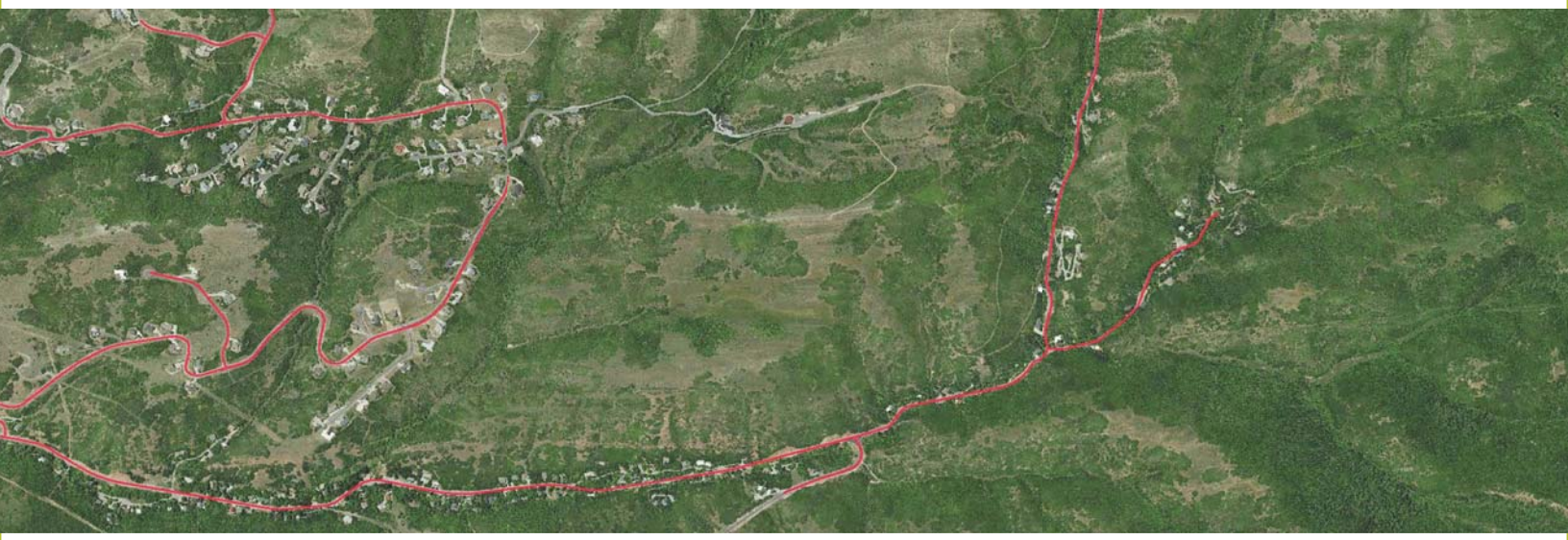
Emigration Canyon
Sewer Planning Study

July 2016



Emigration Improvement District

AQUA ENGINEERING

p: 801.299.1327 | f: 801.299.0153
533 W 2600 S Suite 275, Bountiful, UT 84010
www.aquaeng.com

EMIGRATION CANYON

SEWER PLANNING STUDY

JULY 2016

TABLE OF CONTENTS:

LIST OF FIGURES: IV

CHAPTER 1 - INTRODUCTION 1-1

1.1 PURPOSE OF REPORT 1-1

1.2 DESCRIPTION OF EMIGRATION CANYON 1-1

1.3 EMIGRATION CREEK AND WATER QUALITY 1-2

1.4 SEPTIC TANK DESIGN AND OPERATION 1-4

1.4.1 System Maintenance *1-5*

CHAPTER 2 - EVALUATION OF ALTERNATIVES 2-1

2.1 ALTERNATIVE 0: DO NOTHING 2-1

2.2 ALTERNATIVE 1: ESTABLISH AN ONSITE MANAGEMENT MODEL 2-1

2.2.1 Management Alternatives *2-2*

2.2.2 Preferred Management Model *2-4*

2.3 ALTERNATIVE 2: COMBINED SEPTIC SYSTEMS 2-5

2.3.1 Cluster Group #1 ..... *2-13*

2.3.2 Cluster Group #2 ..... *2-14*

2.3.1 Cluster Group #3 ..... *2-16*

2.3.1 Cluster Group #4 ..... *2-18*

2.3.2 Regulatory Issues *2-19*

2.3.3 Environmental Impact *2-19*

2.3.4 Operations and Maintenance Costs *2-20*

2.4 ALTERNATIVE 3: COLLECTION SYSTEM WITH TREATMENT SYSTEM IN CANYON 2-20

2.4.1 Regulatory Issues *2-21*

2.4.1 Environmental Impact *2-25*

2.4.2 Capital Cost *2-25*

2.4.3 Operations and Maintenance Cost *2-26*

2.5 ALTERNATIVE 4: COLLECTION SYSTEM WITH CONNECTION TO SALT LAKE CITY 2-26

2.5.1 Regulatory Issues *2-27*
2.5.2 Environmental Impact *2-27*
2.5.3 Capital Cost *2-28*
2.5.4 Operations and Maintenance Cost *2-28*
CHAPTER 3 - PUBLIC DISCUSSION AND INVOLVEMENT **3-1**
3.1 OCTOBER 15TH 2015 PUBLIC MEETING 3-1
3.2 JANUARY 2016 SURVEY 3-2
3.3 MAY 21, 2016 PUBLIC MEETING 3-3
CHAPTER 4 - RECOMMENDATIONS AND IMPLEMENTATION SCHEDULE **4-1**
4.1 RECOMMENDATIONS 4-1
4.2 REQUIRED TASKS 4-2
4.2.1 Administrative *4-2*
4.2.2 Funding *4-2*
4.2.3 Permitting *4-3*
4.2.4 Engineering and Construction *4-3*
REFERENCES **5-1**

List of Figures:

Figure 1-1. Emigration Canyon Vicinity Map. *1-2*
Figure 2-1. Typical Individual Pump System *2-6*
Figure 2-2. Typical Drop-In Pump *2-7*
Figure 2-3. Combined System Configuration #1 ..... *2-7*
Figure 2-4. Combined System Configuration #2 ..... *2-7*
Figure 2-5. Potential Combined System Locations (West Portion of Canyon). *2-11*
Figure 2-6. Potential Combined System Locations (East Portion of Canyon). *2-12*
Figure 2-7. Cluster Group #1. ..... *2-14*
Figure 2-8. Cluster Group #2. ..... *2-16*
Figure 2-9. Cluster Group #3. ..... *2-17*
Figure 2-10. Cluster Group #4. ..... *2-19*
Figure 2-11. Collection System for Alternative 3 (West Portion of Canyon). *2-23*
Figure 2-12. Collection System for Alternative 3 (East Portion of Canyon). *2-24*

List of Tables:

Table 1-1. State of Utah Water Quality Criteria *1-3*
Table 2-1. Cost Estimate for Cluster Group #1 ..... *2-14*
Table 2-2. Cost Estimate for Cluster Group #2 ..... *2-15*
Table 2-3. Cost Estimate for Cluster Group #3 ..... *2-17*
Table 2-4. Cost Estimate for Cluster Group #4 ..... *2-18*
Table 2-5. Annual Operations and Maintenance Costs *2-20*
Table 2-6. Capital Cost for Alternative 3 ..... *2-26*
Table 2-7. Operations and Maintenance Costs for Alternative 3 ..... *2-26*
Table 2-8. Capital Cost for Alternative 4 ..... *2-28*
Table 2-9. Operations and Maintenance Costs for Alternative 4 ..... *2-29*

APPENDIX A – Online Survey and Responses

APPENDIX B – Public Presentation Documents

CHAPTER 1 - INTRODUCTION

1.1 Purpose of Report

The purpose of this report is to evaluate wastewater treatment alternatives that could potentially improve the quality of water in the Emigration Creek. The Clean Water Act, adopted in 1972, required that all states restore their waters to be "fishable and swimmable". Utah's Water Quality Assessment lists the water quality status of water bodies in the State. Emigration Creek meets the requirements of being listed as an impaired water body according to Section 303(d) of the Clean Water Act, by exceeding the water quality standard for *e. coli*. A Total Maximum Daily Load (TMDL) was prepared to evaluate alternatives to reduce the *e. coli* to an acceptable level (UDEQ, 2011). One of the sources for *e. coli* identified in the TMDL was existing septic systems in Emigration Canyon. This report evaluates several potential solutions to reduce *e. coli* in Emigration Creek. The potential solutions are evaluated on the basis of total cost, feasibility for implementation and impact to water quality in the Creek. Public response was also considered in evaluating the options. Finally, a preferred solution is recommended and an implementation schedule outlined.

1.2 Description of Emigration Canyon

Emigration Canyon is a township in Salt Lake County located east of Salt Lake City in the Wasatch Range. The Canyon is approximately 8 miles long with a total area of 18 square miles. Approximately 40% of the land is privately owned, 34% is owned by the U.S. Forest Service and 26% is owned by Salt Lake City Corporation. The developed land is primarily composed of residential homes, with a limited number of businesses and municipal buildings. The general location of the Canyon is shown in Figure 1-1.

The 2010 Census estimated the total households in Emigration Canyon to be 580 (U.S. Census Bureau, 2010). The Census also estimated a total population of 1,567, which equates to a density of 2.7 people per household. The Governor's Office of Management and Budget has estimated a population growth of 1.9% for unincorporated areas of Salt Lake County

(GOMB, 2012). Using this growth rate, the 2016 population of Emigration Canyon is estimated to be 1,755 with 650 households.

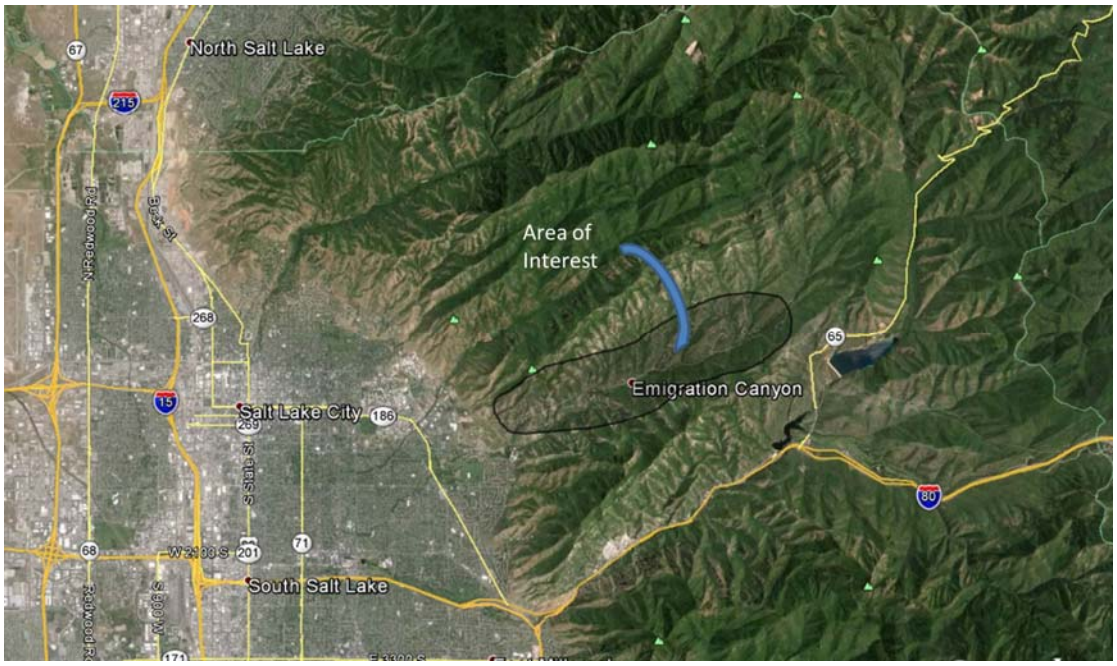


Figure 1-1. Emigration Canyon Vicinity Map.

1.3 Emigration Creek and Water Quality

Emigration Creek begins in Killyon Canyon and is fed from springs and flows down the Canyon alongside Emigration Canyon Road. The Creek continues through a portion of Salt Lake City, eventually entering a conduit that leads to the Jordan River. The Creek averages less than 3 cubic feet per second (cfs) of flow in the winter months, with peak averages up to 24 cfs during the spring runoff.

