be located in the riparian area and a streambed alteration agreement and environmental monitoring during construction would likely be required.

Operations & Maintenance Cost

The outfall structure itself would likely require very little maintenance. The costs of the monitoring and reporting requirements are estimated to be $10,000 yearly based on another site with a Creek Discharge NPDES Permit in San Luis Obispo County. Significant violations of effluent quality or monitoring/reporting are subject to federal Mandatory Minimum Penalties (MMP) of $3,000 for each violation.

Partial Reuse of Recycled Water

Partial Reuse of Recycled Water can complement any of the disposal alternatives evaluated and would include delivery of recycled water from the LOWRPP to nearby ornamental and/or agricultural irrigators for use in offsetting use of other water supplies. This would benefit the District by reducing the quantity of effluent from the LOWRPP that would require disposal and provide an opportunity to utilize water in a way that has reduced water quality requirements.

Regulatory Requirements

Recycled water use is regulated by the California Code of Regulations (CCR) Title 22, Division 4, Chapter 3. The State Water Resources Control Board Order WQ 2016-0068-DDW Water Reclamation Requirements for Recycled Water Use (Reuse Order) establishes standard conditions for recycled water use and would likely be

the permitting framework for a LOWRPP recycled water program. The Reuse Order authorizes the use of recycled water by Producers, Distributors, and Users for uses consistent with the Uniform Statewide Recycling Criteria, other than direct or indirect potable reuse. Reuse options include landscape irrigation, crop irrigation, dust control, industrial/commercial cooling, decorative fountains, etc. A Title 22 Engineering Report is required on the production, distribution, and use of recycled water. There are specific allowable uses for recycled water per the CCR Title 22 and they depend on the treatment process. The treatment options include:

- Undisinfected Secondary
- Disinfected Secondary-23
- Disinfected Secondary-2.2
- Disinfected Tertiary

The recycle water level of treatment requirements for surface irrigation are presented in CCR Title 22, Div. 4, Chapter 3, Article 3, 6304 - Use of Recycled Water for Irrigation. Recycled water treatment limits to be monitored include:

- Total Coliform
- Turbidity
- Chlorine Residual if using chlorine as a disinfectant
- Transmissivity if using ultraviolet light as a disinfectant
- Other Constituents or Operational Requirements identified in a Title 22 Engineering Report.

In order to minimize nutrient loading to the groundwater aquifer, the Reuse Order requires that recycled water used for irrigation purposes be applied at agronomic rates. Assuming the District chooses MBR treatment, this is not anticipated to be an issue with the LOWRPP since the MBR, with biological nutrient removal, can reduce total nitrogen to levels below 10 mg/L, therefore not providing a significant excess amount of nitrogen crops being irrigated.

The use of water from the LOWRPP for irrigation purpose could provide significant advantages due to the potential for reduce salt monitoring and mitigation requirements because the water is being utilized in a beneficial manner compared to disposal. The District is in the process of completing a Recycled Water Master Plan that includes an evaluation of the potential to utilize recycled water from the LOWRPP for irrigation or other uses in the community of Los Olivos. The Recycled Water Master Plan will provide additional information on the recycled water use opportunities and the potential to reduce or eliminate the volume of wastewater disposal from the LOWRPP. Some potential locations for Recycled Water use include:

- Los Olivos Elementary School
- Corner Park
- St Marks In-The Valley Episcopal Church
- Agriculture Irrigation

Potential reclaimed water dispersal fields are shown in Figure 6 below.

It is recommended that the District, continue to investigate recycled water opportunities to reduce reliance or eliminate the need for a primary disposal method and to provide water resources and other benefits to the community.

