Wastewater Facilities Planning Study

City of Lewisville

November 2023 | Project No. 221039-000

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EXECUTIVE SUMMARY

This facility plan presents options for the City of Lewisville to address their wastewater concerns, such as failing septic systems and cesspools. It also presents the benefits and costs of the improvement alternatives and makes recommendations for financial plans to support the recommended improvements. The facility plan was partially funded by a grant from the Idaho Department of Environmental Quality (DEQ). The remaining funding came from the City of Lewisville.

This executive summary provides a brief glimpse into the information provided in the facility plan. Chapter 1 overviews the project location, the environmental considerations, and the population growth forecast. Chapter 2 describes the need for the project and includes the regulatory requirements and planning criteria that would be used to develop a wastewater system. Chapters 3 and 4 discusses the improvement alternatives including the costs, environmental impacts, and sustainability considerations. Chapter 5 presents the capital improvement plan, a recommended implementation schedule, and anticipated user rates including the Engineer's opinion of probable costs and description of funding sources.

ES.1 PROJECT PLANNING

The wastewater service area would be the City limits. The topography, floodplains, climatological data, groundwater data, soils, land use, zoning, and surface water are discussed in Chapter 1. The City is surrounded by farmland.

The historic population of Lewisville has been decreasing. Historical population data from 1980 through 2020 was tabulated from the U.S. Census Bureau and is shown in Table ES-1.

TABLE ES-1: LEWISVILLE HISTORICAL POPULATIONS

Year	Population
1980	502
1990	471
2000	467
2010	458
2020	421

It is anticipated that implementation of a community wastewater system will enable development in Lewisville. Based on discussions with the City of Lewisville and analyzing historic population growth in the region, an annual average growth rate of 0.73% was selected. Collection system improvements as part of this study are based on a planning period of 40 years, while wastewater treatment improvements are based on a 20-year planning period. Table ES-2 shows population projections for the 20- and 40-year planning periods for Lewisville.

TABLE ES-2: POPULATION PROJECTIONS

Year	Population
2023	503
2033	541
2043	**582**
2053	625
2063	**672**

ES.2 NEED FOR PROJECT

The potential for groundwater contamination from cesspools is high in Lewisville because groundwater rises to near the ground surface during the irrigation season which floods the cesspools and shallow sand point wells provide drinking water and other uses in some of the older homes. Also, some properties in Lewisville are not large enough for a replacement septic system if the current system fails. This leaves property owners without an option for maintaining a residence on the property which greatly reduces property values. Other properties cannot be subdivided due to lot size restrictions for septic permits.

Lewisville's projected influent flows and contaminant loads for the planning period are shown in Table ES-3 and Table ES-4, respectively.

TABLE ES-3: INFLUENT FLOW PLANNING CRITERIA

Parameter	Planning Criteria Unit Flow (gpcd)	Planning Criteria Projected Flow (GPD)				
Year		*2023*	*2033*	*2043*	*2053*	*2063*
Population		503	541	582	625	672
ADF	100	50,300	54,100	58,200	62,500	67,200
ALF	60	30,200	32,500	34,900	37,500	40,300
AHF	186	93,600	101,000	108,000	116,000	125,000
MMF	225	113,000	122,000	131,000	141,000	151,000
MDF	273	137,000	148,000	159,000	171,000	183,000
PHF	304	153,000	164,000	177,000	190,000	204,000

Notes:
ADF = average day flow, ALF = average low flow, AHF = average high flow, MMF = maximum month flow, MDF = maximum day flow, PHF = peak hour flow.

TABLE ES-4: INFLUENT LOADING PLANNING CRITERIA

Parameter	Planning Criteria (ppcd*)	Planning Criteria Projected Flow (MGD)		
Year		*2023*	*2033*	*2043*
Population		503	541	582
BOD_5				
ADL	0.20	101	108	116
MML	0.26	131	141	151
TSS				
ADL	0.25	126	135	145
MML	0.33	166	179	192
TKN				
ADL	0.046	23	25	27
MML	0.053	27	29	31
Phosphorus				
ADL	0.0048	2.4	2.6	2.8
MML	0.0054	2.7	2.9	3.1

Notes:
ADL = average day load, MML = maximum month load, BOD_5 = five-day biochemical oxygen demand, TSS = total suspended solids, TKN = total Kjeldahl nitrogen.

ES.3 ALTERNATIVES CONSIDERED

Several options were considered to meet the City's wastewater concerns as discussed in Chapter 3. The major decision was whether to construct a City wastewater treatment plant or join the City of Menan's system. Additionally, the type of collection system (gravity or pressurized system) was discussed.

ES.4 SELECTION OF AN ALTERNATIVE

Chapter 4 included an evaluation of the alternatives. Based on the evaluation, the recommended direction was to move toward joining the City of Menan's system. For the collection system, a gravity system with lift stations on both sides of the railroad was the recommended alternative.

ES.5 PROPOSED PROJECT

The City would need to negotiate a contract for the City of Menan and pay the connection fees. A collection system and lift stations would still need to be constructed in the City of Lewisville. The City would also need to hire an operator to maintain the collection system.

The Capital Improvement Plan (CIP) is shown in Table ES-5. The costs shown in the CIP are planning-level estimates (Class 5 cost opinion by the Association for the Advancement of Cost Engineering) and can vary depending on market conditions.

TABLE ES-5: CAPITAL IMPROVEMENT PLAN

General Line Items	Unit	Unit Price	Estimated Quantity	2023 Cost
4" Pressure Sewer Main	LF	$ 65	3,140	$ 204,100
4" Pressure Sewer Main Clean Outs	EACH	$ 3,730	6	$ 22,380
6" Pressure Sewer Main	LF	$ 75	12,316	$ 923,700
6" Pressure Sewer Main Clean Outs	EACH	$ 4,180	16	$ 66,880
8" Gravity Sewer Main (Depth<10')	LF	$ 60	23,513	$ 1,410,800
8" Gravity Sewer Main (Depth>10')	LF	$ 90	25,160	$ 2,264,370
10" Gravity Sewer Main (Depth>10')	LF	$ 100	5,388	$ 538,800
Manholes (Depth<10')	EACH	$ 5,000	84	$ 420,000
Manholes (Depth>10')	EACH	$ 7,200	69	$ 496,800
Service Connections	EACH	$ 560	182	$ 101,920
4" Gravity Sewer Service Lines	LF	$ 45	41,860	$ 1,883,700
1.5" Poly Line	LF	$ 20	1,030	$ 20,600
Small Lift Station	LS	$ 12,000	1	$ 12,000
East Sewer Lift Station W/Back Up Generator	LS	$ 600,000	1	$ 600,000
West Sewer Lift Station W/Back Up Generator	LS	$ 600,000	1	$ 600,000
Electrical Connections	LS	$ 50,000	1	$ 50,000
Removal of Asphalt	SY	$ 20	2,800	$ 56,000
Plant Mix Asphalt Pavement Section	SY	$ 50	2,800	$ 140,000
Directional Drilling	LF	$ 250	350	$ 87,500
Boring	LF	$ 510	450	$ 229,500
Traffic Control	LS	$ 50,000	1	$ 50,000
Material Testing	LS	$ 60,000	1	$ 60,000
Construction Subtotal (rounded)				***$ 10,240,000***
General Conditions				$ 1,030,000
Contingency				$ 3,390,000
Contractor Overhead and Profit				$ 2,200,000
Build America, Buy America (BABA) Requirements				$ 850,000
Total Construction Subtotal				***$ 17,710,000***
Engineering Design and Bid Phase Services				$ 1,330,000
Engineering Construction Contract Administration				$ 670,000
Permitting and Fees				$ 80,000
Geotechnical Investigation				$ 150,000
Surveying				$ 180,000
Legal, Administrative, and Funding				$ 210,000
Connection Fee to Menan				$ 2,080,000
Total Project Cost (rounded)		***$22,410,000***		

The cost estimate herein is concept level information only based on our perception of current conditions at the project location and its accuracy is subject to significant variation depending upon project definition and other factors. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. This cost opinion is in 2023 dollars and does not include escalation to time of actual construction. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein.

Financing of the project could come from several different sources. A high-level evaluation of possible sources and potential user rates is included in Chapter 5. The rates are approximate and will depend on the actual available package at the time of the project.

CHAPTER 1 - PROJECT PLANNING

The City of Lewisville, Idaho (City) was established in 1882. Many older homes in Lewisville utilized cesspools for sewer disposal. A cesspool is an underground pit that is lined with rock or concrete blocks and was used for private sewage disposal. Cesspools are no longer permitted in Idaho; however, many are still in use in the area. The potential for groundwater contamination from cesspools is high in Lewisville because groundwater rises to within a few feet of the ground surface during the irrigation season which floods the cesspools. An additional concern with groundwater contamination is the use of shallow sand point wells to provide drinking water and other uses in some of the older homes.

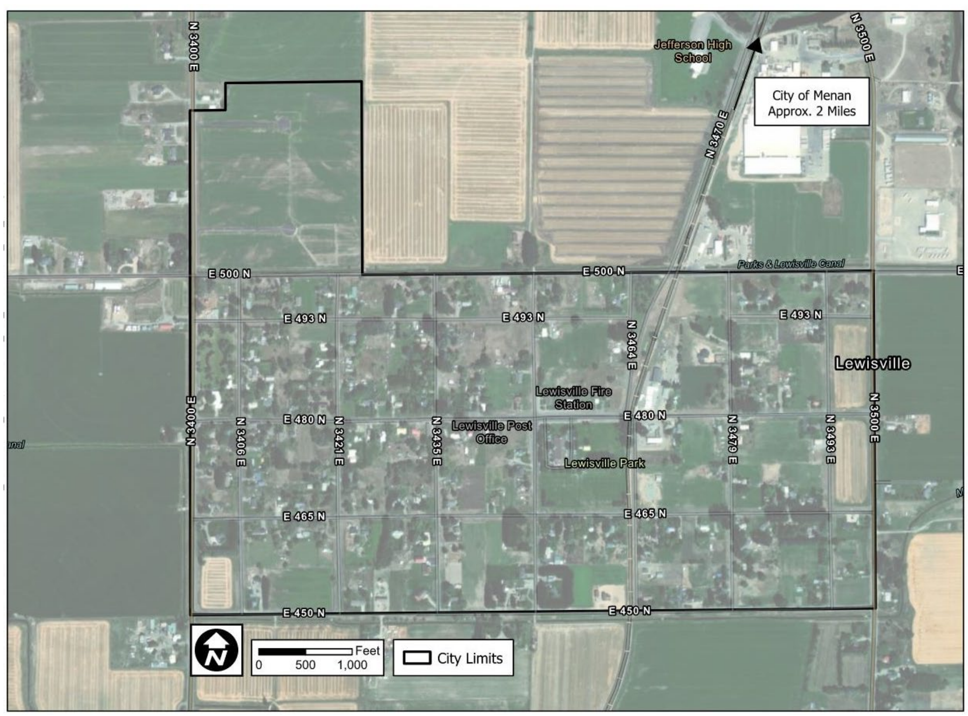
New homes in Lewisville have been constructed with deep wells and modern septic systems that provide better protection for the groundwater. However, the proximity of the septic systems, cesspools, and wells coupled with the high groundwater is a recipe for groundwater contamination and significant health concerns for the City's residents. Some properties in Lewisville are not large enough for a replacement septic system if the current system fails. This leaves property owners without an option for maintaining a residence on the property which greatly reduces property values. Other properties cannot be subdivided due to lot size restrictions for septic permits.

This Wastewater Facilities Planning Study (WWFPS) follows the Idaho Department of Environmental Quality (DEQ) and United States Department of Agriculture (USDA) – Rural Development (RD) requirements and provides a guide to the City for future sewer improvements. This chapter presents the demographic and environmental background of the City. It also provides the planning criteria and regulatory requirements for future wastewater facilities, if constructed.

1.1 LOCATION

The location map of Lewisville is shown in Figure 1-1. The City limits would define the service area if the City constructed a wastewater system.

FIGURE 1-1:SERVICE AREA MAP



1.2 ENVIRONMENTAL RESOURCES PRESENT

This WWFPS focuses on planning. This report briefly discusses the environmental impacts of any recommended infrastructure and operational improvements; however, a full environmental analysis is not included. The following paragraphs present a summary of the environmental features in the study area.

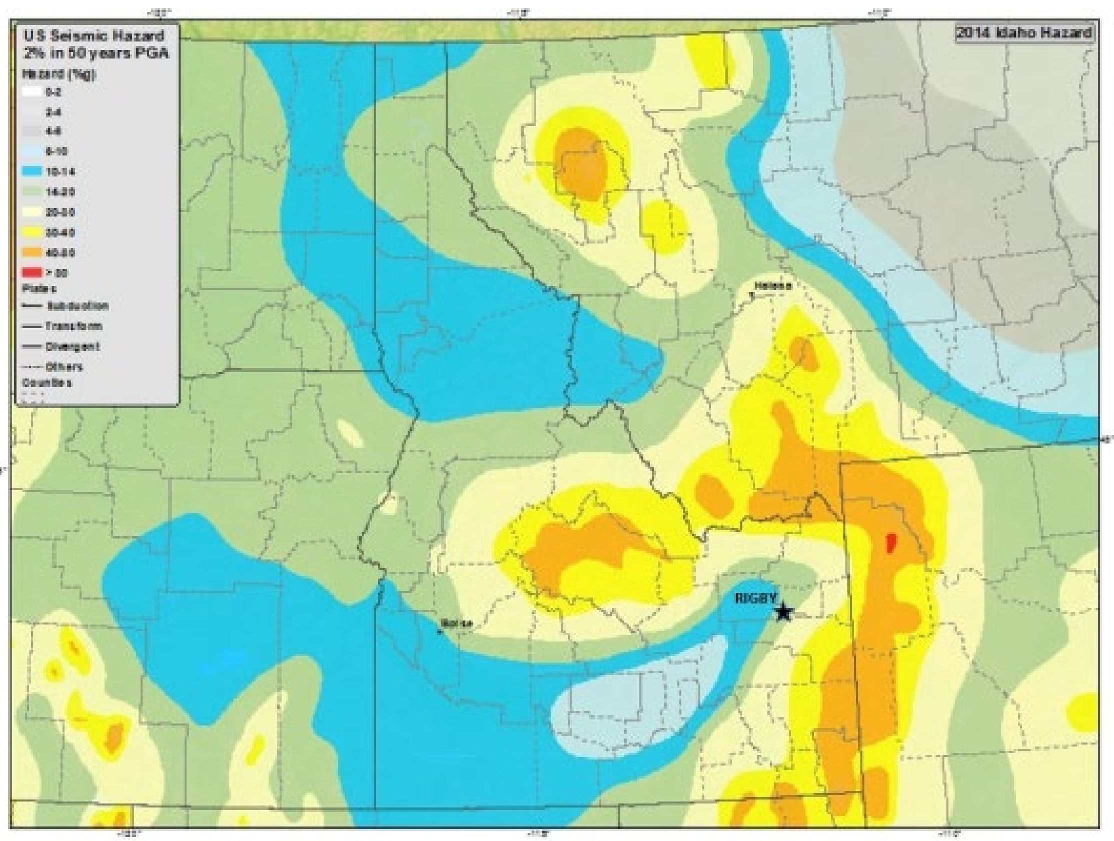
Physiography, Topography, Geology, and Soils

The planning area is relatively flat. The United States Geological Survey (USGS) topography maps show elevations ranging from approximately 4,790 to 4,800 feet above sea level for Lewisville. The highest elevations generally are in the center of the City.