The Creek is classified by the Department of Water Quality as Classes 2B, 3A and 4 water (as given in Utah State Administrative Code R317-2), which determine the water quality standards for the Creek. The water quality criteria for these classifications are summarized in Table 1-1 below. (It is noted that prior to 2006, the bacteriological parameter used in classification standards was fecal coliforms). The Creek is also categorized as a Category 2 water, which severely limits how point sources can discharge to it.

In 2002, the Creek was placed on the Utah Section 303(d) List of Impaired Waters due to the fecal coliform levels being above the standards associated with its classifications. When *e. coli* became the standard for bacteriological limits in 2006, the Creek remained on the 303(d) List due to multiple occasions in which the *e. coli* limit had been exceeded. As a result of being placed on the List, a total maximum daily load (TMDL) was established for the Creek.

Table 1-1. State of Utah Water Quality Criteria

State of Utah water quality criteria and pollution indicators used in Emigration Creek	
Parameter	**Beneficial Use Classification Standards**
Bacteriological	
Total Coliform(1) – Max	5,000 colonies/100 ml
Fecal Coliform(2) – Max(2)	400 colonies/100 ml
Fecal Coliform(1) – 30 Day Geometric Mean(3)	200 colonies/100 ml
E. coli – Max(2)	940 colonies/100 ml
E. coli – 30 Day Geometric Mean	206 colonies/100 ml
Physical	
Dissolved Oxygen – Minimum	5.5 mg/L
Temperature – Max	27° C
pH – Range	6.5 – 9.0
Inorganics	
Total Ammonia as N	pH dependent (see R317-2 Table 2.14.2)
Total Dissolved Solids	1,200 mg/L
Pollution Indicators	
Biochemical Oxygen Demand	5 mg/L
Total Phosphorus as P	0.05 mg/L
Total Suspended Solids(4)	35 mg/L
(1) Total and Fecal coliform are no longer included in Utah water quality standards. (2) All sample values within a 30-day sample period compared to a threshold value. Minimum of five samples collected within 30-days, if <10 samples collected in 30 days – at least two samples must exceed criteria for impairment. (3) Geometric mean calculated from a minimum of five samples collected within 30-days. (4) Total Suspended Solids (TSS) are no longer used as a pollution indicator by Utah DWQ. The criterion was formerly associated with Class 3A – Cold Water Fishery.	

The 2012 TMDL report prepared by the Utah Department of Environmental Quality identified potential sources of the *e. coli* as residential waste disposal, domestic and wild animal waste, stormwater runoff, hydrologic modifications and groundwater seepage from holding vaults and septic tank leach fields.

While the TMDL report provides general recommendations to reduce *e. coli* loading from each of the potential sources described above, the purpose of this report is to address solutions to *e. coli* that may be originate from residential septic systems. As such potential solutions to waste disposal, animal waste and hydrologic modifications are not discussed in this report.

1.4 Septic Tank Design and Operation

Septic systems are designed to first remove biological material and settleable solids in a primary settling tank. In this tank, heavier solids settle at the bottom while floatable solids rise to the water surface in a scum layer. Due to the lack of oxygen in the tank, anaerobic bacteria that consume biological material are able to thrive. These bacteria eventually settle out at the bottom of the tank. Thus, in this primary settling tank a large portion of biochemical oxygen demand (BOD) and total suspended solids (TSS) and a small amount of phosphorus are removed from the effluent stream exiting the tank. This tank does not typically remove significant amounts of *e. coli* (USEPA, 1980). Septic system treatment relies on the majority of coliform bacteria being removed in the soil once the wastewater is discharged in the drain fields.

The effluent from the primary settling tank flows (or is pumped) to a drain field. This drain field consists of a distribution box and laterals, which receive and distribute the flow evenly. The buried laterals have several openings that distribute the effluent evenly over a subsurface, where it is disposed of through the soil. The water then is filtered through the soil, where additional contaminants are removed by contact with the soil, including viruses

and coliform bacteria (Schaub, 1976). An inadequate amount of soil layer between the drainage field and the receiving water body (such as the aquifer or surface water) may result in a contamination of the water body. Several states, including Utah, implement setback regulations which limit how close a drain field may be located to surface water. The purpose of the minimum setback is to allow for the filtration of the wastewater prior to entering a water body. Utah Code R317 requires a minimum of 100 feet from drain fields to watercourses.

1.4.1 System Maintenance

When a new home is constructed, a septic system design is reviewed and permitted by the County health department. Following the construction, there is little oversight of the system by regulatory agencies unless a problem is reported. The maintenance and operation of septic systems is the responsibility of individual homeowners. Typical maintenance includes pumping the solids from the septic tank.

Many homeowners with septic systems do not know where they are located or how to properly maintain them. It is not uncommon to have a septic tank buried with no access for pumping. If the homeowner is not familiar with the septic system, they may not know that the septic tank needs pumping until sewage has backed up into their home. When a home is sold to a new owner there is typically not much information related to the septic system transferred. The lack of proper maintenance often leads to neglect of systems.

CHAPTER 2 - EVALUATION OF ALTERNATIVES

Issues that may exist in septic systems are identified herein to identify potential solutions to improving water quality in Emigration Creek. Septic system failures may result in excessive contaminants, including coliform, being released into the nearby groundwater or surface waters. These failures may include leaks or overflows in the primary settling tank, a clogged drain field, poor soil conditions, or the drain field being located too close to the receiving water body.

The following proposed alternatives address some of these potential issues. The feasibility of each alternative is addressed in regards to regulatory issues, environmental impact and total cost.

2.1 Alternative 0: Do Nothing

The first alternative discussed considers the impact of having no improvements to wastewater treatment in the Canyon. These impacts would be due to having no repairs to faulty septic systems, nor addressing systems that are too close to the Creek.

The County Health Department has the responsibility of promoting and protecting community and environmental health. Permitting of septic systems is issued by the Health Department in order to meet these responsibilities. In instances where individual residences in the Canyon are identified as having septic systems that do not meet regulations and in which the quality of water in the Creek is being degraded, the homeowner would be responsible to meet regulations, or be subject to having the permit revoked.

2.2 Alternative 1: Establish an Onsite Management Model

Where septic systems are not properly maintained, issues such as a primary settling tank cracking or not being regularly emptied, or a clogged drain field may arise. These issues could lead to untreated wastewater entering the soil. This first alternative addresses the potential issue that many septic systems are not maintained properly.

If regular maintenance and services were to be provided, these issues could potentially be prevented or systems could be repaired before they allowed pollutants to reach the Creek. The regular maintenance would include pumping of the settling tank, water quality sampling in the septic tank and drain field, testing for leaks, and/or maintenance of the drain field.

2.2.1 Management Alternatives

There are five management models that could potentially be used for Emigration Canyon to increase quality and frequency of maintenance and service of septic systems. These models, outlined by the EPA (USEPA, 2003) will be evaluated in terms of benefits and risks. Note that each of these management models would benefit from or would require the involvement of a special service district. While a new district in the Canyon could be created, the Emigration Improvement District (EID), which provides water and fire protection services (and some limited sewer services) in the Canyon, could provide some services related to these management models.

2.2.1.1 Model #1: Homeowner Awareness

This management model works by providing information to homeowners to help them become more aware of the need to maintain septic systems. In this model, the homeowner would retain ownership of the septic system and would be responsible for its operation. With this management model, education and information for owners could be provided by EID. As EID already has association with septic service and maintenance companies, they could potentially leverage the contracts with different haulers and inspectors to offer discounted pricing for residents. This could help encourage people to take a more active role in the management of their septic systems.

The liability of this alternative for EID would be minimal because the homeowner would still ultimately be responsible for their system. The impact to the

environment is not anticipated to change significantly because there is no way to compel homeowners to make changes to their current management process.

2.2.1.2 Model #2: Maintenance Contracts

This management model would have EID contract with homeowners to maintain their systems. EID would then coordinate with service and maintenance companies to provide services to those homeowners who choose to participate. In this model, the septic system would still be owned by the homeowner. The contract would require the homeowner to give permission to enter private property and inspect the septic systems. This management model could only function on a voluntary basis; homeowners could not be required to enter into the contract.

It would be necessary for EID to renew contracts as property ownership changes hands. Tracking ownership changes for EID could be quite burdensome. The liability risk for EID would be significantly higher than the previous management model. For example, if a homeowner who had a contract with EID had a septic system failure that led to a sewage backup into the home, EID may be at risk for some of the liability. Contractual language may help ease some of this liability, but would not entirely eliminate it.

2.2.1.3 Model #3: Operating Permits

The third management model would have individual septic system operating permits issued for a limited-term, with renewals conditional upon demonstration that the system is being maintained adequately. As EID has no authority to issue permits, implementation of this management model would need to be executed with the authority from DEQ and the county health department.

2.2.1.4 Model #4: Responsible Management Entity Operation and Maintenance

This management model would have a permit issued to EID to operate and maintain the septic systems in the canyon. Currently Utah does not have legal

authority to issue permits like this. It seems difficult to develop legal authority that would allow third party access to a homeowner's private property. As such, this management option is not available until the legal issues are addressed by the State.

2.2.1.5 Model #5: Responsible Management Entity Ownership

The final management model would remove the homeowner from responsibility of the septic system by giving ownership to EID. Under this model, property around the septic system would either need to be deeded or access granted via an easement. Deeding property to EID would likely be very difficult to achieve; an easement to allow access is the most practicable. Also, to provide accessibility with new septic systems, ordinances would need to be implemented that would require an easement to allow EID to access the system.

The liability for EID in this management model would be much higher than the other models. Where treatment systems owned by the district failed, EID would be responsible to replace them. If the drain field failed, they would be required to install a new drain field. If an alternate drain field area was not available, then they would be responsible to find a new solution. EID would also likely be responsible if the system backed up into a home. The fees associated with this alternative would need to be determined to address the risk associated with this option.

2.2.2 Preferred Management Model

These five management models were discussed with EID. Based on the discussion of the benefits and liabilities described above, the district selected Model #1 as the preferred management model. The rationale for this selection is as follows:

- Model #1 seemed most reasonable as the district could still provide some level of benefit to improving management of septic systems in the Canyon. The

district could send out information in their mailers and emails to help people understand the importance of maintaining their septic systems. They could also issue requests for proposals for system management that they could then forward on to the homeowners. Participation by multiple residents could potentially allow the proposers to optimize their trips to the canyon and reduce service costs.

- Model #2 would increase the risk to the district and the cost for development of adequate contract language to protect the district against excessive liabilities would make this an expensive option for a relatively small number of homeowners that would participate.
- Model #3 is not an available option to the district and was eliminated. Authority to operate this model must come from the County or the State.
- Model #4 is also not an available option.
- Model #5 would likely not be received by homeowners as it would require easements onto private property.

2.3 Alternative 2: Combined Septic Systems

As discussed in Part 1.4, effluent from drain fields located too close to receiving water bodies may not have enough residence time in the soil for coliform bacteria, including *e. coli*, to be filtered out. There are several residences located on Emigration Canyon Road within 100 feet of the Creek. While all of these residences throughout the Canyon may or may not contribute to the high *e. coli* in the Creek, focusing on improving wastewater treatment in the areas closest to the Creek will have a greater chance of improving water quality.

For many individual residences in the Canyon, it may not be physically possible to relocate the drain field sufficiently far enough away from the Creek to meet setback requirements and take advantage of soil filtering. As such, this alternative considers having a combined septic system for multiple residences in which the drain field is located far enough away from the Creek to meet setback requirements and filtering of bacteria in the soil. The combined

system could be configured in one of two ways. These two configurations are diagramed in Figure 2-3 and Figure 2-4:

- The first configuration would consist of a single septic tank and drain field for all participating residences. Each residence would have their wastewater pumped to the combined system with a new individual pump station. A typical individual pump station system is shown in Figure 2-1.

Figure 2-1. Typical Individual Pump System

- The second configuration would have a common drain field. Each residence would continue treatment in existing septic tanks with a new pump installed in the septic tank to pump flows to the common drain field. An example of this type of drop-in pump is shown in Figure 2-2.