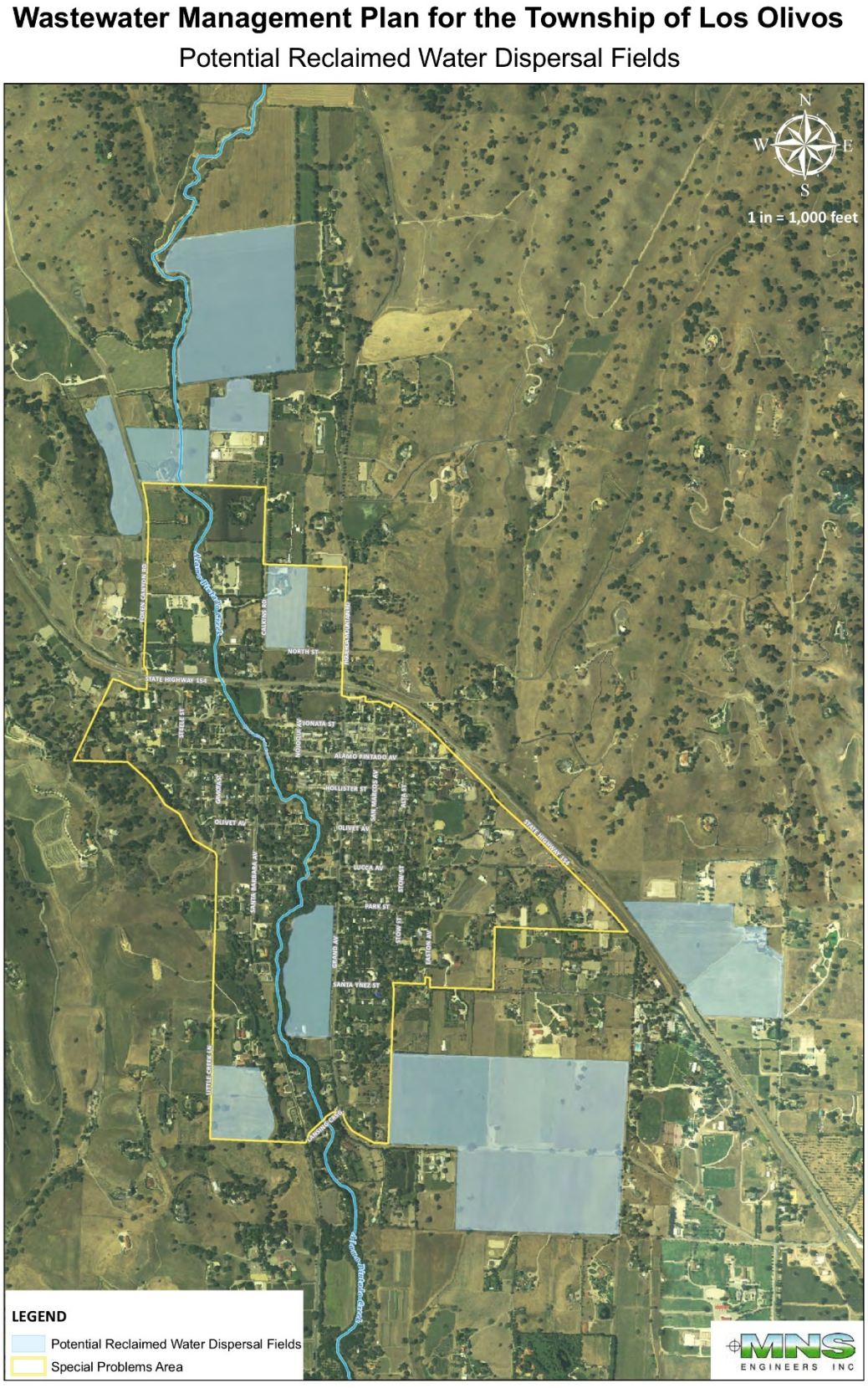

Figure 6. Potential Recycled Water Use Sites

Disposal Alternatives Evaluation

To provide a quantitative comparison of the disposal alternatives, ConfluenceES and GSI developed a ranking matrix that allowed each alternative to be scored relative to each of the identified criteria, with 1 representing the least favorable and 5 the most favorable, see Table 11 for the list of scoring criteria. The total scores for each alternative were then calculated and utilized to develop overall rankings for each disposal alternative, as shown in Table 12 .