According to USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, the City is labeled as “urban land”; however, the immediate surroundings mostly consist of Blackfoot silt loam and Annis silty clay loam. Further geotechnical and soils evaluation would be required, depending on proposed improvements.

The USGS seismic hazard map for the Lewisville area is shown in Figure 1-2. Lewisville is about 5 miles northwest of the marked star (Rigby) on the east side of the state. The closest faults are the Rexburg Fault and the Grand Valley Fault.

FIGURE 1-2: SEISMIC HAZARD MAP



Surface and Ground Water Hydrology

The USGS indicates that the depth to water table for the area of Lewisville ranges from 4 to 6.5 feet. Nearby surface water includes the Snake River, Dry Bed Creek, and nearby irrigation canals. There are no sensitive resource aquifers in this area.

Fauna, Flora, and Natural Communities

According to the University of Idaho, native trees and plants in the Lewisville area include Rocky Mountain Juniper, Pinyon Pine, Flouring Saltbrush, Sagebrush, Indian Paintbrush, and Mutton Bluegrass.

The U.S. Fish and Wildlife Service (USFWS) utilizes the Information for Planning and Consultation (IPaC) tool to determine if endangered/threatened species are likely to occur within the planning area. The USFWS summarized that in the area of Lewisville, threatened species include the Monarch butterfly, Utah Valvata Snail, Greater Sage-Grouse, Yellow-Billed Cuckoo, and North American Wolverine.

Housing, Industrial, and Commercial Development

Lewisville is mainly a bedroom community, conveniently located between Interstate 15 and U.S. Highway 20 with easy access to Idaho Falls. There is very little commercial and industrial development within the City. Idahoan Foods operates a facility north of the City. Ball Brothers Produce operates a potato packaging facility on 2nd North. Hydro Dip has a store on Main Street. There are two automotive repair shops, a post office, and a church in the City.

Cultural Resources

Once a great desert area where hunting and gathering was abundant, settlers from Salt Lake City, Utah, found their way to live on the rich soil in the area. Edmund Ellsworth’s family, one of the original families in the community, arrived at Lewisville in September of 1882. As soon as the settlers had constructed their homes, they began building a community school. The community school was located where the “rock house” now stands.

Utility Use

Electricity is provided within the area by Rocky Mountain Power. Minimizing electrical consumption is an important consideration when evaluating wastewater systems which can sometimes use a relatively large amount of electricity. In cases where it is necessary to utilize electrical power (i.e., pumps, blowers, etc.), it is important to consider electrical efficiency and total power usage.

Floodplains / Wetlands

Information from the Federal Emergency Management Agency (FEMA) was reviewed using the FEMA Map Service Center. The boundaries of the City lie outside of any floodplain. Figure 1-3 shows the nearest floodplain area, which is near Dry Bed Creek.

FIGURE 1-3: FLOODPLAIN MAP

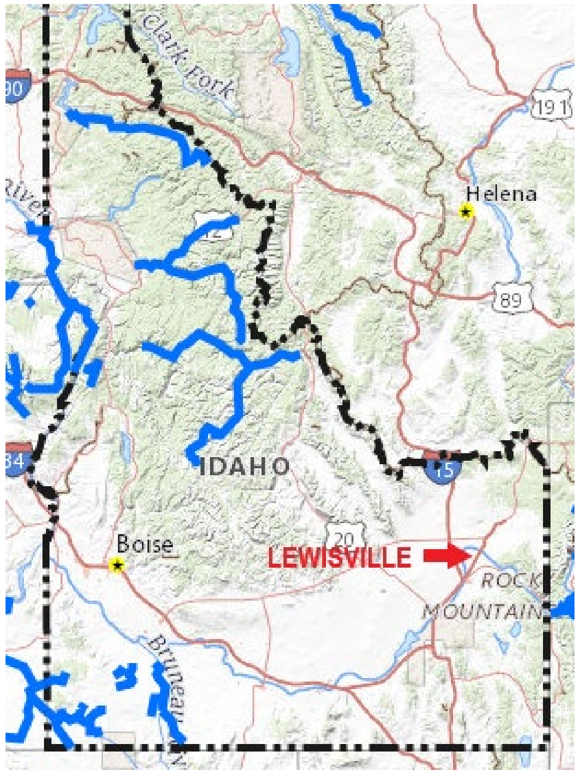
The National Wetlands Inventory through the USFWS provides geographic information system (GIS) data outlining wetlands in Idaho. This data shows there are no wetlands within the City. Figure 1-4 shows the wetlands nearby the service area.

FIGURE 1-4:WETLAND MAP

Wild and Scenic Rivers

There are no scenic rivers within the region of Lewisville according to the National Wild and Scenic Rivers System. A map of Wild and Scenic Rivers in Idaho is provided in Figure 1-5.

FIGURE 1-5: WILD AND SCENIC RIVERS



Public Health and Water Quality Considerations

The residents of Lewisville are currently being served by groundwater wells for potable drinking water. As stated in the introduction to this chapter, there are concerns regarding contamination between the existing cesspool systems and septic tank drain fields, and the shallow drinking water wells.

Prime Agricultural Farmlands Protection

The City area encompasses about 400 acres classified as urban lands. Areas surrounding the City are mostly prime farmland if irrigated. There are a few small areas of prime farmland of statewide importance located to the northeast and east of the City.

Proximity to a Sole Source Aquifer or Stream Flow Source Area

The City resides in the Eastern Snake River Plain Aquifer Area, which has been designated as a sole source aquifer.

Land Use and Development

Outside of Lewisville, Jefferson County is responsible for the administration of the land immediately adjacent to the City limits, all of which are privately owned and primarily used for agricultural activities. Most of the City is zoned Residential; however, there are also business, industrial, and agricultural designations.

Precipitation, Temperature, and Prevailing Winds

The Western Regional Climate Center climate summary (August 1948 through June 2016) for the Lewisville area shows minimum average monthly temperatures ranging from 10.2°F to 50.8°F, and maximum average monthly temperatures ranging from 27.2°F to 86.0°F. Over this same period, the total annual precipitation averaged about 9.95 inches, with an average snowfall of 35.5 inches per year. The coldest month was January, and the hottest month was July. Based on Western Regional Climate Center wind data (1992 to 2002) for Rexburg (about 13 miles northeast of Lewisville), the prevailing wind direction is south from February through December. The prevailing wind direction is south-southwest for January. The average wind speed for the area is 7.0 mph.

Air Quality and Noise

Lewisville is not in an air non-attainment area. Jefferson County does not have any areas of air quality concern. There are no anticipated long-term adverse impacts to air quality or noise levels from wastewater facilities discussed in this planning study. However, there may be a temporary local impact on both noise and air quality (dust) due to any construction activities. Best Management Practices during construction can mitigate adverse impacts.

Energy Production and Consumption

The City of Lewisville does not have any full-time energy production facilities. Energy consumption may occur at the wastewater facilities if constructed. Any proposed improvements will be planned with high-efficiency equipment (i.e., lighting, motors, etc.).

Socioeconomic Profile

According to the 2021 American Community Survey by the U.S. Census Bureau, the City of Lewisville has a median household income of $72,500 with a 9.4% poverty rate, which is below the state poverty rate of 11.0%. Jefferson County has a median household income of $69,097 with an 8.0% poverty rate. The median age for Lewisville residents is 41, and more than 100 people are over the age of 65.

The City does not currently have a City wastewater system, so residents must manage wastewater systems individually. It is likely that users of the City wastewater system will pay rates to the City or a future sewer management agency.

1.3 POPULATION TRENDS

This section outlines the historical and projected future populations for the City. Historical population data from 1980 through 2020 was tabulated from the U.S. Census Bureau and is shown in Table 1-1. For the past five Census periods, the City has experienced population decline.

TABLE 1-1:LEWISVILLE HISTORICAL POPULATIONS

Year	Population
1980	502
1990	471
2000	467
2010	458
2020	421

In 2020 the U.S. Census Bureau reported the number of households in Lewisville as 150; therefore, there were approximately 2.8 people per household. Although the City experienced population decrease, two nearby communities, Menan and Rigby, as well as Jefferson County as a whole have experienced growth. Table 1-2 shows the breakdown of population growth for comparison.

TABLE 1-2: LOCAL HISTORICAL POPULATIONS

Year	Menan Population	Rigby Population	Jefferson County Population
1980	605	2,624	15,304
1990	601	2,681	16,543
2000	707	2,998	19,155
2010	741	3,945	26,140
2020	715	5,038	30,891

The annual average growth for Menan from 1990 to 2000 was approximately 1.5% and from 2000 to 2010 it was approximately 0.5%. Lewisville's population decline is not consistent with trends throughout Jefferson County. It is anticipated that implementation of a community wastewater system will enable development in Lewisville. Based on the similarities between Menan and Lewisville, and in discussion with the City of Lewisville, an annual average growth rate of 0.73% was selected and applied for future planning based on the starting point of the 2010 U.S. Census (Population of 458). Using this approach, the Lewisville population projection lines up well with the 2021 American Community Survey population of 488.

Collection system improvements as part of this study are based on a planning period of 40 years, while wastewater treatment improvements are based on a 20-year planning period. Table 1-3 shows population projections for the 20- and 40-year planning periods for Lewisville. Assuming the number of people per household stays the same as 2020 (2.8 people per household), the number of equivalent dwelling units (EDU) for the representative population is also showed in Table 1-3.

TABLE 1-3: POPULATION PROJECTIONS

Year	Population	EDU
2023	503	180
2033	541	193
2043	**582**	**208**
2053	625	223
2063	**672**	**240**

1.4 COMMUNITY ENGAGEMENT

The City provided opportunities for the community to engage in the planning process through public City Council Meetings. The City plans to make this facility planning study available at City Hall as part of the community engagement requirement of the project following the approval of the report. If there is significant interest, a town hall meeting could be held and would be made open to the public to help the community develop an understanding of the need for the project, the utility operational service levels required, and the funding and revenue strategies to complete the project.

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CHAPTER 2 - NEED FOR PROJECT

This section discusses the need for the project and the disposal and treatment alternatives that can best meet the City of Lewisville's long-term needs.

2.1 HEALTH, SANITATION, ENVIRONMENTAL REGULATIONS AND SECURITY

As discussed in Chapter 1, the City of Lewisville does not have a wastewater collection and treatment system. Many older homes have cesspools, which are no longer permitted in Idaho. The rest of the residences have septic systems. Some properties in Lewisville are not large enough for a replacement septic system if the current system fails. Both cesspools and septic systems pose a human health risk due to the potential for groundwater contamination. New homes in Lewisville have been constructed with deep wells and modern septic systems that provide better protection for the groundwater; however, many homes still rely on shallow sand point wells for drinking water.

2.1.1 REGULATORY REQUIREMENTS

The Dry Bed Creek is nearby the City of Lewisville. The City of Rigby discharges into the Dry Bed Creek approximately 4 miles upstream. A surface water discharge of treated wastewater effluent would need to be permitted under a National Pollution Discharge Elimination System (NPDES) Permit administered by the Idaho Department of Environmental Quality (DEQ). Assuming similar effluent permit limits are required to Rigby, the limits may be as shown in Table 2-1.

TABLE 2-1: POTENTIAL SURFACE WATER DISCHARGE EFFLUENT LIMITS

Parameter	Average Monthly	Average Weekly	Sample Maximum
Biochemical Oxygen Demand (BOD_5)	30 mg/L 85% removal of influent BOD_5	45 mg/L --	--
Total Suspended Solids (TSS)	30 mg/L 85% removal of influent TSS	45 mg/L --	--
Total Ammonia (as N) May 1 – September 30	4.3 mg/L	--	12.6 mg/L
Total Ammonia (as N) October 1 – April 30	0.65 mg/L	--	1.7 mg/L
E. coli Bacteria	126 / 100 mL[1]	-	460 / 100 mL
pH	Daily minimum and maximum between 6.5 and 9.0		

Notes:
1. Monthly geometric mean.

There are currently no impairments or TMDL on the Dry Bed Creek. It is also not anticipated that temperature, phosphorus, toxicity, or heavy metals (e.g., copper, etc.) will be added as future limits, although those contaminants can be of concern in other waters.

In addition to a surface water discharge, the City is also interested in land application of the treated effluent. Table 2-2 provides typical treatment requirements for the different classes along with some allowable uses. Classes A-D are shown in the table. Class E is not shown as it has the fewest uses.

TABLE 2-2: RECYCLED WATER CLASSES AND SOME EXAMPLE USES

	Class A	Class B	Class C	Class D
Typical Treatment Requirements				
Oxidized	X	X	X	X
Coagulated and Clarified	X	X	-	-
Filtered	X	X	-	-
Disinfected	X	X	X	X
BOD_5, mg/L	5 - 10	-	-	-
Total Nitrogen, mg/L	10 (or stricter) - 30	10 (or stricter) - agronomic rate	agronomic rate	agronomic rate
Turbidity, NTU	0.2 - 5	5 - 10	-	-
pH	6.0 - 9.0	-	-	-
Total Coliform, no./100 mL	2.2 - 23	2.2 - 23	23 - 230	230 – 2,300
Virus	5-log reduction	-	-	-
Allowable Uses				
Fodder, fiber, or processed food crops	X	X	X	X
Pasture: not producing milk for human consumption	X	X	X	X
Pasture: producing milk for human consumption	X	X	X	-
All edible food crops	X	X	-	-
Golf courses	X	X	-	-
Parks: non-use periods	X	X	-	-
Parks: use periods	X	-	-	-
Home irrigation	X	-	-	-
Groundwater recharge	X	-	-	-

With land application of Class C or D effluent, the landowner must be willing to comply with the reuse permit requirements and be aware that the discharge can affect the crops that can be grown. Furthermore, potential sites must provide sufficient acreage to dispose of all of the year-round effluent flows and provide sufficient setback distances to surrounding lands, surface water bodies, and wells. Other than special conditions and crop type, effluent generally can only be land applied to crops during the growing season. Consequently, the wastewater effluent generated during the winter months must be stored or disposed of in some other way. Land application during the non-growing season is evaluated on a site-specific basis and may reduce the quantity of winter storage required but does not eliminate the need for winter storage altogether.