Figure 2-2. Typical Drop-In Pump

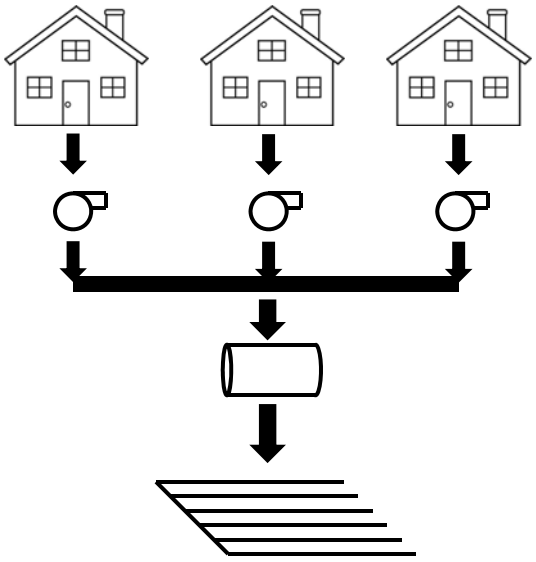


Figure 2-3. Combined System

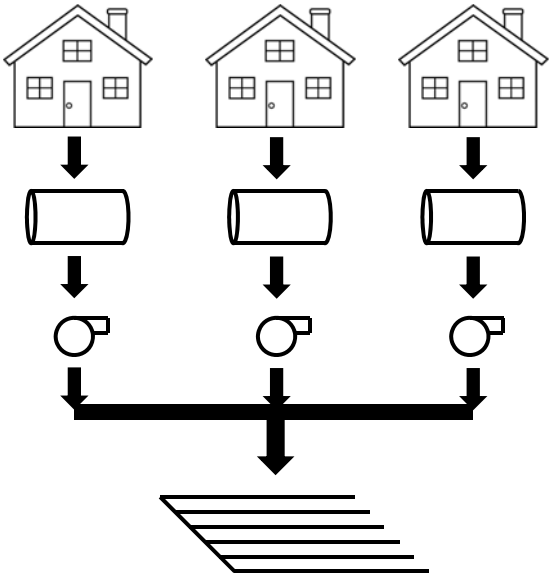


Figure 2-4. Combined System

In either configuration, the pump located at each residence would deliver wastewater to a common 4" pressure main via a 2 ½" lateral. The 4" pressure main would then carry the flow from all participating residences to the drain field (and new septic tank, for Configuration #1). The homeowner would be responsible for purchasing and maintaining the

pumping system, including their septic tank (in Configuration #2), the pump and the 2 ½" lateral up to the edge of their property.

The second configuration is preferable over the first, as no new combined septic tanks would be required, nor would any additional costs for excavation and installation of a new pump station be incurred. As such, cost estimates for the various cluster groups discussed later use costs based on this configuration. Costs for Configuration #1 will likely be somewhat higher.

The drain field would be located on a parcel of land more than 100 feet away from the Creek. There are several factors which limit the locations in which these combined systems could be installed. State regulations require a primary drain field sized large enough to dispose of all flows, with a back-up drain field installed and enough space for a third drain field. State regulations also limit the maximum slope on which a drain field can be installed to no more than 25-30%. The maps for each potential area, discussed below include shading representing slopes in the area. The green shading represents areas with slopes up to 25%, yellow represents areas from 25%-35% and red represents areas with slopes above 35%. If this alternative was implemented, land surveys would be required to verify actual slopes.

Finally, the proposed land for the combined system must be available for purchase or lease. As discussed in Chapter 1, some of the land in the Canyon is privately owned and some is publicly owned.

The size of drain fields is partially dependent on the percolation rate of the soil into which the wastewater is disposed. Based on soil information from the National Resources Conservation Service, the majority of the Canyon (and in particular, the land best suited for drain fields) is composed of a gravelly clay loam. Table 6 of R317-4-13 establishes allowable absorption hydraulic loading rates for various types of soil. As this table does not specifically list the type of soil found in the Canyon, the adsorption loading rate is assumed to be 0.45 gallons per square foot per day. Further soil investigations will be required to

establish more definitive percolation rates and soil suitability for drain fields. These investigations could result in smaller or larger combined drain fields than what is assumed in the following sections.

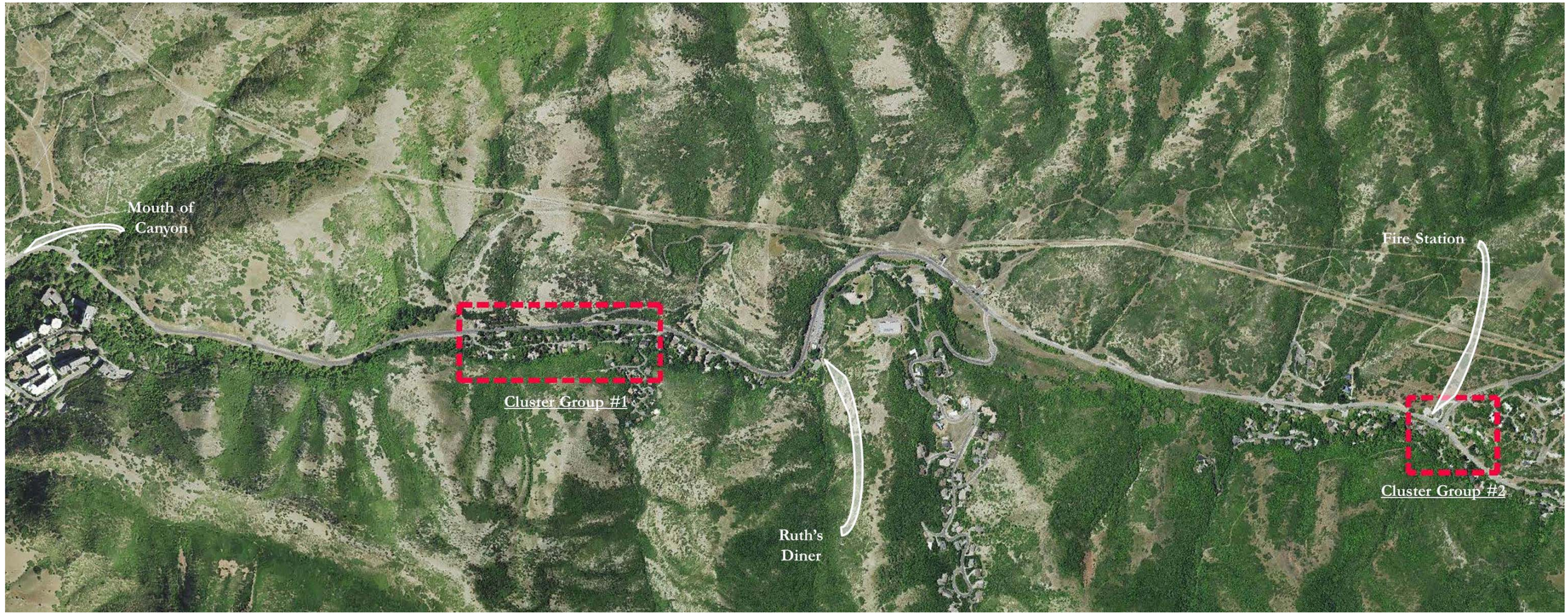


Figure 2-5. Potential Combined System Locations (West Portion of Canyon).

Figure 2-6. Potential Combined System Locations (East Portion of Canyon).

While water quality in the Creek may increase by having all residences with drain fields within 100 feet participate in a combined septic system, it may be more valuable to focus on creating a few combined systems in the most affected areas. Discussion with EID identified four areas in which sewer-related odors have been detected and in which potential combined systems may have a greater impact on water quality in the Creek. These are shown in Figure 2-5 and Figure 2-6. This report considers these areas in more detail by identifying potential sites for locating the combined systems and estimating total cost.

2.3.1 Cluster Group #1

The first area identified by EID in which sewer odors have been detected is the Sunnydale Lane area, located near the mouth of the canyon. There are approximately 30 residences located directly adjacent to Emigration Creek. Based on the Utah R317 design guidelines, this would require a design flow of approximately 9,000-10,000 gallons per day, with a primary drain field area of 96,000 square feet, or over 6 ½ acres of land for all three drain field areas. There is no practical site near these residences with this much available land. At most, there is approximately 97,000 square feet of open, relatively flat area on the north side of Emigration Canyon Road see Figure 2-7. Based on the soil conditions, this location could provide the needed area for drain fields to service up to ten homes. The parcel in which the drain fields would be located is owned by Salt Lake City Corporation.

To deliver wastewater to this drain field, sewage pumps would need to be installed in each existing residential septic tank and a 4" sewer main would be constructed in Sunnydale Lane that would flow southwest and across Emigration Canyon Road to the drain field. The costs for the construction and installation of the pumps, pipeline and drain fields are shown in Table 2-1. It is noted that these estimates include the cost of purchasing land on which the drain fields will be located. For the purposes of this report, the cost of undeveloped land is estimated to be $75,000 per acre.

The total cost per residence is estimated to be **$48,000**. These capital costs would likely be paid for in the form of a loan or bond. Assuming a 100% loan, with a 3% interest rate and a 30 year loan life, the total monthly payment for the system would be approximately $202 per residence each month.

Table 2-1. Cost Estimate for Cluster Group #1

Cluster #1 - Sunnydale	Qty	Units	Unit Price	Total
Drop-In Pumps	10	ea	$3,000	$30,000
Pump Installation	10	ea	$1,000	$10,000
Electrical Installation	10	ea	$3,000	$30,000
2 1/2" Laterals	500	lf	$40	$20,000
4" Pressure Main	2,500	lf	$50	$125,000
Asphalt Cut and Patch	2,500	sf	$15	$37,500
Drain Field Chamber and Pipe	3,500	lf	$10	$35,000
Drain Field Earthwork	1,500	cy	$15	$22,500
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	2.2	acres	$75,000	$165,000
Total Cost				**$478,000**

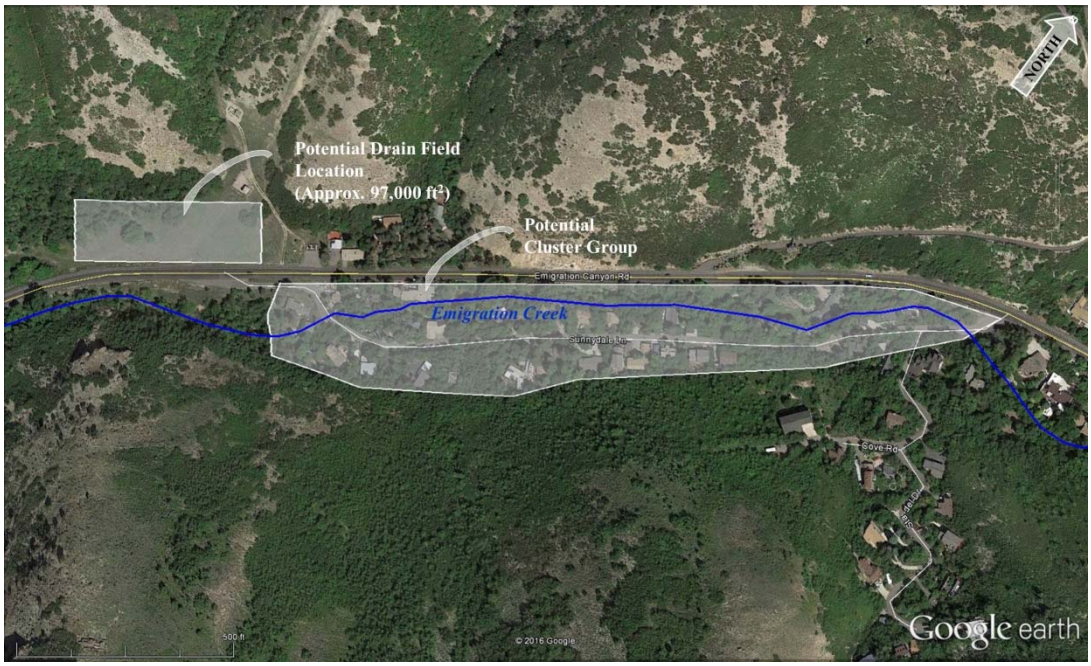


Figure 2-7. Cluster Group #1.