Table 11. Effluent Disposal Alternative Scoring Criteria

Effluent Disposal Alternative Scoring Criteria	Scoring Framework
Permitting Requirements	1- Significant permitting requirements 2- 3- Moderate permitting requirements 4- 5- Limited permitting requirements
Effluent Quality	1- Significant effluent quality requirements 2- 3- Moderate effluent quality requirements 4- 5- Lower effluent quality requirements
Monitoring Requirements	1- Significant monitoring requirements 2- 3- Moderate monitoring requirements 4- 5- Limited monitoring requirements
Social Considerations (e.g., aesthetics, odor, traffic, etc.)	1- Significant social considerations 2- 3- Moderate social considerations 4- 5- Limited social considerations
Footprint	1- >1.5 acres 2- 3- > 0.75 acres 4- 5- < 0.25 acres
Water Resource Benefits	1- Limited water resource benefits 2- 3- Moderate water resource benefits 4- 5- Significant water resource benefits
Feasibility/Complexity/Reliability	1-Significant feasibility, complexity or reliability challenges 2- 3- Potential significant feasibility, complexity or reliability challenges 4- 5- Limited feasibility, complexity or reliability challenges

Table 12. Effluent Disposal Alternative Scoring and Ranking

Disposal Alternative	Effluent Disposal Alternative	Permitting Requirements	Effluent Quality	Social Considerations	Footprint	Water Resource Benefits	Feasibility/ Complexity/ Reliability	Monitoring Requirements	Capital Cost	Operations & Maintenance Cost	Total Score	Ranking
Percolation ponds	An open, graded impoundment that is designed to dispose of treated effluent via percolation	5	5	2	2	3	4	4	5	4	**34**	1
Percolation chambers	Buried impoundments, either above or below ground surface that is designed to dispose of treated effluent via percolation	5	5	4	1	3	3	4	4	4	**33**	2
Shallow aquifer injection wells	Shallow aquifer injection wells (<100-150 feet deep) that inject treated effluent into the saturated portion of the upper aquifer	1	1	5	5	4	1	1	1	1	**20**	4
Alamo Pintado Creek outfall	Discharge outlet to Alamo Pintado Creek for disposal of treated effluent	2	2	3	4	3	2	2	3	2	**23**	3

Summary Recommendation

Based on the results of the scoring and ranking evaluation, percolation ponds or percolation chambers are recommended as the preferred approach for effluent disposal from the LOWRPP. It is also recommended that the District continue to investigate opportunities for recycled water use to complement the preferred disposal alternative. Percolation ponds or percolation chambers are recommended for the following reasons:

1. These disposal alternatives have the lowest permitting and effluent quality requirements of the primary disposal alternatives evaluated.
2. Visual social impacts of percolation ponds can be mitigated with percolation chambers, if desired.
3. There is limited construction or operational complexity associated with these disposal alternatives.
4. These alternatives are anticipated to have the lowest capital and operations & maintenance costs of the evaluated alternatives.

Additional recommendations for further analysis of disposal alternatives include:

1. Perform a detailed percolation studies of potential sites for the LOWRPP to establish the actual percolation rate for the purposes of designing the disposal system if percolation ponds or percolation chambers are selected.
2. Continue to investigate recycled water opportunities to reduce reliance or eliminate the need for a primary disposal method and to provide water resource and other benefits to the community.
3. Perform an analysis of climate change impacts of proposed alternatives. A climate change plan is required within the first 12 months of receiving a permit, see State Water Resources Control Board Resolution No. 2017-0012. The AB 32 Climate Change Scoping Plan identifies recycled water use as a strategy for mitigating the effects of climate change.
4. If percolation chambers are selected, consultation with manufacturer and coordination with the Regional Board is recommended in order to establish actual application rates that can be utilized for the purpose of designing the disposal system.

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