In addition to the owner's willingness and acreage, several other practical considerations include: topography, groundwater levels, groundwater pollutant concentrations, general soils conditions, climate, land use, and water bodies. A suitable Class C or D site must not only have enough land for applying the effluent, but also sufficient room for storage.

This study also considers regulatory requirements relating to the collection system. A summary of the regulatory requirements is summarized below.

- For a gravity collection system, the minimum pipes slopes would be in accordance with the Idaho Administrative Code (IDAPA 58.420.02.d). Minimum mainline diameter of 8-inches (IDAPA 58.430.02.a). Ten State Standards are a widely used guidance document for wastewater systems and recommend a minimum velocity of 2.0 feet per second (fps) in gravity pipes when flowing full to reduce the likelihood of build-up in the pipeline. The minimum slopes for pipes 8-inch to 42-inch diameter pipes are summarized in Table 2-3.

TABLE 2-3: MINIMUM PIPE SLOPES

Pipe Diameter (in)	10 State Standards Minimum Slope (%)
8	0.4
10	0.28
12	0.22
15	0.15
18	0.12
21	0.1
24	0.08
30	0.058
36	0.046
42	0.037

- Lift station electrical and mechanical equipment should remain protected from physical damage from the 100-year flood (IDAPA 58.440.01.a).
- Back-up power or emergency storage at lift stations (IDAPA 58.440.07.b).
- Lift stations should have pumping capacity to meet the peak hour flows with one unit out of service (IDAPA 58.440.02.c.i).
- Force main velocities should not be lower than 2 fps at their design flow rate (IDAPA 58.440.10.a).

2.2 AGING INFRASTRUCTURE

The City of Lewisville was established in 1882 and some of the older homes still use the original cesspools and sand point wells. Also, septic systems on some properties are failing. This infrastructure can lead to contamination.

2.2.1 INFLUENT FLOWS

The wastewater deficiencies were discussed in Chapter 1 and above. There is no community wastewater system to deal with the deficiencies.

This section summarizes the projected average day flow (ADF), average low flow (ALF), average high flow (AHF; which is during periods of high groundwater), maximum month flow (MMF), maximum day flow (MDF), and peak hour flow (PHF). Groundwater levels in the City tend to rise during the irrigation season. Infiltrating groundwater into a wastewater system is expected when the groundwater levels are higher.

There are no existing flow values for the City. An industry-standard value of 100 gallons per capita per day (gpcd) was used for the ADF (Great Lakes-Upper Mississippi River Board of State and Provincial Public

Health and Environment Managers, 2014). This is a likely conservative estimate as a new community wastewater system should be relatively tight without a significant amount of inflow and infiltration (I/I) of stormwater and groundwater. Rigby's wastewater collection system has similar groundwater levels to those in Lewisville, which rise in the summer during the irrigation season and fall during the winter. Due to the lack of data, peaking factors for Rigby were used for this planning study (0.60 for ALF, 1.86 for AHF, 2.25 for MMF, 2.73 for MDF, and 3.04 for PHF).

Lewisville's projected influent flows for the planning period are shown in Table 2-4.

TABLE 2-4: INFLUENT FLOW PLANNING CRITERIA

Parameter	Planning Criteria Unit Flow (gpcd)	Planning Criteria Projected Flow (GPD)				
Year		*2023*	*2033*	*2043*	*2053*	*2063*
Population		503	541	582	625	672
ADF	100	50,300	54,100	58,200	62,500	67,200
ALF	60	30,200	32,500	34,900	37,500	40,300
AHF	186	93,600	101,000	108,000	116,000	125,000
MMF	225	113,000	122,000	131,000	141,000	151,000
MDF	273	137,000	148,000	159,000	171,000	183,000
PHF	304	153,000	164,000	177,000	190,000	204,000

2.2.2 INFLUENT LOADS

The City does not contain any industrial facilities but is home to a few commercial facilities, which are mainly service-oriented businesses. The City expects the commercial customers will be required to pretreat (if necessary) to the levels of domestic wastewater, pay connection fees, and be billed for usage on the appropriate equivalent residential dwelling unit (ERU) basis. Septage can provide a high loading to a treatment plant and is assumed not to be allowed into the wastewater system.

Similar to the flows, there are no existing constituent loading values. Without data, industry-standard values were assumed for the influent five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), total Kjeldahl nitrogen (TKN), and total phosphorus, as shown in Table 2-5. The industry-standard values used were 0.20 ppcd for BOD_5, 0.25 ppcd for TSS, 0.046 ppcd for TKN, and 0.0048 ppcd for phosphorus for the annual average flows (Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environment Managers, 2014; Metcalf & Eddy/AECOM, 2014). An industry standard peaking factor of 1.30 for BOD_5, 1.30 for TSS, 1.15 for TKN, and 1.12 for phosphorus was used for the maximum month flows (Metcalf & Eddy/AECOM, 2014).

Average day and maximum month loads (ADL and MML, respectively) projected for the 20-year planning period are shown in Table 2-5.

TABLE 2-5: INFLUENT LOADING PLANNING CRITERIA

Parameter	Planning Criteria (ppcd*)	Planning Criteria Projected Flow (MGD)		
Year		***2023***	***2033***	***2043***
Population		503	541	582
BOD_5				
ADL	0.20	101	108	116
MML	0.26	131	141	151
TSS				
ADL	0.25	126	135	145
MML	0.33	166	179	192
TKN				
ADL	0.046	23	25	27
MML	0.053	27	29	31
Phosphorus				
ADL	0.0048	2.4	2.6	2.8
MML	0.0054	2.7	2.9	3.1

2.3 REASONABLE GROWTH

The expected population growth during the planning period is discussed in Chapter 1.

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CHAPTER 3 - ALTERNATIVES CONSIDERED

This section discusses the alternatives that can best meet the City of Lewisville's long-term sewer needs.

3.1 DISPOSAL AND TREATMENT ALTERNATIVES

Although there are many different treatment and disposal alternatives for Lewisville's wastewater, the alternatives with the highest likelihood of being selected due to having lower capital and operational costs were considered for in-depth evaluation. A general description of the alternatives is included in this chapter. The advantages and disadvantages and capital and operation and maintenance (O&M) costs of the alternatives are shown in Chapter 4.

3.1.1 NO ACTION ALTERNATIVE

The existing method of disposal puts the property owners at risk for contamination and decreased property values if their septic tanks fail. This problem will continue to worsen as the older cesspools and septic tanks continue to age. Not having a community wastewater system limits the ability of the City to grow and attract businesses. For community health and financial reasons, the "No Action" alternative is not advisable and is not considered further.

3.1.2 LAND APPLICATION – CITY TREATMENT AND LAND APPLICATION

The City could construct a wastewater collection and treatment system, and land apply (irrigate) farm fields with the treated effluent. Land application of treated effluent provides many benefits to crops including water and nutrients. The surface soils and crops also provide additional treatment to the water. The main concern with agricultural land application is the protection of groundwater. This typically translates to irrigating at agronomic rates to match the net irrigation requirements of the crops, although nitrogen and phosphorus application rates are also typically monitored. Allowable agronomic irrigation rates are based on historical precipitation deficit values from ETIdaho -- Evapotranspiration and Net Irrigation Requirements for Idaho.

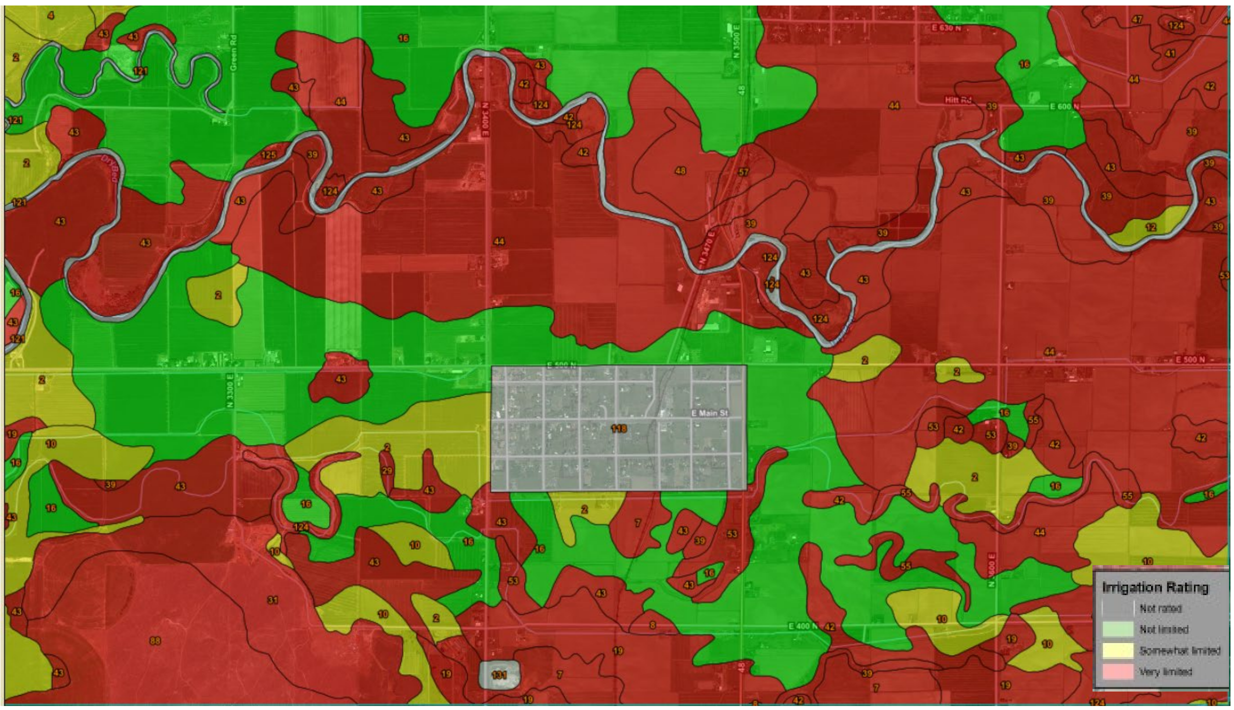
Alfalfa is one of the most used crops for reuse water. If alfalfa were planted, the water application can take place during the growing season at a rate of approximately 33.4 inches per acre per year, assuming 85% irrigation efficiency. For the 2043 average day flow, the minimum estimated farmland needed would be 24 acres. Typical nitrogen uptake from alfalfa is approximately 250 pounds per acre.

This alternative would also require storage during the winter (non-growing season) when water cannot be land applied. Based on the 2043 average day flow, the required total storage volume during the non-growing season is approximately 11 million gallons. Assuming a pond water depth of 8 feet, the storage volume may require approximately 4 additional acres. Thus, with buffers included, the total acreage needed for the land application area and storage pond for this alternative is a minimum of approximately 30 acres (not including the treatment plant).

In addition to the total acreage, there are several other considerations for selecting a land application site. These include topography, groundwater levels, groundwater pollutant concentrations, general soil conditions, climate, land use, well locations, and distance to water bodies. DEQ has published guidance for general setbacks or buffers for agricultural land application (Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater, DEQ 2007). The land application site could involve working with a farmer. Alternatively, the City could purchase land and lease the land to a farmer or the City could purchase land and farm the land. It should be noted that, if the farmland used for effluent land application is privately owned, the City would need to have special control over when the effluent is used and that it be used in conformance with reuse permit requirements (e.g. no ponding or runoff, application at rates not to exceed irrigation water requirements, etc.). For the purposes of this plan, it was assumed that the City would own the land and a farmer would be contracted to farm the land.

A preliminary assessment of the feasibility of land application in the Lewisville area was done based on soil suitability ratings from the USDA NRCS Soil Data Explorer. Figure 3-1 shows the NRCS rating map for disposal of wastewater by land application. There are some promising areas for land application near Lewisville (green areas on Figure 3-1). Additionally, some additional land that is shown as yellow or red, may be more promising upon further inspection (e.g., Menan's land application fields). For this alternative, it was assumed the land application fields would be adjacent to the treatment plant and winter storage pond.

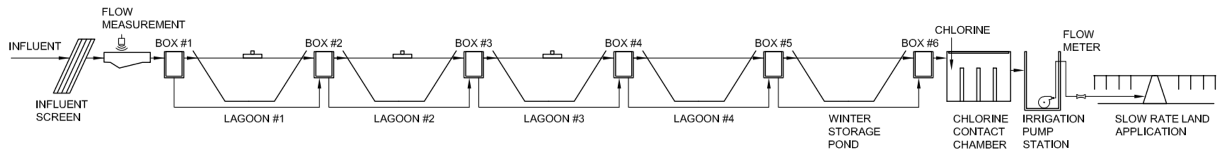
FIGURE 3-1: NEARBY LAND SUITABILITY FOR LAND APPLICATION



The wastewater treatment effluent requirements are Class C or D as shown in Table 2-2 in Chapter 2. Although there are several different treatment technologies that could achieve these effluent requirements, for this alternative a partially mixed aerated lagoon system was chosen due to its ease of construction and operation. This alternative would include an influent screen, four treatment lagoons, a winter storage pond, and chlorine disinfection. To remain below the nitrogen loading limit for the land application system, nitrogen concentrations may be limited to 40 mg/L for the current population and 34 mg/L for the 2043 flows. It is anticipated that the lagoons will remove some nitrogen so that a separate nitrogen removal treatment process, or additional land application area, will not be required.

An irrigation lift station would pump the treated effluent to the land application fields. Sludge that deposits in the lagoons would periodically be removed, dewatered, and disposed of in a landfill by a contractor. The approximately total area for the treatment plant, winter storage, and land application, with buffers, is 40 acres. Both the collection system and treatment plant would be classified as Class I. A schematic of the treatment process is shown in Figure 3-2.