2.3.2 Cluster Group #2

The second area identified as a potential site for a combined system is located near the fire station, at the intersection of Emigration Canyon Road and Pioneer Fork Road. This area has approximately 10 residences that could potentially improve the water quality in the Creek by participating in a combined system. Total area required for drain fields is about 97,000 ft2. One potential area for a drain field would be west of the fire station, as shown on Figure 2-8. The parcel is owned by the Salt Lake Valley Fire Service. The costs for the construction and installation of the pumps, pipeline and drain fields are shown in Table 2-2. The cost per residence is estimated to be $38,000. Assuming a 100% loan, with a 3% interest rate and a 30 year loan life, the total monthly payment for the system would be approximately $160 per residence each month.

Table 2-2. Cost Estimate for Cluster Group #2

Cluster #2 - Pioneer Fork	**Qty**	**Units**	**Unit Price**	**Total**
Drop-In Pumps	10	ea	$3,000	$30,000
Pump Installation	10	ea	$1,000	$10,000
Electrical Installation	10	ea	$3,000	$30,000
2 1/2" Laterals	500	lf	$40	$20,000
4" Pressure Main	1,000	lf	$50	$50,000
Asphalt Cut and Patch	1,000	sf	$15	$15,000
Drain Field Chamber and Pipe	3,500	lf	$10	$35,000
Drain Field Earthwork	1,500	cy	$15	$22,500
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	2.2	acres	$75,000	$165,000
Total Cost				**$380,500**

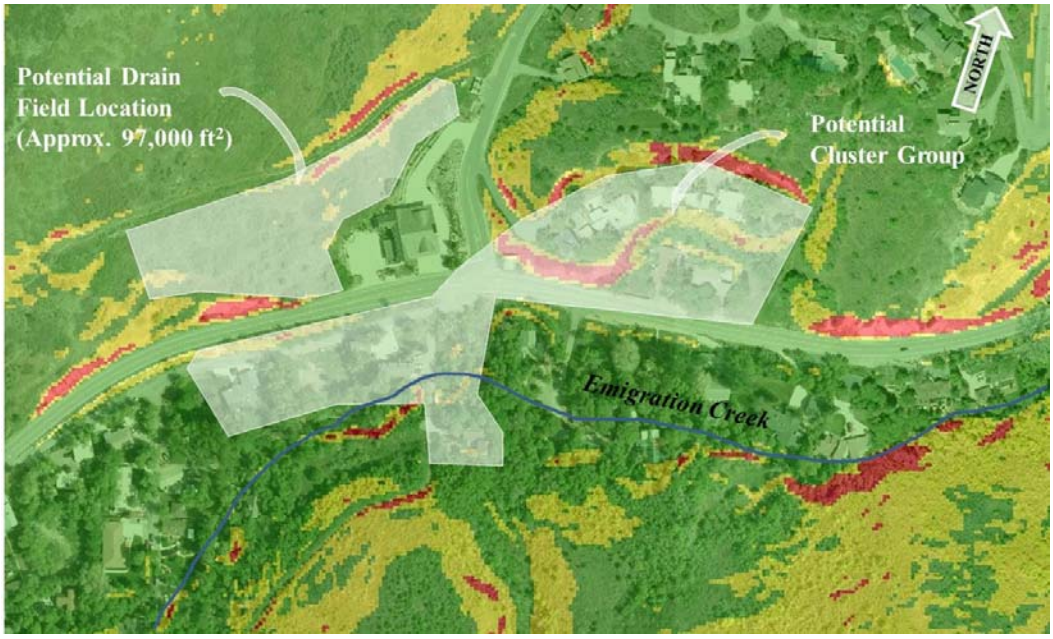


Figure 2-8. Cluster Group #2.

2.3.1 Cluster Group #3

The third area identified is near the intersection of Emigration Canyon Road and Pioneer Ridge Road. This area has approximately 7 residences near the Creek that could be connected in a combined system. Total area required for drain fields is approximately 69,000 ft^2. One potential area for the main and backup drain field would be just west of the intersection, as shown on Figure 2-9. The second and third fields would be located just to the north, across the street. The parcel is owned by the Emigration Oaks Property Owners Association. The costs for the construction and installation of the pumps, pipeline and drain fields are shown in Table 2-3. The cost per residence is estimated to be **$39,000**. Assuming a 100% loan, with a 3% interest rate and a 30 year loan life, the total monthly payment for the system would be approximately $165 per residence each month.

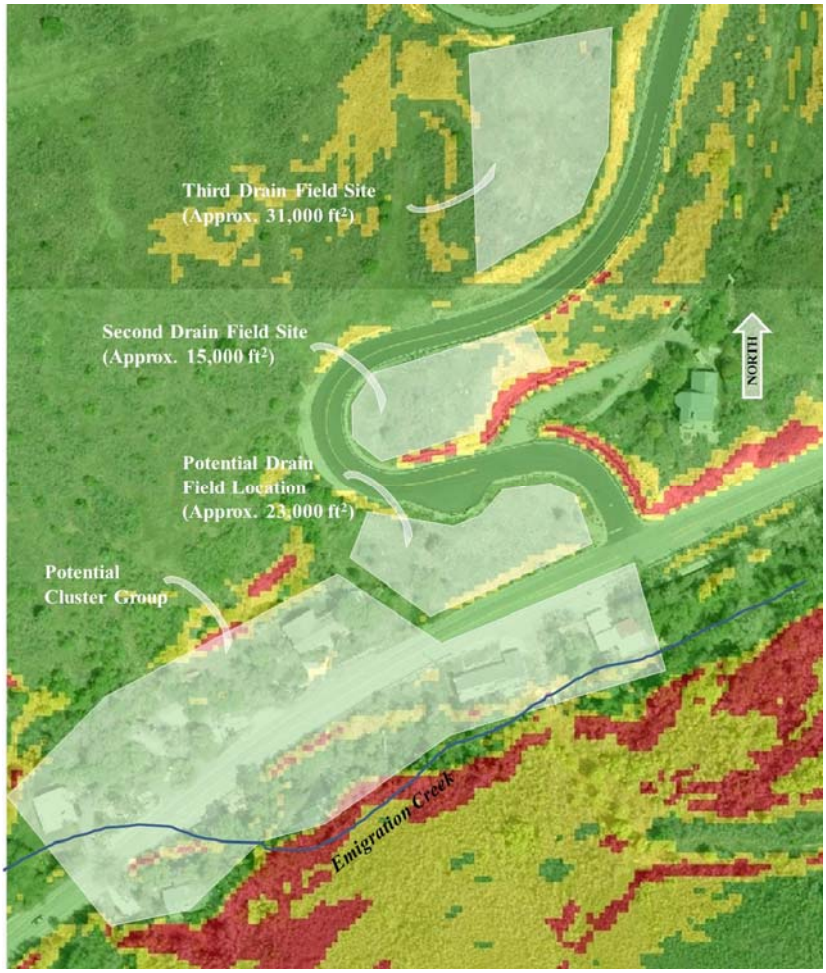


Figure 2-9. Cluster Group #3.

Table 2-3. Cost Estimate for Cluster Group #3

Cluster #3 - Pioneer Ridge	Qty	Units	Unit Price	Total
Drop-In Pumps	7	ea	$3,000	$21,000
Pump Installation	7	ea	$1,000	$7,000
Electrical Installation	7	ea	$3,000	$21,000
2 1/2" Laterals	350	lf	$40	$14,000
4" Pressure Main	750	lf	$50	$37,500
Asphalt Cut and Patch	750	sf	$15	$11,300
Drain Field Chamber and Pipe	2,500	lf	$10	$25,000
Drain Field Earthwork	900	cy	$15	$13,500
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	1.6	acres	$75,000	$120,000
Total Cost				**$273,300**

2.3.1 Cluster Group #4

The last area identified is located at the fork of Killyons Lane and Pinecrest Canyon Road. This area has approximately 5 residences that could be connected in a combined system. Total area required for drain fields is approximately 49,000 ft^2. This area of the Canyon is significantly steeper than the other areas discussed, and the possible locations for drain fields are very limited. Potential areas are shown on Figure 2-10. The proposed areas straddle multiple parcels with private ownership. The costs for the construction and installation of the pumps, pipeline and drain fields are shown in Table 2-4. The cost per residence is estimated to be **$55,000**. Assuming a 100% loan, with a 3% interest rate and a 30 year loan life, the total monthly payment for the system would be approximately $231 per residence each month.

Table 2-4. Cost Estimate for Cluster Group #4

Cluster #4 - Pinecrest	Qty	Units	Unit Price	Total
Drop-In Pumps	5	ea	$1,000	$5,000
Pump Installation	5	ea	$1,000	$5,000
Electrical Installation	5	ea	$3,000	$15,000
2 1/2" Laterals	350	lf	$40	$14,000
4" Pressure Main	2,000	lf	$50	$100,000
Asphalt Cut and Patch	750	sf	$15	$11,300
Drain Field Chamber and Pipe	1,750	lf	$10	$17,500
Drain Field Earthwork	750	cy	$15	$11,300
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	1.1	acres	$75,000	$82,500
Total Cost				**$264,600**

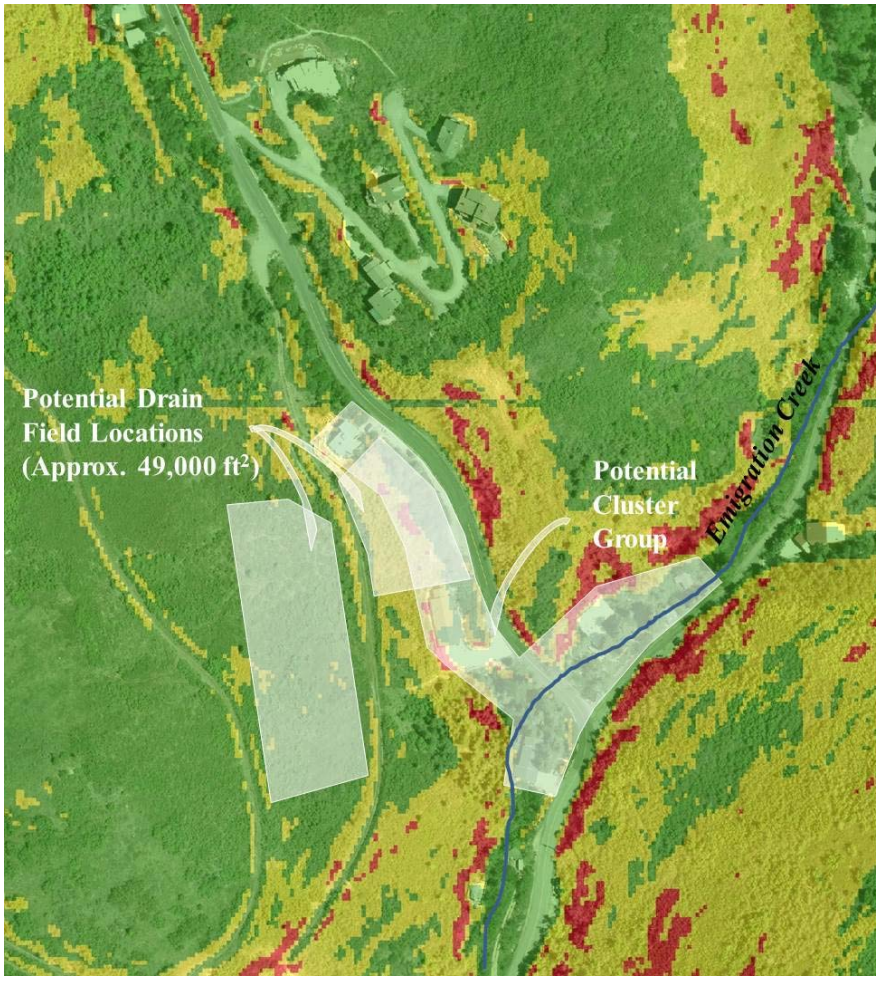


Figure 2-10. Cluster Group #4.

2.3.2 Regulatory Issues

As mentioned in Part 2.2, homeowners would have ownership and be responsible for equipment and piping on their property. The combined drain field would be owned by EID, which would be responsible to provide maintenance repairs. Each combined septic system would need to be permitted through the County Health Department or the State Department of Environmental Quality.

2.3.3 Environmental Impact

Dependent on the quantity and location of the combined systems, this alternative could have significant impacts on the water quality in the Creek. With new combined drain

fields located sufficiently far away from the Creek, *e. coli* which may have been reaching the Creek from nearby drain fields could be adequately filtered so as to significantly reduce these sources as a point of pollution.

2.3.4 Operations and Maintenance Costs

The annual fees to each participating resident would include maintenance and service to the combined drain field and pressure main. Homeowners would be responsible to service the individual pumps located in their septic tank. Services would be provided by a contracted service company with costs to residents being assessed through monthly fees. The annual cost to maintain the drain field and pressure main, as well as provide water quality sampling is estimated to be $3,000. The annual cost to each residence, including maintenance and debt service, is shown in Table 2-5.

Table 2-5. Annual Operations and Maintenance Costs

Description	Cluster #1	Cluster #2	Cluster #3	Cluster #4
Drain Field Inspection	$500	$500	$500	$500
Debt Service for Capital Costs	$24,240	$19,200	$13,800	$13,920
Total Annual Cost	*$24,740*	*$19,700*	*$14,300*	*$14,420*
Monthly Cost per Residence	*$206*	*$164*	*$170*	*$240*

2.4 Alternative 3: Collection System with Treatment System in Canyon

Instead of treating wastewater in existing or new septic systems, wastewater would be collected and conveyed to a centralized mechanical treatment facility. This effectively solves any contamination issues associated with septic systems by eliminating them from usage in the Canyon. Because the cost of a centralized collection and treatment system is significant, this option only becomes economically feasible with a large number of residences participating. Therefore, the collection system would need to reach a large portion of the residences in the Canyon, as shown in red on Figure 2-11 and Figure 2-12. Utah Code requires the collection system to use a minimum 8" sewer main, with 4" laterals from each residence. Due to the geography of the canyon, the conveyance system would be able to move sewage primarily via a gravity system with a limited number of lift stations. The centralized treatment facility would best be

located near the lowest elevation in the Canyon near the mouth of the canyon. Figure 2-11 shows one potential location for this facility.

Design criteria for this facility must be discussed briefly before considering impacts and costs. Using the same per residence flowrates from Alternative 2, which are based on Utah Code R317, the total flow to the facility would be 195,000 gallons per day. The loading of BOD and TSS are expected to be typical of municipal wastewater with concentrations of 190 and 210 mg/L, respectively.

2.4.1 Regulatory Issues

Because the Creek is a Category 2 water, any surface discharge from the facility would need to meet or exceed the water quality standards as outlined in Table 1-1. While meeting the e. coli and other water quality standards are easily achievable with common and relatively inexpensive treatment technology, the water quality standards for the ammonia and phosphorus levels are quite stringent and would require significant capital and annual costs to achieve.

To avoid these excessive costs, it may be possible to discharge of treated effluent through subsurface disposal. Two commonly available technologies for disposal are Rapid Infiltration Basins (RIBs) and injection wells. Several wastewater treatment facilities in the state have utilized the RIB technology, including Wolf Creek Water and Sewer Improvement District and Heber City. A RIB uses a pond with a large surface area to allow treated effluent to infiltrate into the soil (UDEQ, 2010). It is estimated that a RIB for a centralized mechanical treatment plant would be about 1 acre in size.

Treated effluent could also be discharged into the subsurface using an injection well, which uses a pump to force the water into the groundwater layer. While injection wells are commonly used for various applications in Utah, there are very few injection wells

being used in effluent wastewater applications. It may be difficult to obtain permitting for an injection well to dispose of treated wastewater effluent.

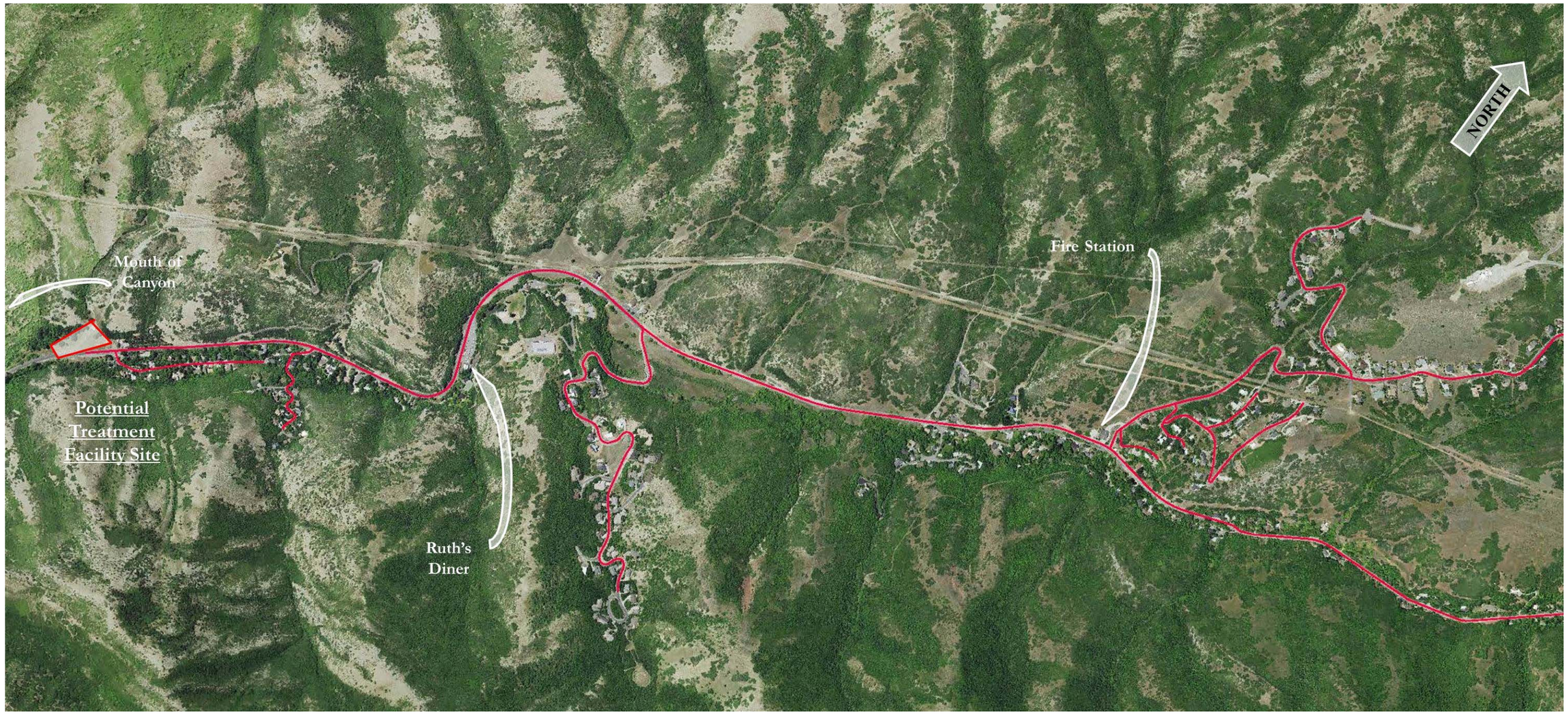


Figure 2-11. Collection System for Alternative 3 (West Portion of Canyon).

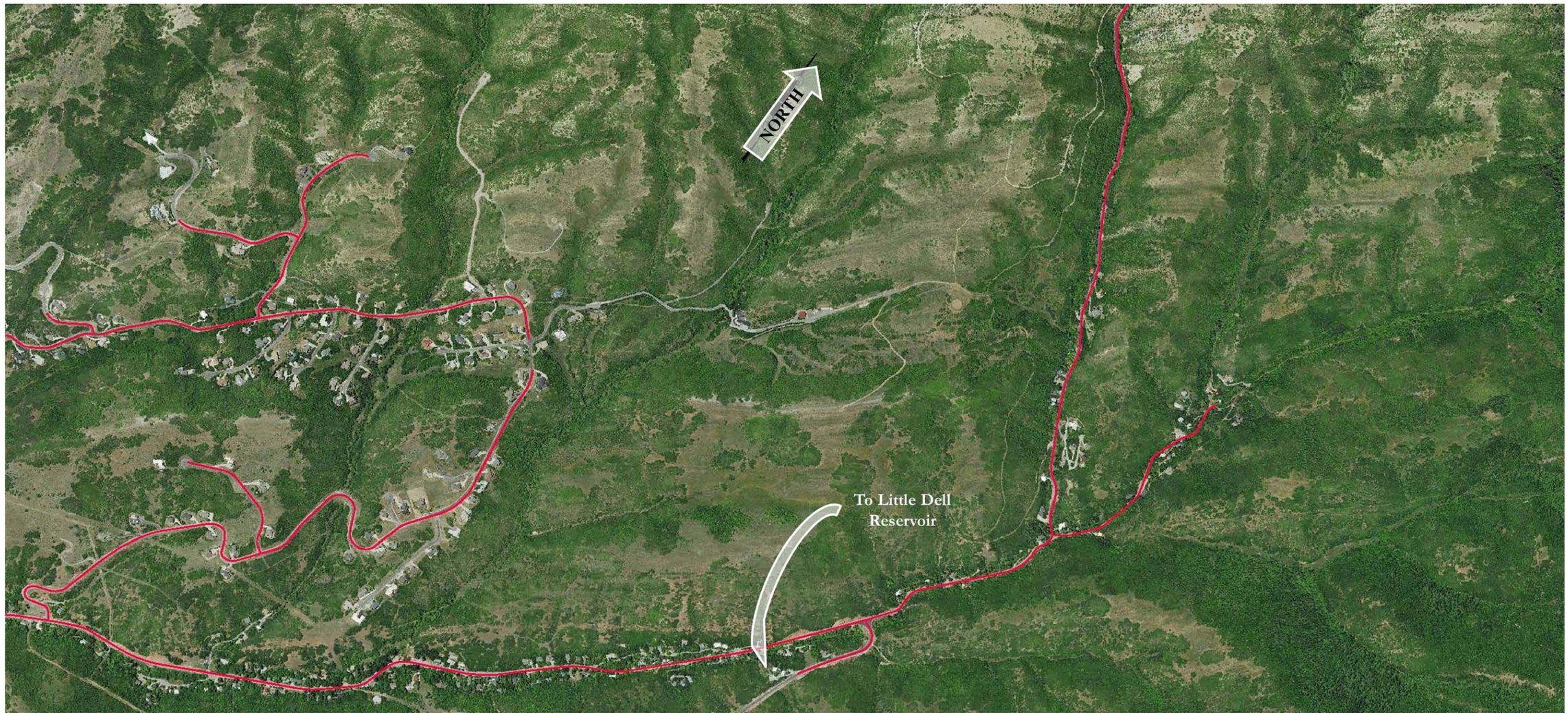


Figure 2-12. Collection System for Alternative 3 (East Portion of Canyon).

2.4.1 Environmental Impact

It is highly likely that water quality in the Creek will improve where wastewater is treated in a mechanical facility and discharged into the subsurface via injection wells or RIBs, depending on their location. While the groundwater and geologic features in the area were not studied in detail, a subsurface disposal site located adequately far from the Creek would allow for extended time in which *e. coli* and other pathogens and inorganic pollutants could be removed in the soil prior to infiltrating back into the Creek. Additionally, the mechanical facility could provide UV or chlorine disinfection, which would reduce *e. coli* levels in the effluent to meet Classification Standards without relying on any soil filtration.

While a centralized mechanical treatment facility would likely improve the quality of water being discharged (either directly or indirectly) to the Emigration Creek, other environmental impacts must be considered, including water balance in the groundwater. By directly conveying water to a treatment facility at the mouth of the Canyon, there may be limited opportunity for the water to remain in the Canyon watershed to be used in beneficial uses. As a result, it is possible that the overall volume of groundwater in the Canyon may be reduced over several years.

2.4.2 Capital Cost

As discussed previously, the greater the number of connections to this system, the smaller the cost per residence. Therefore, a collection system that services the majority of the Canyon would carry the smallest per capita cost. The total length of the collection system is approximately 15 miles, not including laterals to each residence. The total cost of the collection system and mechanical treatment and disposal facility are estimated in Table 2-6. The cost per residence is calculated as **$39,000**. It is noted that these estimates do not include the cost of purchasing or leasing the land.