FIGURE 3-2: CITY TREATMENT AND LAND APPLICATION SCHEMATIC

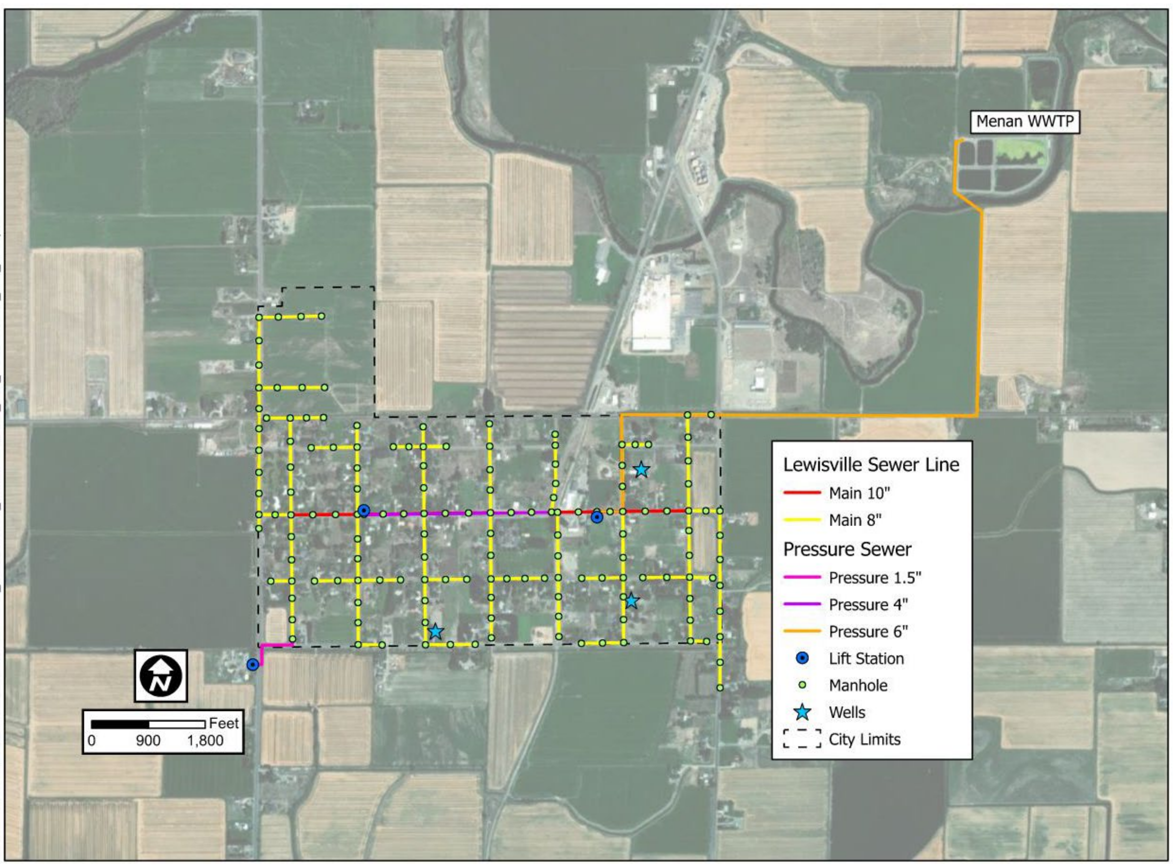


3.1.3 LAND APPLICATION – REGIONAL SYSTEM WITH MENAN

Rather than construct a new treatment plant, another alternative for the City would be to construct a wastewater collection system and pump the wastewater to Menan's wastewater treatment plant (WWTP) for treatment followed by their land application system. For this alternative it was assumed that the City of Lewisville would build and own the collection system, including pump stations, and pressure line to the Menan WWTP. The collection system would be classified as Class I.

Menan's WWTP consists of two aerated lagoons, three facultative lagoons, a winter storage pond, and chlorine disinfection. The aerated and facultative lagoons are clay-lined. The storage pond is high density polyethylene (HDPE) lined. Sodium hypochlorite is used to disinfect the effluent prior to it entering the reuse pond. Menan land applies their treated effluent on fields adjacent to the WWTP. The effluent is classified as Class D reuse. This alternative is shown in Figure 3-3.

FIGURE 3-3: CONNECTION TO MENAN'S WWTP



The City of Lewisville would negotiate a contract with the City of Menan to accept, treat, and land apply the wastewater. In 2020 Menan completed a study to consider the effect of this alternative on their existing infrastructure (Civilize, City of Menan 2020 Wastewater Treatment Plant Capacity Summary and Estimated Connection Fee). Based on their evaluation, Menan does have some shortcomings that would need to be addressed, mainly with their winter storage. Menan's winter storage would allow about 357 additional people; their wastewater treatment facility will allow about 1,274 additional people; and the land application system will allow about 1,128 additional people. The evaluation also included an approximate connection fee of $10,000 per connection. The City of Lewisville would need to pay for 208 connections by 2043, or a little more than $2 million. This is in addition to the construction of the collection system, lift stations and force mains in Lewisville. Menan would likely need to expand their winter storage pond, and the money to do this would come from the connection fees paid by Lewisville.

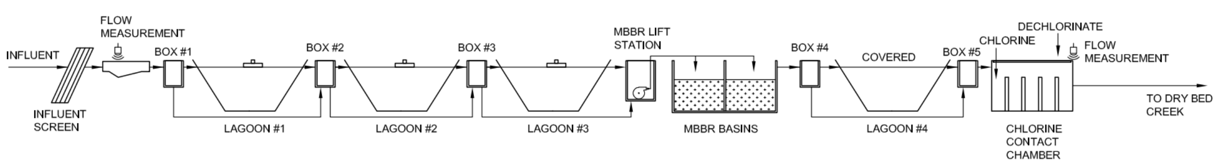
3.1.4 DRY BED CREEK DISCHARGE – CITY ONLY SYSTEM

A surface water discharge to Dry Bed Creek is another alternative. The City would collect and treat their wastewater and then discharge it to Dry Bed Creek in accordance with a surface water discharge permit (Idaho Pollutant Discharge Elimination System (IPDES)). For this alternative, the collection and treatment systems would generally be similar to Alternative 3.1.2. There would be an influent screen, treatment lagoons, and disinfection. In order to meet the likely ammonia limit on Dry Bed Creek, a moving bed biofilm reactor (MBBR) would be added to the treatment. Although there are other technologies, for this high-level evaluation an MBBR was selected due to its reliability. A finer screen than the one in Alternative 3.1.2 is included in the alternative to protect the MBBR media from plugging.

There would not be a winter storage pond since the treatment plant would continue to discharge in the winter in accordance with an IPDES permit. To achieve likely stringent total residual chlorine limits, chemical dechlorination would be used. To avoid overuse of chemicals, an automatic monitoring system is included. Biosolids would be periodically removed by a contractor. It is assumed the contractor will be able to dewater and dispose of the sludge in a landfill. Although currently not included additional items to consider if this alternative is selected include baffles in the lagoons to reduce short-circuiting, and adding piping, pumps, and valving to return water from Cell 4 to Cell 2 for additional process control. This could also apply to Alternative 3.1.2.

Due to the additional treatment with this alternative, the treatment plant would be classified as Class II; the collection system would still be classified as Class I. For this evaluation, it was assumed the treatment plant would be located near Dry Bed Creek. A schematic is shown in Figure 3-4.

FIGURE 3-4: CITY TREATMENT AND SURFACE WATER DISCHARGE SCHEMATIC



3.1.5 ADDITIONAL DISPOSAL ALTERNATIVES

There are some additional disposal alternatives that were considered, but due to the limitations discussed below, they were not included for further analysis.

<u>Summer Land Application / Winter Surface Water Discharge</u>

The treatment required for discharge to the Dry Bed Creek in the winter is more stringent than in the summer, due to the low creek flows. Therefore, the total cost for this hybrid alternative would be higher than any of the other alternatives evaluated as it would include both higher treatment as well as the same land application costs.

Surface Water Discharge to the Snake River

Another discharge alternative is to pump the treated effluent to the Snake River. The distance to the Snake River is approximately 2.5 miles. This alternative would include a lift station, stream crossing, and about 2.5 miles of pressurized pipeline. There are currently no impairments on this segment of the Snake River; however, this would be the first treatment plant to discharge on this segment (unlike Dry Bed Creek, which Rigby already discharges into), and a thorough investigation of the Snake River would be required.

In preliminary discussions with DEQ, it was mentioned that a discharge permit may have similar requirements to Idaho Falls. Idaho Falls is required to meet effluent limits for BOD_5, TSS, E. Coli bacteria, pH, residual chlorine, total ammonia, and total phosphorus. An anticipated effluent total ammonia limit is likely to be a higher concentration than is required for Dry Bed Creek, due to the higher base flow in the Snake River. However, the capital expenditures would likely be similar to discharge to the Dry Bed Creek due to the nature of biological ammonia removal. There may also be a total phosphorus limit on a Snake River discharge, which may require additional capital and operating costs.

Rapid Infiltration

Rapid infiltration uses the characteristics of the soil to provide additional treatment (e.g., filtration, adsorption, and biological treatment, etc.) and then the treated wastewater typically percolates into the groundwater. Due to the close proximity of groundwater in Lewisville, trying to implement rapid infiltration would be a challenge. In addition to the issues with infiltration into high groundwater, the treatment required for rapid infiltration is more rigorous and expensive as the treated effluent must not contaminate the groundwater. For these reasons, rapid infiltration was not explored further as an alternative.

City Reuse

Using the treated wastewater for residential use as reclaimed water was not evaluated due to the high level of treatment required as shown in Table 2-2 in Chapter 2. This level of treatment would not be feasible for the City due to the high capital and operating costs.

3.2 COLLECTION SYSTEM ALTERNATIVES

There are several different alternatives for the collection system. The alternatives with the highest likelihood were considered for in-depth evaluation. The collection system alternatives would be designed to comply with the Idaho Administrative Code as outlined in Chapter 2. The advantages and disadvantages and capital and O&M costs of the alternatives are shown in Chapter 4.

Groundwater levels were investigated as part of the facility planning study since they can affect the alternative evaluation. Three wells were identified by the City and were monitored during the spring and summer for groundwater levels and also contamination. High groundwater can cause difficulty during construction. Also, groundwater can lead to infiltration (subwater) and premature failures in the collection system. In addition to the groundwater levels, samples were taken on October 27, 2021, and analyzed for nitrate and E. coli bacteria. Monitoring results are shown in Table 3-1 and the location is in Figure 3-5.

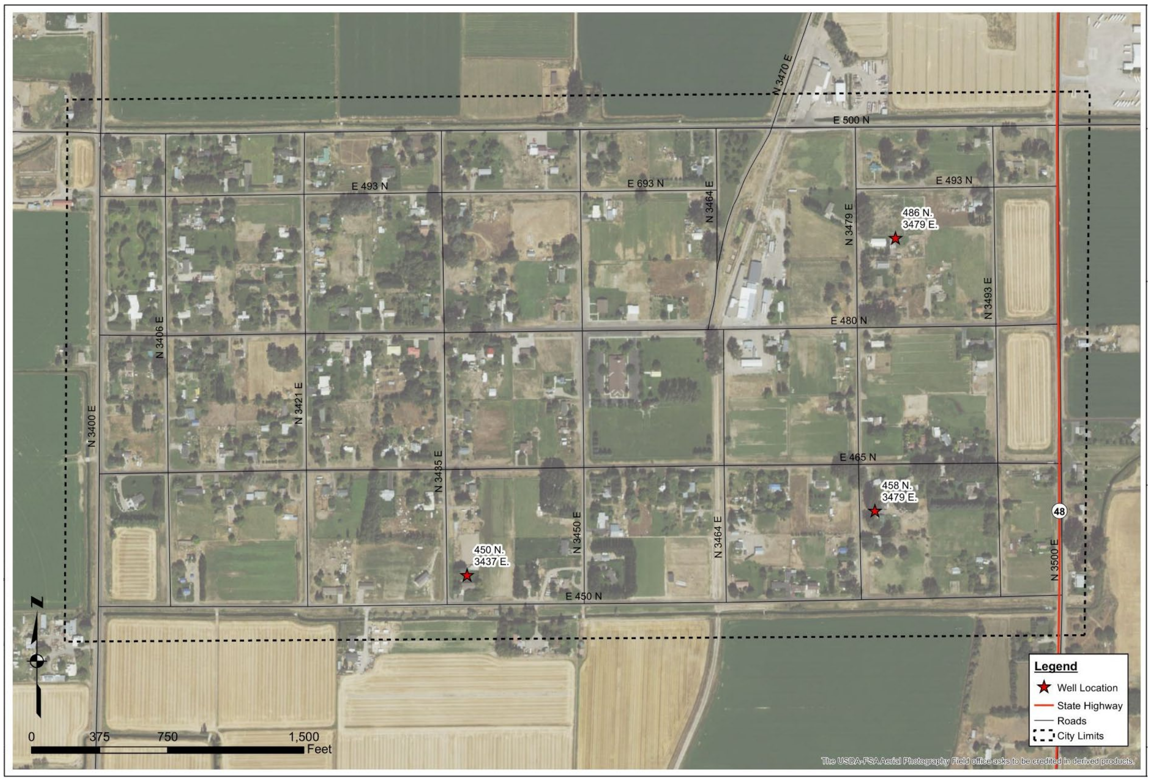
TABLE 3-1: GROUNDWATER SAMPLING RESULTS

	Location 1	Location 2	Location 3
Adress	**458 N. 3479 E.**	**486 N. 3479 E.**	**450 N. 3437 E.**
Ground Surface Elevation (ft)	4,812	4,809	4,808
Water Elevation (10/27/21)	10’-9”	10’-6”	10’-8”
Water Elevation (4/27/22)	19’-7”	18’-5” (bottom of well)	20’-3”
E.coli (MPN/100mL)	<1.0	<1.0	<1.0
Nitrate as N (mg/L)[1]	2.48	1.46	Not Detected

Notes:

1. Drinking Water Maximum Contaminant Level (MCL) for nitrate is 10 mg/L as nitrogen.

FIGURE 3-5: GROUNDWATER WELL LOCATIONS



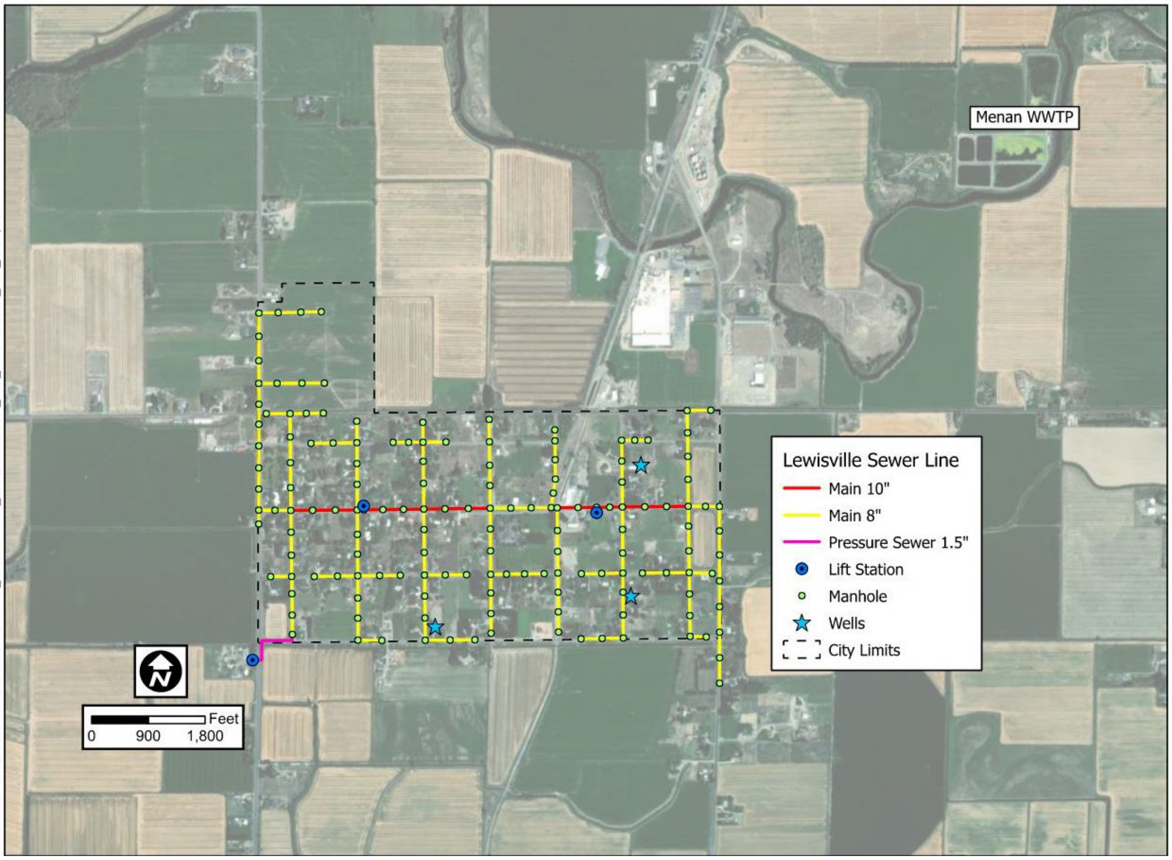
The monitoring results indicate high groundwater levels during the summer. Additionally, two of the monitoring wells showed higher than normal nitrate sampling results, which could be occurring due to contamination from cesspools or septic tanks.

3.2.1 GRAVITY COLLECTION SYSTEM

In an ideal gravity collection system, all the pipelines would feed into a lift station that could be used to pump to the treatment plant. However, as noted in the Chapter 1, the planning area is relatively flat. For Lewisville, it would be advantageous to have a main lift station on either side of the railroad tracks. For example, all homes and businesses located west of the railroad tracks would connect to the west lift station and the east lift station would handle all of the homes and businesses east of the railroad tracks. There would also be a single home grinder pump station for the property at 447 N. 3400 E. due to its location. The wastewater would then be pumped to the other lift station prior to pumping to the treatment plant. This configuration would be advantageous as it would require a single railroad crossing of the pressure sewer line under 480 North. Figure 3-6 shows a conceptual layout of this alternative.

Sewer lines would run beside roadways with asphalt removal and repair at roadway crossings only. Borings would occur under the railroad and major highways. Most canal crossings would be installed by trenching during periods when the canals are dry. Service lines would be installed from existing septic tank connections to the sewer main. Additional details on the gravity alternative are available in the Lewisville Sewer Feasibility Study (Appendix A).

FIGURE 3-6: GRAVITY COLLECTION SYSTEM



If the collection system were connected to the City of Menan's WWTP, a pressure sewer line would be installed along 500 N. The line would be installed under the canal via directional drilling and connect into Menan's system on the northwest corner of the lagoons. This connection would be isolated from the lagoons and thus not require the connection to be hot tapped in.

3.2.2 PRESSURE COLLECTION SYSTEM

Rather than collecting the wastewater by gravity, a pressurized system could be installed. A pressurized system uses pumps at every connection to transport the wastewater rather than gravity. A centralized lift station would still be needed to collect the wastewater from the pressure system and pump it to a treatment plant. A pressurized collection system can use smaller diameter pipelines than a gravity collection system, which makes it less expensive to construct. However, there is more risk of incremental failures due to the number of pumps. Also, the materials of construction are normally not as resilient, so the total expected life of the pressure system is not as long as a gravity system. It can also be more difficult to deal with sustained power outages with pressure systems, whereas a gravity collection system usually requires only a generator at the lift stations.

A pressurized system does not require deep excavations. Also, the pressure system can be more watertight than gravity systems. Coupled with the shallower construction and the lack of manholes, pressurized system can be good for areas with high groundwater as they can have less infiltration and inflow. Similarly, there is less opportunity for wastewater to infiltrate into groundwater, which would protect the drinking water especially near shallow sandpoint wells.

3.2.3 ADDITIONAL ALTERNATIVES

There are some additional collection system alternatives that were considered, but due to the limitations discussed below, were not included for further analysis.

Single Lift Station

As mentioned previously, ideally a single lift station would be used. However, pipe bury depths and lift station depths would require extensive excavation as well as expensive dewatering efforts. Due to the construction difficulties and likely increased I/I associated with deeper pipelines and lift station wet well, this alternative was not considered further.

STEP System

A Septic Tank Effluent Pump (STEP) system is like a pressurized system in that it uses pumps at each connection to transfer the wastewater rather than gravity. However, a STEP system also utilizes septic tanks to hold the wastewater prior to the pumps. Utilizing a septic tank typically decreases the organic and solids load to the treatment plant, which decreases the cost of treatment at the plant. However, the septic tanks must be maintained. Typically STEP systems are operated by the City, which leads to high maintenance costs to periodically pump out the septic tanks. The ability to use existing septic tanks would need to be considered on a case-by-case basis. Due to the high maintenance costs, a STEP system was not considered further in this facility plan.

CHAPTER 4 – SELECTION OF AN ALTERNATIVE

This section provides an evaluation of the alternatives discussed in Chapter 3, including the advantages, disadvantages, and comparative costs.

The cost estimates are a Class 5 cost opinion, as defined by the Association for the Advancement of Cost Engineering. In addition to project capital costs, annual O&M costs are compared to arrive at a more complete picture of the total alternative costs. The annual O&M costs include the cost to staff and test the wastewater in accordance with assumed permit requirements. A 20-year life-cycle cost analysis is provided based on a real discount rate (inflation removed) of 2.0%. The equipment (unless a short-lived asset) is assumed to have a 20-year useful life, so no depreciation or salvage value is included for comparing the alternatives. A rate of $0.10 per kWh was used for estimating power costs, and a labor cost of $40 per hour was used to estimate maintenance costs. An estimated cost of $50,000 per acre was assumed for any land purchase.

4.1 DISPOSAL AND TREATMENT ALTERNATIVES ANALYSIS

Table 4-1 shows the principal advantages and disadvantages of each discharge alternative considered.

TABLE 4-1: DISPOSAL AND TREATMENT ALTERNATIVES SUMMARY

Alt. 1: City Treatment and Land Application	Alt. 2: Regional System with Menan	Alt. 3: City Treatment and Dry Bed Creek Discharge
Advantages		
• Permit application process is not as difficult as surface water discharge • Less stringent permit requirements than surface water discharge • Less operation and maintenance than surface water discharge • Beneficial use of the effluent for crops	• Lowest construction and total capital costs • Least operation and maintenance • No permit process with DEQ	• No winter storage lagoon or land application area needed • No need to find a farmer or to work with another city
Disadvantages		
• Requires permitting land application • May have difficulty in finding acceptable land and farmer	• No control over the treatment and land application • Risk of transmission failures • Must negotiate and work together well with the City of Menan	• Most stringent effluent limits and greatest risk of future additional permit limits • Greatest operation and maintenance costs • Likely higher treatment plant classification than land application • Challenge to receive a discharge permit

A preliminary cost comparison of the disposal and treatment alternatives is summarized in Table 4-2.

TABLE 4-2: DISPOSAL ALTERNATIVES 20-YEAR LIFE CYCLE COST COMPARISON

Item	Alt. 1: City Treatment and Land Application	Alt. 2: Regional System with Menan	Alt. 3: City Treatment and Dry Bed Creek Discharge
Collection System with Pump Stations	$ 9,110,000	$ 9,110,000	$ 9,110,000
Forcemain to Menan's WWTP	$ -	$ 1,130,000	$ -
Headworks with Influent Screen	$ 670,000	$ -	$ 730,000
Treatment Lagoons	$ 2,000,000	$ -	$ 2,000,000
MBBR Treatment and Lagoon Cover	$ -	$ -	$ 1,500,000
Winter Storage Pond	$ 1,400,000	$ -	$ -
Chlorine Dosing System	$ 100,000	$ -	$ 100,000
Dechlorination System	$ -	$ -	$ 70,000
Irrigation Pump Station	$ 230,000	$ -	$ -
Irrigation System	$ 100,000	$ -	$ -
Miscellaneous (Piping, Valves, Fence, etc.)	$ 300,000	$ -	$ 250,000
Electrical/Controls	$ 230,000	$ -	$ 320,000
Construction Subtotal	**$ 14,140,000**	**$ 10,240,000**	**$ 14,080,000**
General Conditions	$ 1,420,000	$ 1,030,000	$ 1,410,000
Subtotal	***$ 15,560,000***	***$ 11,270,000***	***$ 15,490,000***
Contingency	$ 4,670,000	$ 3,390,000	$ 4,650,000
Subtotal	***$ 20,230,000***	***$ 14,660,000***	***$ 20,140,000***
Contractor Overhead and Profit	$ 3,040,000	$ 2,200,000	$ 3,030,000
Subtotal	***$ 23,270,000***	***$ 16,860,000***	***$ 23,170,000***
Build America, Buy America (BABA) Requirements	$ 1,170,000	$ 850,000	$ 1,160,000
Total Construction Cost	**$ 24,440,000**	**$ 17,710,000**	**$ 24,330,000**
Design Engineering	$ 2,450,000	$ 1,330,000	$ 2,920,000
Construction Engineering & Inspection	$ 1,230,000	$ 1,080,000	$ 1,220,000
Admin/Legal	$ 490,000	$ 210,000	$ 490,000
Total Project Cost	**$ 28,610,000**	**$ 20,330,000**	**$ 28,960,000**
Property Cost	$ 2,000,000	$ -	$ 500,000
Connection Fee to Menan	$ -	$ 2,080,000	$ -
Total Project and Land Cost	**$ 30,610,000**	**$ 22,410,000**	**$ 29,460,000**
Electricity and Fuel	$ 29,000	$ 1,000	$ 41,000
Chemicals	$ 5,000	$ -	$ 8,000
Disposal	$ 7,000	$ -	$ 9,000
Parts	$ 21,000	$ 7,000	$ 30,000
Personnel	$ 45,000	$ 12,000	$ 56,000
Menan Maintenance	$ -	$ 32,000	$ -
Estimated Annual O&M	$ 107,000	$ 52,000	$ 144,000
20-Year Life Cycle Cost	**$ 32,360,000**	**$ 23,270,000**	**$ 31,820,000**

A summary of the potential environmental impacts is provided in Table 4-3 and is outlined in the following sections.

Land Use / Prime Farmland / Formally Classified Lands

Changes in land use would occur if a new treatment plant were constructed including a new winter storage pond.

Floodplains and Wetlands

It is not anticipated that the alternatives would be located inside the 100-year floodplain. This will be further evaluated, but provisions to protect the equipment will be considered. Similarly, it is not anticipated that any of the alternatives will be in wetland areas.

Cultural, Biological, and Water Resources

It is not anticipated that any of the alternatives will interfere with cultural resources. If selected, a new treatment plant and winter storage pond may change the use of existing lands. Land application could benefit the groundwater by reducing the amount extracted and beneficially using the treated water. The only alternative that may involve stream crossings is if the City selects to combine with Menan's WWTP.

Socio-Economic Conditions

None of the alternatives presented are anticipated to have a disproportionate effect on any segment of the population (economic, social, or cultural status). Additionally, having a City-wide wastewater system would protect residents from risks of groundwater contamination as well as decreased property values due to cesspools and failing septic systems.

Land Requirements

If the City selects land application, the City would either purchase land or sign a long-term lease agreement with a land owner. If the City selects discharge to Dry Bed Creek, the City would need to purchase land. If the City looks to combine with Menan, the only land needed would be for the pump stations and right of ways would be used for the pipelines.

Potential Construction Problems

The depth of the water table and subsurface rock may affect the construction of the alternatives. However, subsurface investigations were not within the scope of this project. Construction techniques to effectively manage excavation, dewatering, and sloughing issues should be required of any construction plans. Construction plans for any of the alternatives should also include provisions to control dust and runoff.

Sustainable Considerations

Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility. These are considered in the alternative selection.

Water and Energy Efficiency

Land application, because of the fertilizer and water savings, would be beneficial to the farmland. All the alternatives would require additional energy; however, each would improve the groundwater quality by eliminating the use of cesspools and septic systems.

Green Infrastructure

If pursued, land application would use the nutrients in the effluent for crop growth.

TABLE 4-3: DISPOSAL AND TREATMENT ALTERNATIVES GENERAL IMPACT

Impact Criteria	Alt. 1: City Treatment and Land Application	Alt. 2: Regional System with Menan	Alt. 3: City Treatment and Dry Bed Creek Discharge
Land Use/ Important Farmland/ Formally Classified Lands	City to construct treatment plant and storage	No Impact	City to construct treatment plant
Floodplains	Undetermined - depends on location	No Impact	Undetermined - depends on location
Wetlands	Undetermined - depends on location	No Impact	Undetermined - depends on location
Cultural Resources	None Known	None Known	None Known
Biological Resources	None Known	None Known	None Known
Water Quality Issues	None Known	None Known	None Known
Groundwater Quality Issues	Improved	Improved	Improved
Socio-Economic/ Environmental Justice Issues	None Known	None Known	None Known
System Classification	Additional Permitting	No Impact	Additional Permitting

Disposal and Treatment Recommendation

Due to the high capital cost for the City-only options, the recommended alternative is to **join Menan's treatment system**. If the City is unable to successfully work with the City of Menan, the second alternative would be to construct its own treatment plant and land apply the effluent during the summer. There is very little construction cost difference between the land application alternative and the surface water discharge alternative; however, the operation and maintenance and treatment plant classification of the land application alternative is lower than the surface water discharge alternative making it more appealing for the City.