Table 2-6. Capital Cost for Alternative 3

Description	Qty	Units	Unit Price	Total
8" SDR-35 Sewer Pipe	79,200	lf	$150	$11,880,000
4' Dia. Concrete Manholes	396	ea	$8,000	$3,168,000
Lift Stations	22	ea	$100,000	$2,200,000
Laterals	650	ea	$500	$325,000
MBR Facility	1	ls	$6,000,000	$6,000,000
Subsurface Disposal System	1	ls	$1,500,000	$1,500,000
Land Purchase	2	acres	$75,000	$150,000
Total Capital Cost				**$25,223,000**

This cost would likely be paid for in the form of a loan or bond. Assuming a 100% loan, with a 3% interest rate and a 30 year loan life, the total monthly payment for the system would be approximately $165 per residence each month.

2.4.3 Operations and Maintenance Cost

The collection system and treatment facility would require annual costs, including facility and collection system maintenance, operating costs and operator salaries. The annual costs are estimated to be $300,000, or $40 per month per residence. These costs are shown itemized in Table 2-7. Including the debt service on the loan for the capital costs, the total cost per residence would be **$205** per month.

Table 2-7. Operations and Maintenance Costs for Alternative 3

Description	Annual Cost
Operator Salary	$75,000
Utilities (Electricity, Gas, etc.)	$150,000
Maintenance and Repairs	$75,000
TOTAL ANNUAL COST	**$300,000**

2.5 Alternative 4: Collection System with Connection to Salt Lake City

The final alternative considered is to construct a collection system that would connect to the existing Salt Lake City sewer system, with wastewater eventually being delivered to and treated at the Salt Lake Water Reclamation Facility. Similar to Alternative 3, the cost of a

collection system is significant and this option becomes economically feasible only with a large number of participating residences. Therefore, the collection system would need to reach a large portion of the residences in the canyon, with a layout similar to what is shown in Figure 2-11 and Figure 2-12. The collection system would consist of a minimum 8" sewer main, with 4" laterals from each residence. Communications with Salt Lake City Public Works has confirmed that there is an existing sewer main at the mouth of the canyon and that it has sufficient capacity to receive all wastewater generated in the canyon.

2.5.1 Regulatory Issues

In order for Salt Lake City to agree to allow a connection from the canyon, there are two possible methods. First, the canyon could be annexed in as part of Salt Lake City. Alternatively, the connection could potentially be treated as an industrial connection, with a fee being assessed by SLCPU based on the amount of flow delivered.

Annexation into Salt Lake City could face significant pushback from the residents. At a public meeting held on Thursday, October 15th, 2015, several residents voiced their desire to not be annexed as part of Salt Lake City, due to the potential for increased taxes and requirements to accept regulations and policies pertaining to the City. Additionally, annexation must not only be agreed upon by Canyon residents, but must also be agreed upon by the Salt Lake City Council.

If the Canyon were to remain a separate entity, the City and the service district would need to have a contractual agreement in which the Canyon residents could connect to the City. Flows would need to be monitored for fee assessments.

2.5.2 Environmental Impact

This alternative would eliminate any contaminants resulting from septic systems from reaching the Creek by collecting all wastewater and conveying it out of the Canyon to the Salt Lake Water Reclamation Facility. However, similar to Alternative 3, the

potential to reduce the groundwater level in the Canyon exists as effluent from drain fields would no longer be available for recharging the groundwater.

2.5.3 Capital Cost

As with Alternative 3, the majority of the cost of this alternative is in the construction of sewer lines throughout the canyon. Also, it is possible that Salt Lake City will require each residence to pay the regular connection fee, currently set at $545/connection. The total costs are estimated in Table 2-8. The cost per residence is calculated as **$30,000**. It is also noted that there may be additional costs associated with either annexing into Salt Lake City, or upfront costs associated with establishing a contract with the City. At the time of this report, no estimates on these costs were available. However, these costs should be considered in evaluating the total capital costs.

Table 2-8. Capital Cost for Alternative 4

Description	Qty	Units	Unit Price	Total
8" SDR-35 Sewer Pipe	87,120	lf	$150	$13,068,000
4' Dia. Concrete Manholes	436	ea	$8,000	$3,485,000
Lift Stations	22	ea	$100,000	$2,200,000
Laterals	650	ea	$500	$325,000
City Connection Fee	650	ea	$545	$355,000
Total Capital Cost				**$19,433,000**

This cost would likely be paid for in the form of a loan or bond. Assuming a 100% loan, with a 3% interest rate and a 30 year loan life, the total monthly payment for the system would be approximately $125 per residence each month.

2.5.4 Operations and Maintenance Cost

Where the Canyon is annexed into Salt Lake City, the ownership of the collection main in the Canyon would become the responsibility of the City, and any maintenance would be handled by the SLCPU. Laterals on homeowners' land would remain under their responsibility. Under this situation, each resident would be responsible to pay the

monthly sewer bill associated with all residents in Salt Lake City. This is currently set at **$20** per month.

Where a contractual agreement between the Canyon and the City is established, ownership of the collection main would remain with EID and any costs associated with maintenance and repairs would be the responsibility of the district. The annual costs would therefore include both maintenance as well as the monthly fee paid to the City. It is noted that Salt Lake City's fee schedule for contracted sewer connections is based on flow, BOD loading and TSS loading. (The Canyon sewer flow will likely be considered a Class 1 Customer Class). The total operations and maintenance costs, and fees to Salt Lake City are estimated to be **$50** per month per residence and are shown itemized in Table 2-9.

Table 2-9. Operations and Maintenance Costs for Alternative 4

Description	Annual Amount	Units	Unit Cost	Annual Cost
Collection System Maintenance	1	Lump	$100,000	$100,000
Lift Station Maintenance	22	Each	$5,000	$110,000
Salt Lake City Sewer Rates				
Class 1 Flow Rate Fee	95,154	100 Cubic Feet	$0.87	$82,800
Class 1 BOD Rate Fee	112,784	Pounds BOD	$0.32	$36,100
Class 1 TSS Rate Fee	124,656	Pounds TSS	$0.19	$23,700
TOTAL ANNUAL COST				**$352,600**

Including the debt service on the loan for the capital costs, the total cost per residence would be between **$145 to $170** per month, depending on whether the Canyon was annexed or contracted with Salt Lake City.

CHAPTER 3 - PUBLIC DISCUSSION AND INVOLVEMENT

All of the options discussed above are contingent on some level of public involvement. As such, attempts have been made to keep the residents in Emigration Canyon informed about the considerations being made to improving water quality in the Creek.

3.1 October 15th 2015 Public Meeting

On October 15th, 2015, a public meeting was held at the Unified Fire Authority Station 119 at 5025 East Emigration Canyon Road. In this meeting, the alternatives described above were presented conceptually, with diagrams and handouts to visually represent the impacts and challenges associated with each option. In addition, the public was asked if they could help identify areas that were causing problems. The Salt Lake Valley Health Department and the Emigration Improvement District, along with AQUA Engineering, were represented at this meeting. Approximately 100 individuals attended.

The primary concerns of the public attending the meeting were:

- Is the contamination in the creek causes by the residents or is it from the animals in the canyon? The equestrian center was mentioned as a potential source along with dogs along the creek. In addition, they inquired about the wild animals in the area. It was explained that sampling was done higher in the watershed and the *e. coli* concentrations were much lower than when the sampling was done below the residence.
- Several people asked if the individual septic tanks that were having the problems have been identified. It was explained that sampling was done high up in the watershed and near the mouth of the canyon. This sampling indicated that the *e. coli* increased as it moved past the homes in the canyon but the individual problems were not identified. As people came by the presentation stations they were asked if they were aware of any areas that needed to be included in the study beyond the selected sites.

- The majority of the people that were in attendance believed it would be a good thing to clean up the stream. However, they all felt their septic systems were working properly and it was "someone else that was causing the problem". They generally preferred the cluster alternatives because the people that needed to fix the problem would be paying to fix their own problem.
- Most people did not want to be annexed into Salt Lake City.
- There was a concern if a collection system was installed in the canyon that it would dry up the wells because all the water would be drained out.
- At this meeting, costs were not assigned to the alternatives. However, there were concerns of the cost of installing a collection system for everyone. Some residents that would be connected to the collection system are located a long distance from the stream and do not feel their septic system is part of the *e. coli* problem.

3.2 January 2016 Survey

In January of 2016, a survey was emailed to 300 separate email accounts, and was also delivered to the Oaks Home Owner's Association and Upper Pinecrest Community for circulation among those residents. The survey was created using the online services of Survey Monkey, and a complete copy of the survey is included in Appendix A. To date, 69 responses have been returned on that survey. Some of the questions asked in the survey included:

- Frequency of septic tank pumping
- Noticing sewer smells near their residence
- Interest in participation in a combined system

The survey was not intended to get statistical valid information. However, it provided some insight as to how aware people are with their septic systems. There was an indication that people would be interested in paying to have their septic system managed. There was also an indication that people would be interested in participating in the cluster systems.

3.3 May 21, 2016 Public Meeting

In May 2016, a second public meeting was held at the Fire Station in which the alternatives discussed above were presented in more detail, including estimated capital and annual costs to residents. This meeting was held as part of the annual fire day breakfast. It was anticipated that this would attract additional residences that could participate in the wastewater discussion. The same groups from the first public meeting (SLVHD, EID and AQUA) attended this meeting as well.

A short presentation was given that outlined the different alternatives and the costs associated with each option. The presentation is included in Appendix B. While specific discussions with residents were not recorded, the general consensus among those that attended seemed to be:

- There is a desire not be annexed into Salt Lake City, as may be required in Alternative 4. However, there was a single individual that felt connecting to Salt Lake City was the best option and if it required being annexed, that would be acceptable with him.
- Nobody was eager to pay a sewer bill that ranged from approximately $160 to over $200 per month.
- Some residents questioned whether the whole county would be willing to participate in the cost of the sewer system.
- One canyon resident uses a holding tank for her sewage and has it pumped on a regular basis. She was interested in participating in the cluster systems.
- A couple attended that stated at their last tank pumping, the pumper recommended that they reduce the water that they sent to their drain field so it would last longer before it needed replaced. They said they had additional property above their house that could be used for a drain field. If they decide to install one in the future, they would be willing to work with EID and allow other neighbors to participate. However, at this time they feel their existing system is satisfactory.

CHAPTER 4 - RECOMMENDATIONS AND IMPLEMENTATION SCHEDULE

Following the review of the alternatives, as well as the input from public, this Chapter provides recommendations to the district. One of the key issues with the recommendations is the authority to require something to be done. EID has no authority to require anyone to participate in a wastewater project. It is assumed that either the County or the State has the authority to implement actions that may require a wastewater project. In general, EID is a body politic which is required if there is more than a single individual connected to a sewer system. EID is willing to support the County or the State in taking the responsibility of acting as the body politic on an as-needed basis. This would allow them to manage a collection system, treatment facility or cluster systems depending on the needs of the regulatory authority.

4.1 Recommendations

Alternatives 3 and 4 would require the consent of the majority of residents in the Canyon in order to be enacted. A common concern raised in public meetings was whether the alternatives considered would be affordable to the homeowners. It is highly unlikely that the majority of residents will agree to either of these solutions, as each resident would become responsible to pay a monthly fee, where one did not previously exist.

EID should help educate the public as part of Alternative 1 which could provide some benefit to the water quality in the Creek. EID should continue to educate and make decisions based on the Management Model #1: Homeowner Awareness. In addition to sending out information related to sewer systems, EID should arrange group contracts with septage haulers and inspectors and provide group pricing for the residents in the canyon. This could allow for better pricing because the providers could make better use of their time when traveling to the canyon. While this education alternative could help homeowners with septic system failures to repair or improve their existing systems, this Management Model does not provide any benefit to residents with septic systems located too close to the Creek.

There appears to be some interest in Alternative 2. The district does not intend to go out and force residences to connect to a cluster system. However, EID is willing to act as the body politic for a group that would like to develop a cluster system. It is anticipated that this would be initiated by the residences. If a homeowner's septic system was found to be out of compliance, that homeowner could repair their existing system meeting the current onsite rules or they could coordinate with willing neighbors to establish a cluster group. These willing homeowners would then solicit EID to be their body politic for the cluster system. EID could assist in engineering procurement, land acquisition, installation, and financing depending on the need of the participating parties. Once the cluster group is established, EID would become the body politic and take ownership of the portion of the cluster group as described in Part 2.3 of this report.