4.2 COLLECTION SYSTEM ALTERNATIVES ANALYSIS

Table 4-4 shows the principal advantages and disadvantages of each collection system alternative selected from Chapter 3 for evaluation.

TABLE 4-4: COLLECTION SYSTEM ALTERNATIVES SUMMARY

Pressure Collection System	Gravity Collection System
Advantages	
• Can be pumped in smaller, shallower piping, reducing collection system line costs (including elimination of manholes) • May have less Inflow / Infiltration • Can be more protective of shallow groundwater from contamination than gravity system • Lower capital cost	• Longer expected lifespan • Simple collection system with fewer pumps • More resilient to power outages and varying homeowner usage habits • Can connect future gravity and pressurized connections to a gravity system
Disadvantages	
• Requires new pumping system at each point of connection • Failures or loss of power results in backup at each connection rather than in the collection pipelines	• Gravity flow will require more slope installed at greater depths than pressure system • Existing septic tanks would need to be abandoned in place

A summary of the environmental impacts is provided in the section below.

Land Use / Prime Farmland / Formally Classified Lands

It is not anticipated that either alternative will change the use of prime farmland.

Floodplains and Wetlands

It is not anticipated that the alternatives would be located inside the 100-year floodplain. This will be further evaluated, but provisions to protect the equipment will be considered. Similarly, it is not anticipated that any of the alternatives will be in wetland areas.

Cultural, Biological, and Water Resources

It is not anticipated that any of the alternatives will interfere with cultural resources. Both alternatives would improve the groundwater quality.

Socio-Economic Conditions

Both alternatives would benefit the community approximately equally.

Land Requirements

The land requirements of both alternatives are roughly the same; however, due to the smaller pipeline size, the pressure system provides more flexibility in where to place the pipeline.

Potential Construction Problems

The depth of the water table and subsurface rock may affect the construction. Construction techniques to effectively manage excavation, dewatering, and sloughing issues should be required of any construction plans. Construction plans for any of the alternatives should also include provisions to control dust and runoff. Due to the deeper excavations, a gravity collection system normally presents more challenges than a pressure system.

Sustainable Considerations

Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility. A gravity collection system uses less electricity. Also, the life-expectancy of a gravity system is greater than a pressure collection system.

Water and Energy Efficiency

Both alternatives would require energy; however, the pressure system would require more than the gravity system.

Green Infrastructure

Neither alternative would be defined as green infrastructure.

Collection System Recommendation

Due to the longer life-expectancy, the recommended alternative is a **gravity collection system**. The cost of the gravity collection system is included in Table 4-2.

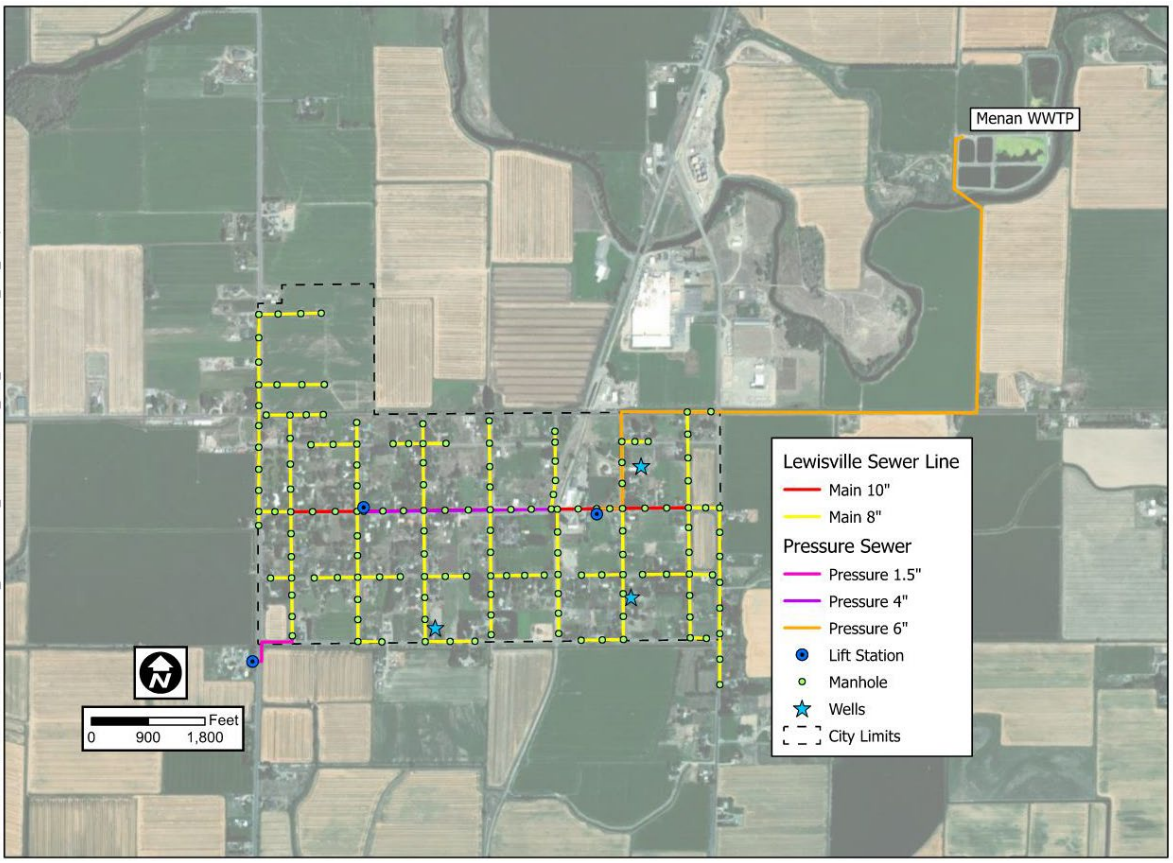
CHAPTER 5 – PROPOSED PROJECT

This chapter provides a capital improvement plan that can best meet the City of Lewisville's wastewater needs. This chapter also includes discussion on project schedule, funding, and user rates.

5.1 PRELIMINARY PROJECT DESIGN

The project includes a City-wide collection system. The collected wastewater would then be pumped to the City of Menan for treatment and land application as discussed in Chapters 3 and 4. The improvements are shown in Figure 5-1. Two main lift stations would be constructed along with a forcemain to Menan's WWTP.

FIGURE 5-1: NEW CITY COLLECTION SYSTEM AND CONNECTION TO MENAN'S WWTP



5.2 PROJECT SCHEDULE

An estimated schedule for the design and construction of the wastewater facilities is shown in Table 5-1. These dates are contingent upon successful negotiation with the City of Menan and obtaining sufficient funding to construct the wastewater facilities.

TABLE 5-1: PROJECT SCHEDULE

Task	Completion Date
Wastewater Facility Plan	September 2023
Project Funding Secured	July 2024
Preliminary Engineering Report	September 2024
Project Design Completion	April 2025
Construction Completion	December 2026

5.3 PERMIT REQUIREMENTS AND OWNERSHIP

The collection system will be designed in accordance with IDAPA requirements. Based on preliminary evaluation of the collection system components, it is assumed that the collection system will be classified as a Class I system and require a Class I operator (Appendix B).

The collection system will be owned and operated by the City of Lewisville. The City of Menan will receive the wastewater, provide treatment, and then land apply the treated effluent.

5.4 SUSTAINABILITY CONSIDERATIONS

5.4.1 Water and Energy Efficiency

Variable frequency drives and LED lighting will be implemented at the lift stations.

5.4.2 Green Infrastructure

Land application of the treated effluent by the City of Menan is utilizing the effluent to grow crops without withdrawing water from the aquifer.

5.4.3 Other

The depth of the water table and subsurface rock may affect the construction of the alternatives. However, subsurface investigations were not within the scope of this project. Construction techniques to effectively manage excavation, dewatering, and sloughing issues should be required of any construction plans. Construction plans for any of the alternatives should also include provisions to control dust and runoff.

5.5 ENGINEER'S OPINION OF PROBABLE COST

The summary of costs is shown in Table 5-2 Capital Improvement Plan (CIP). The costs shown are a Class 5 cost opinion by the Association for the Advancement of Cost Engineering (AACE). The range of accuracy for a Class 5 cost estimate is broad (-50 to 100%) due to the uncertainty in specific design requirements and the economic climate when a project is bid, and it is the industry standard for planning-level estimates. The costs are based on experience with similar recent wastewater projects; however, these costs should be updated as the project is further refined in the pre-design and design phases.

TABLE 5-2: CAPITAL IMPROVEMENT PLAN (CIP)

General Line Items	Unit	Unit Price	Estimated Quantity	2023 Cost
4" Pressure Sewer Main	LF	$ 65	3,140	$ 204,100
4" Pressure Sewer Main Clean Outs	EACH	$ 3,730	6	$ 22,380
6" Pressure Sewer Main	LF	$ 75	12,316	$ 923,700
6" Pressure Sewer Main Clean Outs	EACH	$ 4,180	16	$ 66,880
8" Gravity Sewer Main (Depth<10')	LF	$ 60	23,513	$ 1,410,800
8" Gravity Sewer Main (Depth>10')	LF	$ 90	25,160	$ 2,264,370
10" Gravity Sewer Main (Depth>10')	LF	$ 100	5,388	$ 538,800
Manholes (Depth<10')	EACH	$ 5,000	84	$ 420,000
Manholes (Depth>10')	EACH	$ 7,200	69	$ 496,800
Service Connections	EACH	$ 560	182	$ 101,920
4" Gravity Sewer Service Lines	LF	$ 45	41,860	$ 1,883,700
1.5" Poly Line	LF	$ 20	1,030	$ 20,600
Small Lift Station	LS	$ 12,000	1	$ 12,000
East Sewer Lift Station W/Back Up Generator	LS	$ 600,000	1	$ 600,000
West Sewer Lift Station W/Back Up Generator	LS	$ 600,000	1	$ 600,000
Electrical Connections	LS	$ 50,000	1	$ 50,000
Removal of Asphalt	SY	$ 20	2,800	$ 56,000
Plant Mix Asphalt Pavement Section	SY	$ 50	2,800	$ 140,000
Directional Drilling	LF	$ 250	350	$ 87,500
Boring	LF	$ 510	450	$ 229,500
Traffic Control	LS	$ 50,000	1	$ 50,000
Material Testing	LS	$ 60,000	1	$ 60,000
Construction Subtotal (rounded)				***$ 10,240,000***
General Conditions				$ 1,030,000
Contingency				$ 3,390,000
Contractor Overhead and Profit				$ 2,200,000
Build America, Buy America (BABA) Requirements				$ 850,000
Total Construction Subtotal				***$ 17,710,000***
Engineering Design and Bid Phase Services				$ 1,330,000
Engineering Construction Contract Administration				$ 670,000
Permitting and Fees				$ 80,000
Geotechnical Investigation				$ 150,000
Surveying				$ 180,000
Legal, Administrative, and Funding				$ 210,000
Connection Fee to Menan				$ 2,080,000
Total Project Cost (rounded)	***$22,410,000***			

The cost estimate herein is concept level information only based on our perception of current conditions at the project location and its accuracy is subject to significant variation depending upon project definition and other factors. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. This cost opinion is in 2023 dollars and does not include escalation to time of actual construction. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices, or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein.

5.6 FUNDING ALTERNATIVES

This section presents several alternatives for funding the capital improvements discussed previously. These funding alternatives include grants, loans, and City funding. The City can apply for multiple grants to improve the likelihood of receiving funding for the capital improvements.

Cash Funding

The City of Lewisville could consider cash finance for the improvements using sewer rates. This would require the least total cash outlay for the City; however, the rates would be significantly higher than if they were spread out over a long-term loan, which would be a hardship to the community. This would also require the City to hold off on the improvements until the funds have been raised.

Idaho Department of Environmental Quality (State Revolving Fund (SRF))

The SRF program is funded by a combination of repayment of loans previously made by DEQ and grant money supplied by EPA. Owners of public wastewater systems can apply for SRF funds annually through a competitive application process. Applications are ranked by state officials based on need, sustainability, water quality improvements, and other criteria. Davis-Bacon Wage Act and Build America, Buy America (BABA) requirements may apply. Applicants may qualify for principal forgiveness or other subsidy programs. DEQ is required to commit a significant percentage of available loan funds to sustainable, energy efficient, and “green” infrastructure improvements. Consequently, elements that meet the “green” infrastructure qualifications may receive priority for funding. Voter approval in a bond election or through judicial confirmation is required for this funding source.

Idaho Department of Commerce and Community Development Block Grants (CDBG)

The Idaho Department of Commerce offers several grant programs for public wastewater system improvements. Eligibility for these funds is dependent on economic development. Grants up to $500,000 are available through community programs. Applicants must secure the services of a certified grant administrator to administer grant money and follow other grant requirements. There is an annual application window for applying for these funds.

U.S. Department of Agriculture-Rural Development (USDA-RD)

USDA-RD offers a grant and loan program for improvements to wastewater systems that serve rural communities which is defined as systems that serve less than 10,000 people as is the case in the City of Lewisville. Grants up to 45% of the project cost are eligible depending on user rates. Applicants can apply for USDA-RD funds anytime during the year. Funds have many program requirements including the completion of a short-lived asset inventory, approved engineering report, and others. Voter approval in a bond election or through judicial confirmation and interim financing are required with this funding source.

U.S. Army Corps of Engineers (Section 595)

The USACE can sometimes offer money for water-related infrastructure projects to supplement funding from DEQ or USDA-RD. Funding availability depends on an appropriation from Congress and varies from year to year. Costs are shared with a 25 percent local match required.

Idaho Bond Bank

A bond bank is a state level entity which lends money to local governments within the state, with the goal of providing funds for their infrastructure needs and access to the capital markets at competitive interest rates. Under the Idaho Bond Bank program "IBBA", a municipality obtains a loan from the Bond Bank secured by either the municipality's bond or a loan agreement with the Bond Bank. The Bond Bank pools several loans to municipalities into one bond issue. The municipalities then repay the loan, and those repayments are used to repay the revenue bonds. The Bond Bank can obtain better credit ratings, more attractive interest rates, and lower underwriting costs than municipalities could achieve individually. The Bond Bank is able to pledge certain state funds as additional security for its bonds, further reducing interest costs. The Idaho Bond Bank Authority can open doors to municipalities that were previously barred from the capital markets due to the high costs of financing or challenging credit situations.

Local & Private

In addition to federal and state funding programs, there are local and private funding sources available to communities. Some of these include a local improvement district (LID), the municipal bond market with voter approval or judicial confirmation, a business improvement district (BID), urban renewal district, connection fees, development agreements with developers, and others.

5.7 ANNUAL OPERATING BUDGET

In addition to the construction cost for the collection system, it is important to consider the O&M costs once the system is built. The projected O&M, including electricity, parts, and personnel costs, as well as costs for Menan to maintain their systems for Lewisville's flows, are shown in Table 4-2 of Chapter 4. Planning for annual system replacement costs is vital to keeping the system functioning over the next several decades. Annualized costs associated with the replacement of the short-lived assets for the preferred alternative has been prepared and is approximately $7,000 per year as shown in Table 5-3. It is estimated that saving for the replacement of these short-lived assets should cost the current users (180 EDUs in 2023) approximately $3.24 per EDU per month.

TABLE 5-3: SHORT-LIVED ASSETS

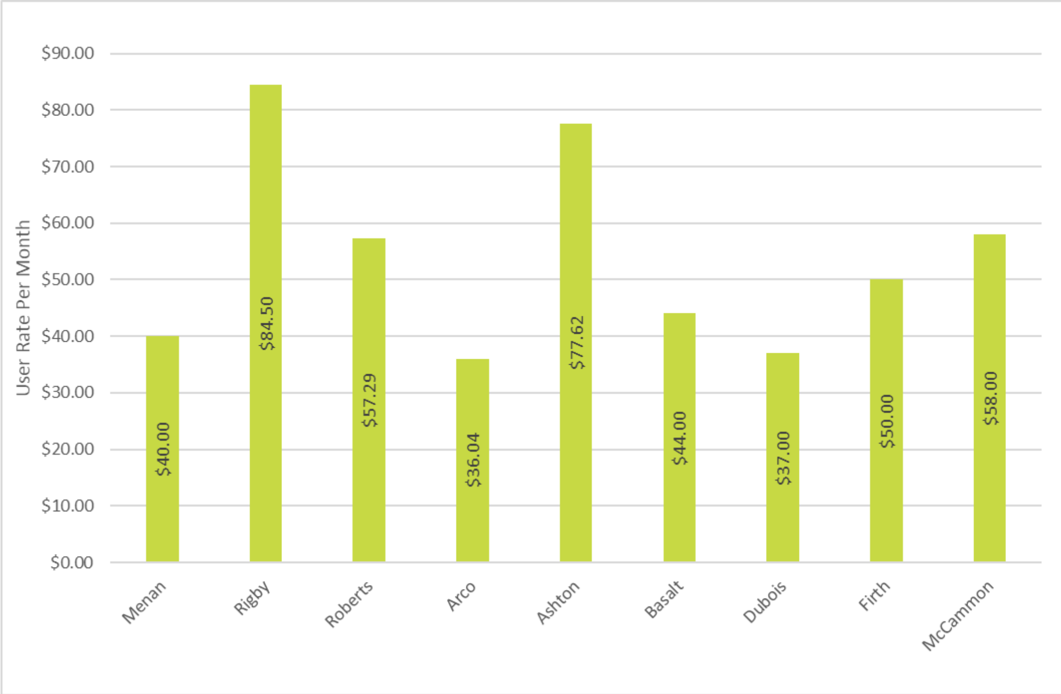
Item	Lifespan (years)	Quantity	Unit Cost	Total Cost	Cost per Year
Replace pumps	10	4	$10,000	$40,000	$4,000
Replace electrical components at lift stations	15	2	$15,000	$15,000	$1,000
Replace bearings, belts, etc. on generators	15	2	$15,000	$30,000	$2,000
Total Annual Contribution Needs					**$7,000**
Total EDUs (2023)					**180**
User Cost Estimate for Short Lived Asset Replacement ($/month)					**$3.24**

In addition to putting funds away in an annual reserve account for short-lived assets, the City should also budget each year for replacement of pipelines and manholes, so that when replacements are needed, the City has money set aside. Based on linear feet of pipeline and number of manholes, the City should set a goal to budget a total of approximately $90,000/year for pipeline and manhole replacement/rehabilitation. This number assumes a 50-year lifespan for manholes and a 100-year lifespan for collection pipes. Recognizing the magnitude of fully funding an annual replacement program and that the City's system will be in excellent shape for many years, a phased implementation program is recommended, increasing the annual replacement budget to fully fund the program in about 30 years. Lastly, it should be noted that this replacement budget, like the Capital Improvement Plan are based on 2023 dollars and should be periodically updated to reflect construction cost inflation.

5.8 USER RATES

The City does not currently have a wastewater system, so there are currently no fees for wastewater assessed by the City. The City also does not have any debt associated with a wastewater system. A detailed rate analysis is not included; however, for the project to move forward and protect human health and the environment, actual funding packages would need to include a very significant amount of grants or principal forgiveness. Based on the 2023 Eastern Idaho Residential Water and Sewer User Rates and Connection Fees Survey (S&A Engineers, PC), the average sewer rate for local or similarly sized communities generally ranges from $35 to $85 per month as shown in Figure 5-2. It is anticipated that the principal forgiveness / grant amounts would need to allow the City to construct a collection system with an affordable user rate similar to other Idaho communities.

FIGURE 5-2: WASTEWATER USER RATE COMPARISON



Appendices

- Lewisville Sewer Feasibility Study Technical Memo
- Lewisville Collection System Classification Worksheet

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KELLER ASSOCIATES

Technical Memorandum

TO: City of Lewisville, Idaho; ATTN: Mayor George Judd

FROM: Marvin Fielding, P.E.
Seth Thompson, E.I.

DATE: 9/11/2019

SUBJECT: **Lewisville Sewer Feasibility Study**

CC:

PROFESSIONAL ENGINEER REGISTERED 11802 9/11/19 STATE OF IDAHO MARVIN "W" FIELDING

Marvin W Fielding

1.0 INTRODUCTION

The purpose of this study was to determine the feasibility of installing a gravity sewer collection system for the City of Lewisville, Idaho with a pressure sewer line connecting to the Menan Wastewater Treatment Plant (WWTP). This process included examining four alternatives of lift station locations, three with a single lift station and one with two lift stations. The properties west of Lewisville Highway, south of 450 North, and east of Highway 48 that are split between the city and county were included in the study. Ball Bros. Produce on the north side of the city was not included. All alternatives, except for a West Lift Station, would also require a single home grinder pump station for the property on the southwest corner of the city (447 N 3400 E).

Google Earth was used to obtain elevation data used in this study. A bury depth of 5 feet was used at the start of each gravity sewer line except where a different point along the line had a low elevation that controlled the bury depth. Bury depths at the lift stations and along the sewer lines for each alternative were estimated using the available elevation data. Railroad crossings were minimized to reduce the utility crossing fees from the railroad. The study found the alternative of installing two lift stations to be the most feasible option since all single lift station alternatives required sewer depths of 20 feet and greater.

2.0 SINGLE LIFT STATION ALTERNATIVES

This section discusses three alternatives for a single lift station: a west lift station, a central lift station, and a north lift station. These alternatives were not explored in detail due to preliminary findings of deep pipe bury depths and lift station depths which would likely require an extensive and expensive dewatering effort. The water table was assumed to be highest on the perimeter of the city due to the presence of canals on each side. This made the alternatives of a west or north lift station less feasible. The elevations in the center of the city were found to be higher than the elevations found near the perimeter in most cases. This made it difficult to use natural grade to help give the required pipe slopes to a single central lift station. All three of these alternatives also required two railroad crossings instead of one crossing. South and east lift station locations were not considered due to higher elevations on these sides of the city.

2.1 West Lift Station

The west lift station alternative was located west of 3400 East between 480 North and 465 North. The elevation at the lift station was 4800 feet. This alternative would not require a single home grinder pump station for the property at 447 N 3400 E. The sewer lines starting on the northeast and southeast corners of the city were used to determine depths at the lift station. The northeast corner controlled due to a starting elevation of 4804 feet. This led to pipe bury depth of 27 feet at the lift station assuming a 0.4% slope in all pipes. Some sections had a bury depth greater than 27 feet in the lines nearest the lift station. These bury depths are likely well below the water table due to the presence of the canal near the lift station. These bury depths made this alternative impractical.

2.2 Central Lift Station

The central lift station alternative was located on the southwest corner of 480 North and 3450 East. The elevation at the lift station was 4803 feet. The sewer lines beginning in the northwest, northeast, and southwest corners of the city all led to similar lift station depths with the southwest corner controlling with a pipe bury depth at the lift station of 19.9 feet. This line had a maximum bury depth of nearly 25 feet. This was assuming a 10-inch main pipe with a 0.28% slope running along 480 North and 8-inch pipes with a 0.40% slope connecting to it from the rest of the city. These bury depths made this alternative impractical.

2.3 North Lift Station

The north lift station alternative was located north of 500 North between 3435 East and 3450 East. The elevation at the lift station was 4799 feet. The sewer line starting at the southwest corner was the controlling line. This led to a pipe bury depth of 19.1 feet at the lift station with several points on the line with depths greater than 20 feet. This assumes a 10-inch main pipe with a 0.28% slope running along 500 North and 8-inch pipes with a 0.40% slope connecting to it from the rest of the city. These bury depths are likely below the water table due to the presence of the canal nearby the lift station. These bury depths made this alternative impractical.

3.0 PREFERRED ALTERNATIVE: TWO LIFT STATIONS

The preferred alternative from this study was two lift stations, one on the west side of the city and one on the east side of the city. The west lift station was located on the northeast corner of 480 North and 3421 East. The elevation at this lift station was 4801 feet. All homes and businesses located west of the railroad tracks connected to this lift station via a 10-inch main pipe with a 0.28% slope along 480 North and 8-inch pipes with a 0.40% slope connecting to it. This lift station pumped to the east side of the city with a

4-inch pressure sewer line running along 480 North connecting to a manhole on the corner of 480 North and 3464 East. The pipe bury depth at the lift station was 15.8 feet. This alternative required a single railroad crossing where the pressure sewer line crossed on 480 North.

The east lift station was located on the south side of 480 North between 3464 East and 3479 East. The elevation at this lift station was 4805 feet. All homes and businesses located east of the railroad tracks and the pressure sewer line from the west side of the city connected to this lift station via a 10-inch main pipe with a 0.28% slope along 480 North and 8-inch pipes with a 0.40% slope connecting to it. The pipe bury depth at the lift station was 16.7 feet.

3.1 Connecting to Menan WWTP

The City of Menan has agreed to allow Lewisville to connect to their wastewater treatment plant. Menan estimates that their system has a capacity of 250,000 gpd currently and that their peak usage during the summer is 150,000 gpd. This means that the system is adequate to handle the increased flows from Lewisville. Menan recently obtained an additional field to the south of the lagoons for a future land application site. Menan also acquired a 25 ft right-of-way along the west side of the field to the south that connects their new property to 500 North. The pressure sewer line would be installed along 500 N until it turned to the north to follow Menan’s right-of-way. The line would be installed under the canal via directional drilling and connect into Menan’s system on the northwest corner of the lagoons. This connection will be isolated from the lagoons and thus not requiring the connection to be hot tapped in.

3.2 Description of Work

Sewer lines will run beside roadways with asphalt removal and repair at roadway crossings only. A total of 46,073 ft of 8” gravity sewer main and 5,388 ft of 10” gravity sewer main will be installed. A total of 3,140 ft of 4” pressure sewer main and 12,316 ft of 6” pressure sewer main will be installed. Manholes will be installed at intervals of 400 ft maximum on the gravity sewer lines. A total of 142 manholes will be installed. Clean-outs will be installed at intervals of 800 ft maximum on the pressure sewer lines. A total of 20 pressure clean-outs will be installed. Boring will occur under the railroad, Highway 48, and Lewisville Highway. Directional drilling will occur under the canal near the WWTP. The other canal crossings will be installed by trenching during periods when the canals are dry. Service lines will be installed from existing septic tank connections to the sewer main. It is estimated that there are 182 sewer connections in the city that will need to be made. Two lift stations will be constructed, each with backup generators. Power will come from the power lines running along 480 North. A single home grinder pump station will be installed for the property on the southwest corner of the city with a 1.5-inch poly line connecting it to the nearest manhole on 3406 East.

3.3 Design Criteria

The design criteria for the gravity sewer main, lift stations, and pressure sewer main are shown in Table 3.1.

Table 3.1. Pressure and Gravity Sewer Design Criteria

Pressure Sewer Clean-Out Maximum Spacing	800 ft
Manhole Maximum Spacing	400 ft
8 Inch Gravity Sewer Minimum Slope	0.40%
10 Inch Gravity Sewer Minimum Slope	0.28%
West Lift Station	
Pump Size	5 horsepower
Pump Flow Rate	190.7 gpm
Effluent Velocity	4.04 fps
Pressure Sewer Size	4 in.
Pressure Sewer Length	3,140 ft
Design Flow Rate	30.8 gpm (44,400 gpd)
Peak Hourly Flow	124.5 gpm
East (Main) Lift Station	
Pump Size	7 horsepower
Pump Flow Rate	237.0 gpm
Effluent Velocity	2.43 fps
Pressure Sewer Size	6 in.
Pressure Sewer Length	12,316 ft
Design Flow Rate	41.2 gpm (59,280 gpd)
Peak Hourly Flow	163.7 gpm

3.4 Operation and Maintenance

The City of Menan would take care of the maintenance and operation of the wastewater treatment plant. Lewisville would be responsible for operating and maintaining the gravity sewer collection system, 2 lift stations, and the pressure sewer force main to the Menan WWTP. This would require Lewisville to have someone with a sewer collection operator's license on staff to operate the system. The property owner would be responsible for the single home grinder pump station and pressure line for the property on the southwest corner of the city.

3.5 Cost

The project cost for installing the collection system and the pressure sewer system with lift stations totals $8,243,000. This includes the railroad crossings fees estimated to be around $5,000 and Menan's connection fee of $2,800/connection for the estimated 182 connections in Lewisville. This connection fee is to pay for a share of the capacity in

Menan's WWTP. Lewisville residents would also pay a \$13/month/connection user fee to Menan for the operation and maintenance of the wastewater treatment plant. The \$2,800/connection and \$13/month/connection fees are estimates from Menan. If Lewisville decides to proceed with installing the sewer system, a study would be performed to evaluate these rates. Assuming no grants or principal forgiveness, the user rate for Lewisville would be \$185.87/month/connection based on a 30-year loan at 1.50 percent interest. This rate includes Menan's user fee, the loan payments for the system, and the cost for operation and maintenance of the system. Included in the Appendix to this Technical Memorandum are funding scenarios prepared by the Development Company that compare user rates that result from different funding packages.