4.2 Required Tasks

The following tasks must be completed in order to create cluster groups as recommended in the previous section. These tasks would be the responsibility of the participating homeowners, but assistance from EID could be provided to accomplish each task.

4.2.1 Administrative

The primary administrative task that must be accomplished is establishing a service district to provide maintenance and service to the new combined septic systems. As described in Part 2.3, this would be provided by EID, which already provides a limited amount of sewer services in the Canyon. The only requirement to establish EID as the body politic for the cluster system would be the consent of participating residents.

4.2.2 Funding

Funding for capital expenditures related to construction of the combined septic system will need to be obtained prior to permitting, engineering and construction. This may be able to be obtained with loans, bonding or potentially, assistance from the State or County. It is noted that funding for purchasing or leasing of land will also need to be obtained at this stage.

4.2.3 Permitting

New combined septic systems will need to be permitted through the Salt Lake Valley Health Department and the State Department of Environmental Quality. It is anticipated that this permitting process will take 3-6 months. This permitting process likely can begin at the same time as the establishment of the service district discussed in the previous section.

4.2.4 Engineering and Construction

Required engineering work includes selecting an appropriate site, technical design and selection of equipment, including pump systems, septic tanks and drain fields. This work would need to also include soil studies and land surveys. It is anticipated that the engineering portion of the work will take three months. Construction can immediately proceed the design phase, assuming all permits have been obtained. It is anticipated that construction can be completed in 4-6 months.

CHAPTER 5 - REFERENCES

1. Governor's Office of Management and Budget, Sub-County Population Projections. (2012).
2. Schaub, S., Sorber, C., *Virus and Bacteria Removal from Wastewater by Rapid Infiltration Through Soil*. (1976).
3. Schaub, S., Sorber, C., *Virus and Bacteria Removal from Wastewater by Land Treatment*. (1976).
4. U.S. Census Bureau, 2010 Census.
5. U.S. EPA, *Design Manual: Onsite Wastewater Treatment and Disposal Systems*. (1980).
6. Utah Department of Environmental Quality, *TMDL for* Escherichia coli (e. coli) *in the Upper Emigration Creek Watershed*. (2011).
7. Utah Department of Environmental Quality, *Utah Guidance for Constructing Rapid Infiltration Basins (RIBs)*. (2010).
8. Utah Code, Title 17D. (2008).

Appendix A – Online Survey and Responses

Memorandum

To Eric Hawkes

From Dallin Stephens, P.E.

Date 2/5/16

CC Brad Rasmussen, P.E.

Subject Sewer Study – Online Survey Summary

Eric,

This memo summarizes the results of the online survey that was created to gauge the interest of residents in cluster treatment systems and/or systems maintained by EID. The survey was hosted by SurveyMonkey.com and the residents in Emigration Canyon were made aware of the survey through email and mailings. While not all residences were included in the email list, we expect that the majority of residences were contacts through both email and standard mail. As of today, we have had 52 responses (including your test response). Based on our estimates, this represents about 10% of the total households in the canyon.

The following figures show a summary of the responses provided. Of particular note is that five respondents were interested in being a part of a cluster system, with an additional 16 who were “not sure”. There are also 6 respondents who are interested in EID maintaining and servicing their septic system (some of which are also interested in the cluster system).

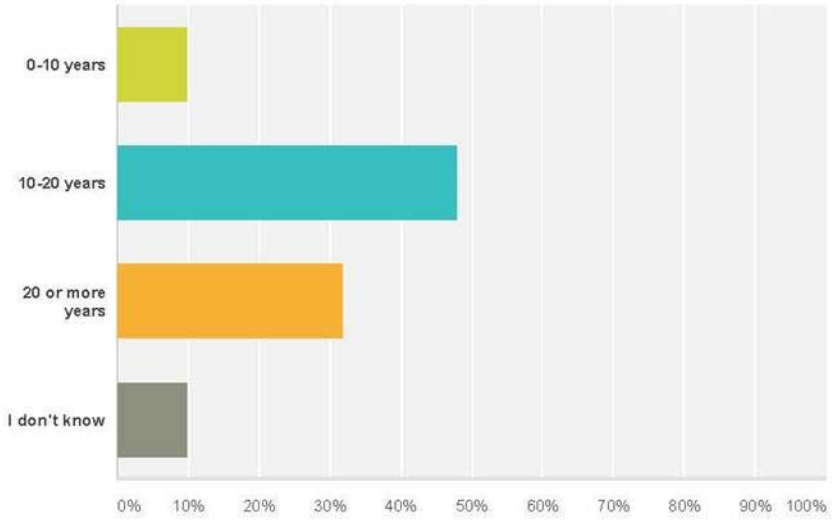
533 W 2600 S Suite 275 Bountiful, UT
P (801) 299-1327 F (801) 299-0153
www.aquaeng.com

Q1

Customize Export

How old is your septic system?

Answered: 50 Skipped: 2



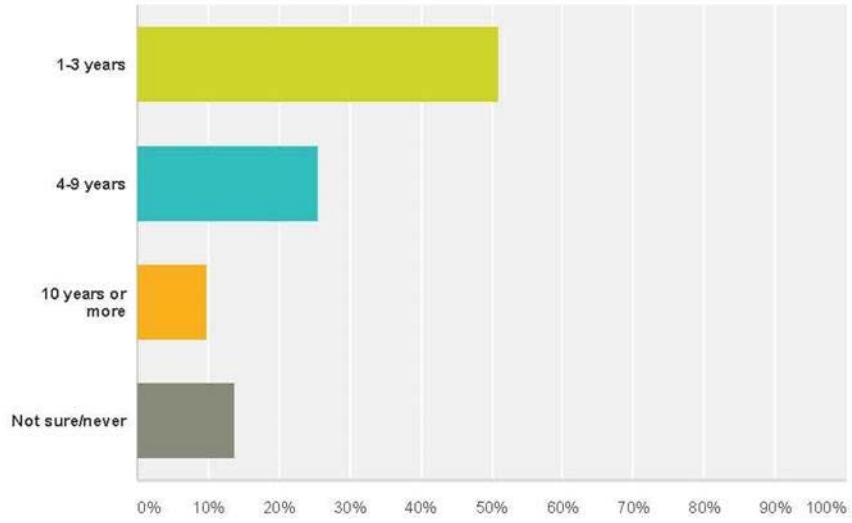
Answer Choices	Responses	
0-10 years	10.00%	5
10-20 years	48.00%	24
20 or more years	32.00%	16
I don't know	10.00%	5
Total		50

Q2

Customize Export

When was the last time your septic tank was pumped?

Answered: 51 Skipped: 1



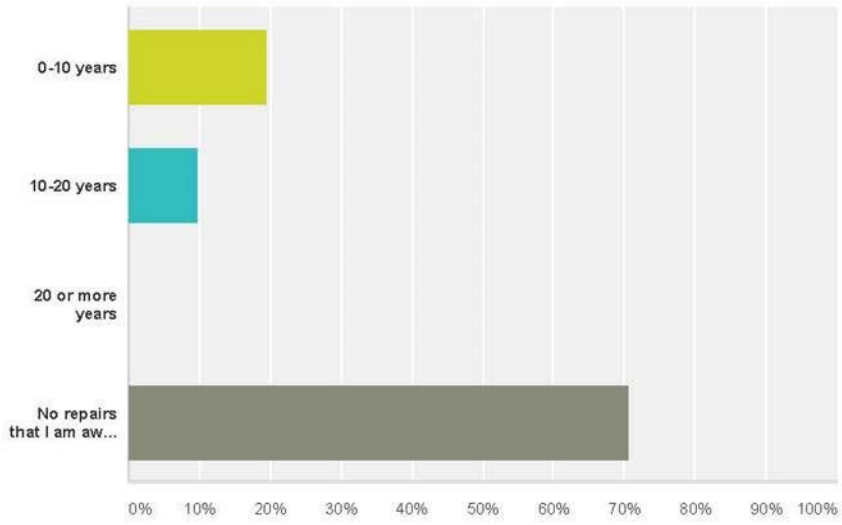
Answer Choices	Responses	
1-3 years	50.98%	26
4-9 years	25.49%	13
10 years or more	9.80%	5
Not sure/never	13.73%	7
Total		51

Q3

Customize Export

When was the last time major repairs (i.e., replacement of drain field or septic tank) took place?

Answered: 51 Skipped: 1



Answer Choices	Responses	
0-10 years	19.61%	10
10-20 years	9.80%	5
20 or more years	0.00%	0
No repairs that I am aware of	70.59%	36
Total		51

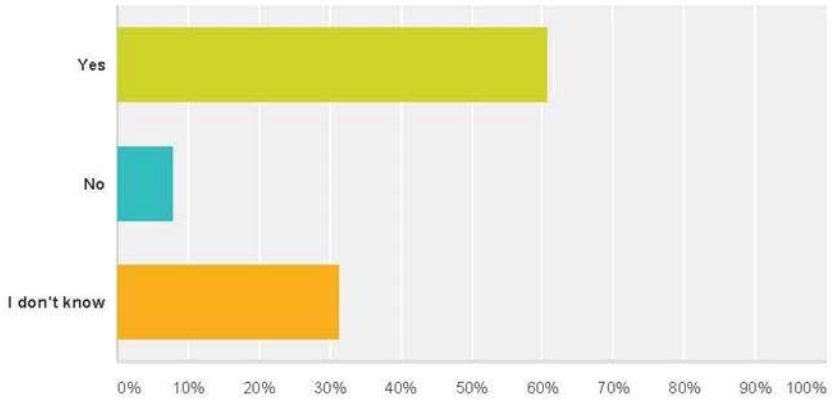
Comments (15)

Q4

Customize Export

Does your system include a backup drain (leach) field?

Answered: 51 Skipped: 1



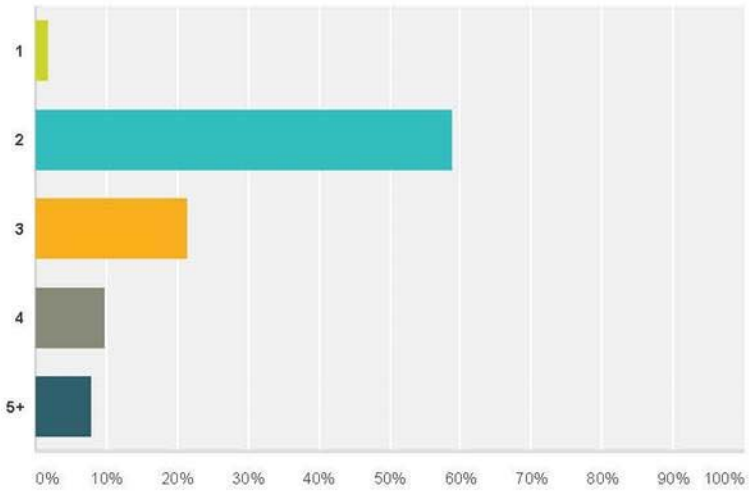
Answer Choices	Responses	
Yes	60.78%	31
No	7.84%	4
I don't know	31.37%	16
Total		51

Q5

Customize Export

How many people live in the house(s) that feed into the septic system?

Answered: 51 Skipped: 1



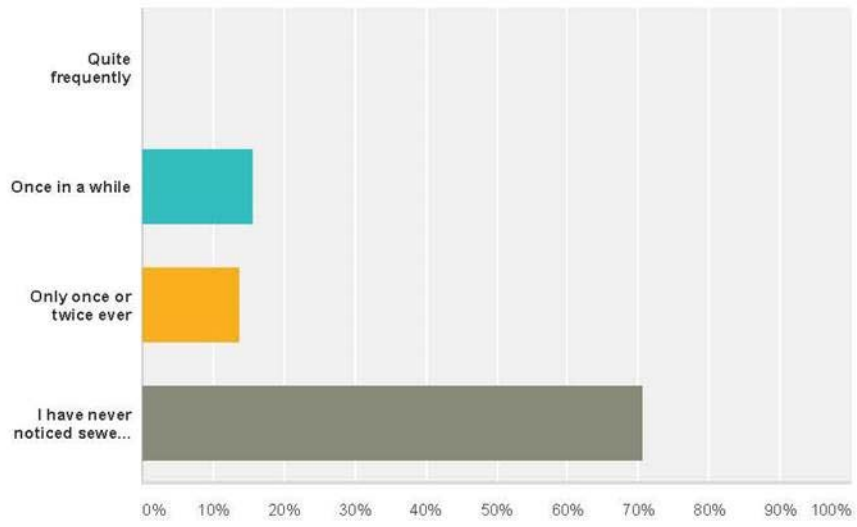
Answer Choices	Responses	
1	1.96%	1
2	58.82%	30
3	21.57%	11
4	9.80%	5
5+	7.84%	4
Total		51

Q6

Customize Export

How often have you noticed sewer smells near your home?

Answered: 51 Skipped: 1



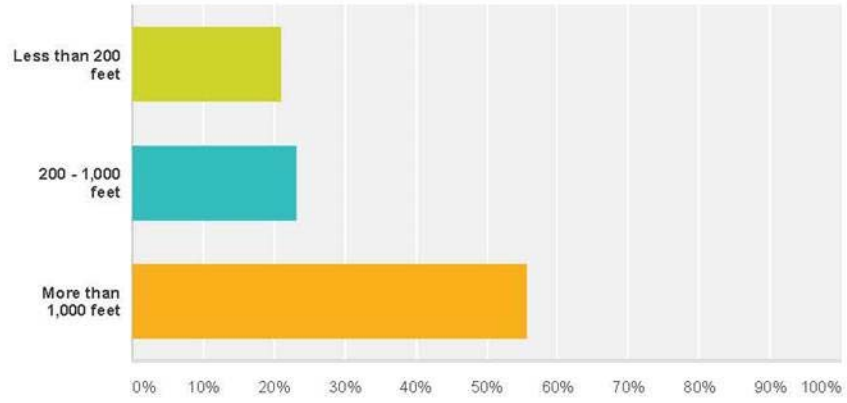
Answer Choices	Responses	
Quite frequently	0.00%	0
Once in a while	15.69%	8
Only once or twice ever	13.73%	7
I have never noticed sewer smells near my home	70.59%	36
Total		51

Q7

Customize Export

How far is Emigration Creek from your home?

Answered: 52 Skipped: 0



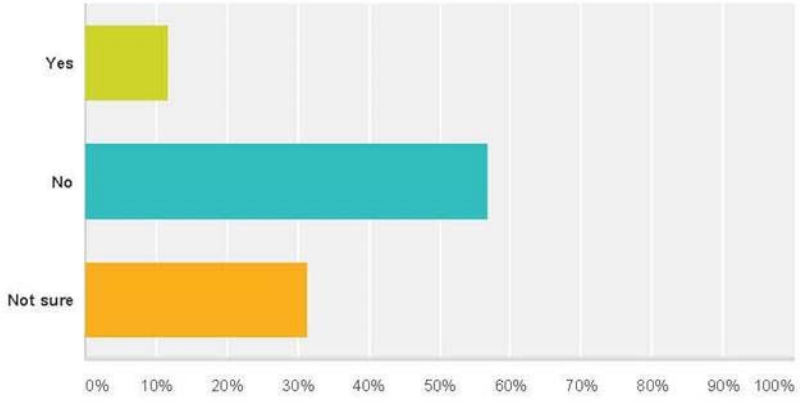
Answer Choices	Responses	
Less than 200 feet	21.15%	11
200 - 1,000 feet	23.08%	12
More than 1,000 feet	55.77%	29
Total		52

Q8

Customize Export

Would you be interested in having Emigration Improvement District (EID) maintain and service your septic system for a monthly fee?

Answered: 51 Skipped: 1

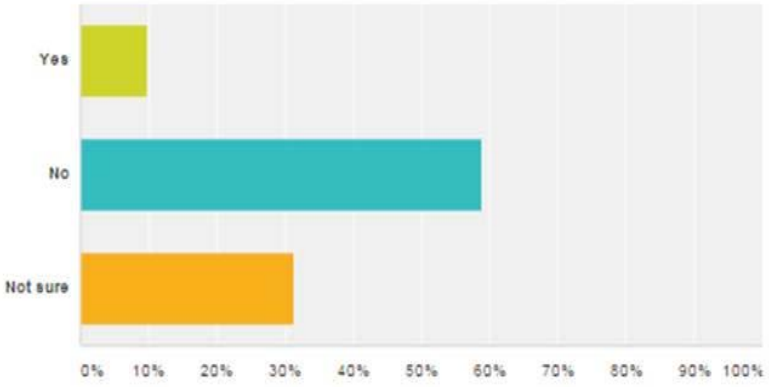


Answer Choices	Responses	
Yes	11.76%	6
No	56.86%	29
Not sure	31.37%	16
Total		51

Q9 Customize Export

To better improve the water quality in Emigration Creek, the Emigration Improvement District (EID) has considered "clustering" multiple homes in close proximity into a single wastewater treatment system. This system would use a combined septic system and drain (leach) field to treat wastewater from these clustered homes. The drain field would be located on a vacant plot of land near the cluster. This system would take the place of individual septic systems that are failing or that are not operating at optimal efficiency. Also, because this drain field would be located farther away from the creek, it would produce better water quality before the water reaches the creek. The system would be maintained by EID and each residence in the cluster group would pay a certain monthly fee for maintaining the system. There would also be an upfront cost to install the system. Would you be interested in connecting to a cluster system?

Answered: 51 Skipped: 2



Answer Choices	Responses	
Yes	9.80%	5
No	58.82%	30
Not sure	31.37%	16
Total		51

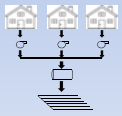
Comments (17)

Appendix B- Public Presentation Documents

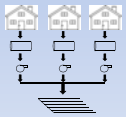
Alternative 1: Management Systems

Management System	Description	Comments
Homeowner Awareness	EID would educate owners on proper maintenance of septic systems	No liability for EID; may see limited improvements to septic system management
Maintenance Contracts	EID would provide service to septic systems of interested owners and charge monthly fees	Any septic system failures would be the liability of EID
Operating Permits	EID would issue permits for septic systems, including renewal of existing permits	This option is not available; EID has no authority to issue or reissue permits
Responsible Management Entity Operation and Maintenance	EID would be issued a permit (by the County) to operate septic systems	State law does not allow this type of permit; would require third party access to private property
Responsible Management Entity Ownership	EID would take ownership of septic systems and be responsible for maintenance	EID would be liable for any failures; would require easements to the septic systems

Alternative #2: Cluster Locations



Cluster Configurations



Configuration #1

- Individual pump stations
- Common septic tank and drain field
- More upfront capital cost

Configuration #2:

- Pumps in existing septic tanks
- Common drain field
- More maintenance by homeowner

Cluster #1 – Sunnydale

Cluster #1 – Sunnydale	Qty	Units	Unit Price	Total
Drop-In Pumps	10	ea	$3,000	$30,000
Pump Installation	10	ea	$1,000	$10,000
Electrical Installation	10	ea	$3,000	$30,000
2 1/2" Laterals	500	lf	$40	$20,000
4" Pressure Main	2,500	lf	$50	$125,000
Asphalt Cut and Patch	2,500	sf	$15	$37,500
Drain Field Chamber and Pipe	3,500	lf	$10	$35,000
Drain Field Earthwork	1,500	cy	$15	$22,500
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	2.2	acres	$75,000	$165,000
Total Cost				**$478,000**

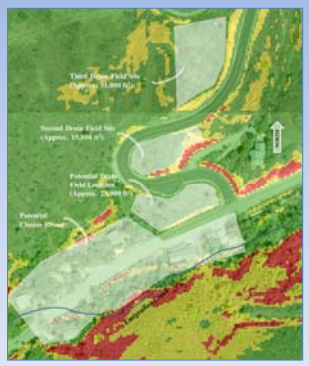
Design Conditions
Homes: 10
Flow: 3,000 gpd
Total Area: 2.2 acres
Monthly Cost: $206

Cluster #2 – Pioneer Fork

Cluster #2 - Pioneer Fork	Qty	Units	Unit Price	Total
Drop-In Pumps	10	ea	$3,000	$30,000
Pump Installation	10	ea	$1,000	$10,000
Electrical Installation	10	ea	$3,000	$30,000
2 1/2" Laterals	500	lf	$40	$20,000
4" Pressure Main	1,000	lf	$50	$50,000
Asphalt Cut and Patch	1,000	sf	$15	$15,000
Drain Field Chamber and Pipe	3,500	lf	$10	$35,000
Drain Field Earthwork	1,500	cy	$15	$22,500
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	2.2	acres	$75,000	$165,000
Total Cost				**$380,500**

Design Conditions
Homes: 10
Flow: 3,000 gpd
Total Area: 2.2 acres
Monthly Cost: $164

Cluster #3 – Pioneer Ridge



Cluster #3 - Pioneer Ridge	Qty	Units	Unit Price	Total
Drop-In Pumps	7	ea	$3,000	$21,000
Pump Installation	7	ea	$1,000	$7,000
Electrical Installation	7	ea	$3,000	$21,000
2 1/2" Laterals	350	lf	$40	$14,000
4" Pressure Main	750	lf	$50	$37,500
Asphalt Cut and Patch	750	sf	$15	$11,300
Drain Field Chamber and Pipe	2,500	lf	$10	$25,000
Drain Field Earthwork	900	cy	$15	$13,500
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	1.6	acres	$75,000	$120,000
Total Cost				**$273,300**

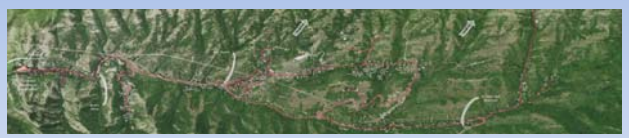
Design Conditions
Homes: 7
Flow: 2,100 gpd
Total Area: 1.6 acres
Monthly Cost: $170

Cluster #4 – Pinecrest

Cluster #4 - Pinecrest	Qty	Units	Unit Price	Total
Drop-In Pumps	5	ea	$1,000	$5,000
Pump Installation	5	ea	$1,000	$5,000
Electrical Installation	5	ea	$3,000	$15,000
2 1/2" Laterals	350	lf	$40	$14,000
4" Pressure Main	2,000	lf	$50	$100,000
Asphalt Cut and Patch	750	sf	$15	$11,300
Drain Field Chamber and Pipe	1,750	lf	$10	$17,500
Drain Field Earthwork	750	cy	$15	$11,300
Drain Field Distribution System	1	ls	$3,000	$3,000
Land Purchase	1.1	acres	$75,000	$82,500
Total Cost				**$264,600**

Design Conditions
Homes: 5
Flow: 1,500 gpd
Total Area: 1.1 acres
Monthly Cost: $240

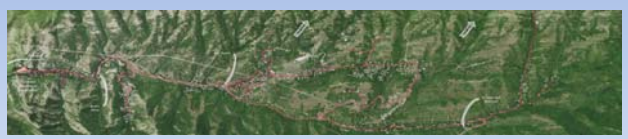
Alternative 3: Collection System with Treatment in the Canyon



Description	Qty	Units	Unit Price	Total
8" SDR-35 Sewer Pipe	79,200	lf	$150	$11,880,000
4' Dia. Concrete Manholes	396	ea	$8,000	$3,168,000
Lift Stations	22	ea	$100,000	$2,200,000
Laterals	650	ea	$500	$325,000
MBR Facility	1	ls	$6,000,000	$6,000,000
Subsurface Disposal System	1	ls	$1,500,000	$1,500,000
Land Purchase	2	acres	$75,000	$150,000
Total Capital Cost				**$25,223,000**

Design Conditions
Homes: 650
Flow: 195,000 gpd
Total Area: 2 acres
Monthly Cost: $205

Alternative 4: Collection System with Connection to Salt Lake City



Description	Qty	Units	Unit Price	Total
8" SDR-35 Sewer Pipe	87,120	lf	$150	$13,068,000
4' Dia. Concrete Manholes	436	ea	$8,000	$3,485,000
Lift Stations	22	ea	$100,000	$2,200,000
Laterals	650	ea	$500	$325,000
City Connection Fee	650	ea	$545	$355,000
Total Capital Cost				**$19,433,000**

Design Conditions
Homes: 650
Flow: 195,000 gpd
Monthly Cost: $145-$170