3.6 Funding

This section discusses potential funding sources for the recommended alternative. If Lewisville chooses to proceed with centralized sewer and wants to use money from DEQ, USDA-RD, Idaho Department of Commerce, and/or U.S. Army Corps of Engineers to help fund the improvements, a full Wastewater Facilities Planning Study (WWFPS) must be completed.

The Idaho Department of Environmental Quality (DEQ) offers up to \$65,000 for a public wastewater system planning grant. This grant must be used entirely to create a WWFPS that identifies wastewater system upgrades that are cost-effective and environmentally beneficial. DEQ also has funding available for construction through the State Revolving Fund (SRF). The SRF program would provide a low interest loan for the sewer system and may include principal forgiveness if Lewisville were to qualify.

The U.S. Department of Agriculture – Rural Development (USDA-RD) provides loans and grants for sanitary sewer systems through the Water and Environmental Programs (WEP) for systems that serve less than 10,000 people. Grants of up to 45% of the project cost are available depending on user rates, median household income, and competing requests for the funding.

The U.S. Army Corps of Engineers (USACE) offers funding for wastewater collection and treatment projects under Section 595 Program – Rural Idaho. USACE provides up to 75% of the project funding and the city would be responsible for the remaining cost. USACE funds are typically limited and meant to supplement traditional funding sources from DEQ and USDA-RD.

The Idaho Department of Commerce offers community development block grants of up to \$500,000. Eligibility for these funds is dependent on median household income. Funds are limited and applications are competitively ranked.

4.0 CONCLUSION

If Lewisville can find funding to make centralized sewer affordable to their residents, we recommend the two lift station option to decrease the depth of the sewer and pump stations and decrease the likelihood of dewatering in order to construct the improvements. A lift station would be installed on the west side of the city to collect and pump the effluent from all the buildings west of the railroad to the east side of the city. A second lift station would be installed on the east side of the city to pump the entire city's effluent to Menan for treatment. It is estimated that the total project cost will be $8,243,000, and the user rate will be $185.87/month based on a 30-year loan at 1.50 percent interest with no grants. Other funding scenarios are explored in the Appendix.

If the City of Lewisville chooses to continue to explore the feasibility of centralized sewer, we recommend that a full Wastewater Facilities Planning Study be completed. The cost of a WWFPS would be approximately $50,000. The City could seek a planning grant from DEQ to cover half of the cost of the study. The City would be responsible for the other half. The City should also confirm what Menan would charge Lewisville for connection fees and monthly user rates. Menan has indicated there may be some cost to the City of Lewisville to have Menan's engineer evaluate their user rates and connection fees.

Capital Improvements Project
Centralized Sewer

Project Identifier:
Gravity sewer collection sytem with pressure sewer and lift stations to pump effluent to Menan WWTP

Objectives:
- 8" and 10" Gravity Sewer Collection Lines
- 4" Pressure Sewer and Lift Station to Pump from West Side of City to East Side
- 6" Pressure Sewer and Lift Station to Pump to Menan WWTP

Potential Issues:
- Railroad Crossing
- Canal Crossings
- Dewatering and/or winter construction may be required to construct sewer

Project Location:
Lewisville, ID

General Line Items	Unit	Unit Price	Estimated Quantity	2019 Cost
4" Pressure Sewer Main	LF	$ 15.8	3140	$ 49,612
4" Pressure Sewer Main Clean Outs	EACH	$ 3,127	6	$ 18,762
6" Pressure Sewer Main	LF	$ 19	12316	$ 234,004
6" Pressure Sewer Main Clean Outs	EACH	$ 3,500	16	$ 56,000
8" Gravity Sewer Main (Depth<10')	LF	$ 30.8	23513	$ 724,211
8" Gravity Sewer Main (Depth>10')	LF	$ 51.54	22560	$ 1,162,742
10" Gravity Sewer Main (Depth>10')	LF	$ 62	5388	$ 334,056
Manholes (Depth<10')	EACH	$ 3,600	84	$ 302,400
Manholes (Depth>10')	EACH	$ 5,500	58	$ 319,000
Service Connections	EACH	$ 468	182	$ 85,176
4" Gravity Sewer Service Lines	LF	$ 16	41860	$ 669,760
1.5" Poly Line	LF	$ 12	1030	$ 12,360
Small Lift Station	LS	$ 10,000	1	$ 10,000
East Sewer Lift Station W/Back Up Generator	LS	$ 318,030	1	$ 318,030
West Sewer Lift Station W/Back Up Generator	LS	$ 318,030	1	$ 318,030
Electrical Connections	LS	$ 40,000	1	$ 40,000
Removal of Asphalt	SY	$ 14.85	2800	$ 41,580
Plant Mix Asphalt Pavement Section	SY	$ 38.7	2800	$ 108,360
Connect to Menan WWTP	LS	$ 1,500	1	$ 1,500
Directional Drilling	LF	$ 152	350	$ 53,200
Boring	LF	$ 300	450	$ 135,000
Traffic Control	LS	$ 35,000	1	$ 35,000
Mobilization	LS	$ 299,627	1	$ 299,627
Material Testing	LS	$ 45,000	1	$ 45,000
Subtotal				***$ 5,373,410***
Contingency - % of construction costs	%	25%		$ 1,343,352
Total Construction Costs				***$ 6,716,762***
Railroad Crossing Fees	LS	$ 5,000		$ 5,000
Connection Fee - Menan	EACH	$ 2,800.00	182	$ 509,600
Permitting	LS	$ 4,000		*$ 4,000*
Engineering and CMS - % of construction costs	%	15%		$ 1,007,514
Total Project Cost (rounded)	***$8,243,000***			

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein.

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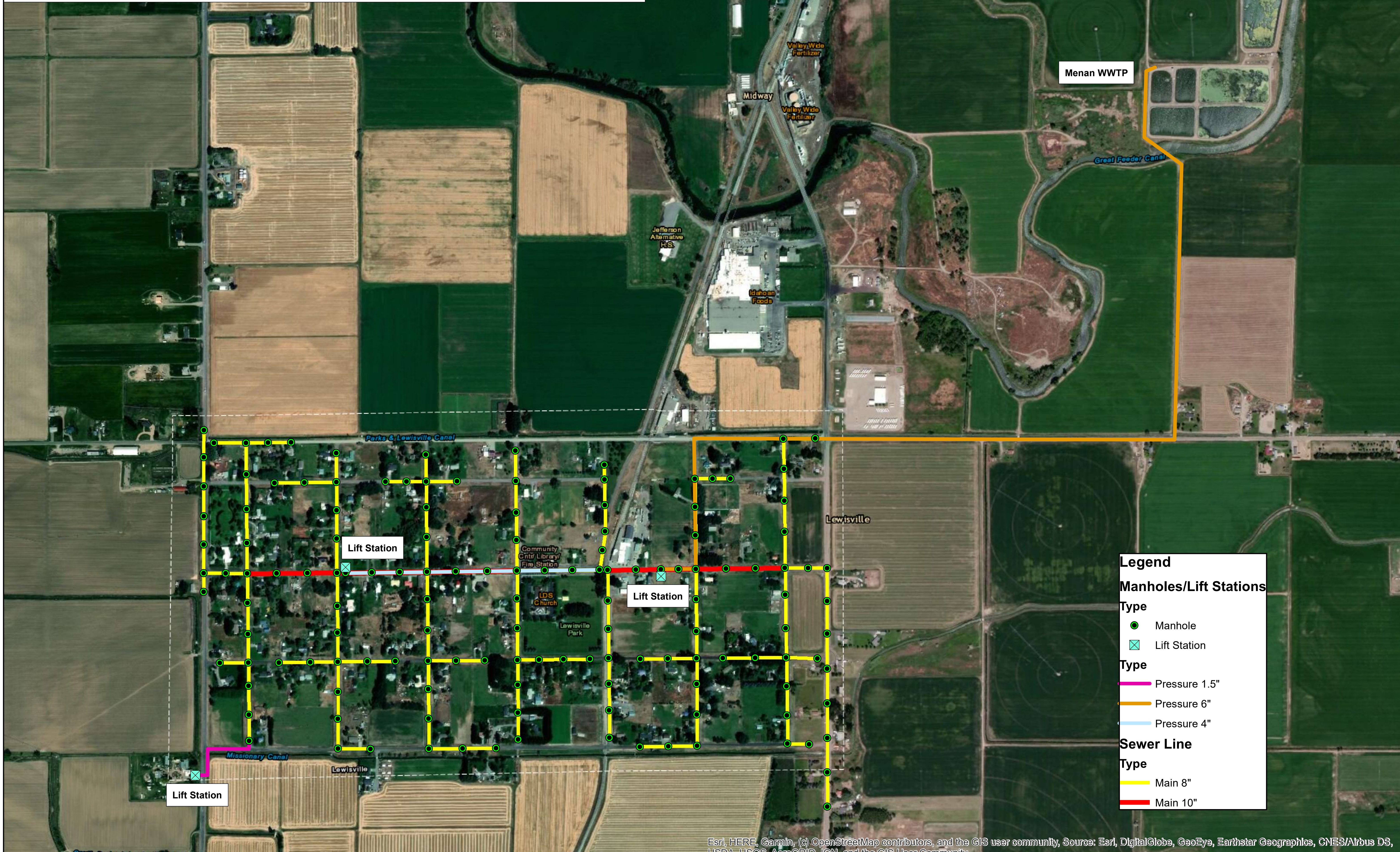
Figure 1 - Sewer System Conceptual Layout

*Elevations based on Google Earth and not actual survey data

Figure 2 - Menan WWTP Connection Conceptual Layout



City of Lewisville User Rate Analysis-Sewer Collection

	Loan Amount	Interest Rate	Term (Years)	Users	Estimated O&M
DEQonly	$8,250,000	1.00%	30	182	
USDA Loan/w BG and USDA Grant		3.50%	40		
			Metered Flow used Each Month(thousands)	Total Fee Collected Monthly	
	Flow Charge per 1,000 ga	# Flat Fee Customers			
	$0.00	182	0	$0.00	
	Semi-Annual	Annual	Total Life-Semi	Total Life-Annual	
DEQ Loan	$159,495.61	$319,671.93	$9,569,736.76	$9,590,158.02	
USDA Loan	$0.00	$0.00	$0.00	$0.00	
		DEQ Annual		**USDA-Annual**	**Total**
Annual Debt Service		$319,671.93		$0.00	$319,671.93
Monthly Debt Service		$26,639.33		$0.00	$26,639.33
Current # Users		182		182	
Monthly Debt Service per User		$146.37		$0.00	$146.37
Monthly Debt Service Reserve (10%)		$14.64		$0.00	$14.64
Monthly Capital Reserve (10%)					$0.00
thly Fixed Costs (Debt+Reserves) per User		$161.01		$0.00	$161.01
Monthly Operations and Maintainance		$0			$0.00
Monthly O&M per User		$0.00		$0.00	$0.00
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Fixed Costs per User		$161.01		$0.00	$161.01
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Cost per User		$161.01		$0.00	**$161.01**

City of Lewisville User Rate Analysis-Sewer Collection

	Loan Amount	Interest Rate	Term (Years)	Users	Estimated O&M
DEQLoan 9% LF/BG/USCOE1.5MM	$5,500,000	1.00%	30	182	
USDA Loan/w BG and USDA Grant		3.50%	40		
			Metered Flow used Each Month(thousands)	Total Fee Collected Monthly	
	Flow Charge per 1,000 ga	# Flat Fee Customers			
	$0.00	182	0	$0.00	
	Semi-Annual	Annual	Total Life-Semi	Total Life-Annual	
DEQ Loan	$106,330.41	$213,114.62	$6,379,824.50	$6,393,438.68	
USDA Loan	$0.00	$0.00	$0.00	$0.00	
		DEQ Annual		**USDA-Annual**	**Total**
Annual Debt Service		$213,114.62		$0.00	$213,114.62
Monthly Debt Service		$17,759.55		$0.00	$17,759.55
Current # Users		182		182	
Monthly Debt Service per User		$97.58		$0.00	$97.58
Monthly Debt Service Reserve (10%)		$9.76		$0.00	$9.76
Monthly Capital Reserve (10%)					$0.00
thly Fixed Costs (Debt+Reserves) per User		$107.34		$0.00	$107.34
Monthly Operations and Maintainance		$0			$0.00
Monthly O&M per User		$0.00		$0.00	$0.00
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Fixed Costs per User		$107.34		$0.00	$107.34
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Cost per User		**$107.34**		**$0.00**	**$107.34**

City of Lewisville User Rate Analysis-Sewer Collection

	Loan Amount	Interest Rate	Term (Years)	Users	Estimated O&M
DEQonly		1.00%	30	182	
USDA Loan/w BG and USDA Grant	$6,100,000	3.50%	40		
			Metered Flow used Each Month(thousands)	Total Fee Collected Monthly	
	Flow Charge per 1,000 ga	# Flat Fee Customers			
	$0.00	182	0	$0.00	
	Semi-Annual	Annual	Total Life-Semi	Total Life-Annual	
DEQ Loan	$0.00	$0.00	$0.00	$0.00	
USDA Loan	$142,257.68	$285,646.42	$11,380,614.34	$11,425,856.87	
		DEQ Annual		**USDA-Annual**	**Total**
Annual Debt Service		$0.00		$285,646.42	$285,646.42
Monthly Debt Service		$0.00		$23,803.87	$23,803.87
Current # Users		182		182	
Monthly Debt Service per User		$0.00		$130.79	$130.79
Monthly Debt Service Reserve (10%)		$0.00		$13.08	$13.08
Monthly Capital Reserve (10%)					$0.00
thly Fixed Costs (Debt+Reserves) per User		$0.00		$143.87	$143.87
Monthly Operations and Maintainance		$0			$0.00
Monthly O&M per User		$0.00		$0.00	$0.00
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Fixed Costs per User		$0.00		$143.87	$143.87
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Cost per User		**$0.00**		**$143.87**	**$143.87**

City of Lewisville User Rate Analysis-Sewer Collection

	Loan Amount	Interest Rate	Term (Years)	Users	Estimated O&M
DEQonly		1.00%	30	182	
JSDA Loan/w BG and USDA Grant/USCOE	$5,100,000	3.50%	40		
			Metered Flow used Each Month(thousands)	Total Fee Collected Monthly	
	Flow Charge per 1,000 ga	# Flat Fee Customers			
	$0.00	182	0	$0.00	
	Semi-Annual	Annual	Total Life-Semi	Total Life-Annual	
DEQ Loan	$0.00	$0.00	$0.00	$0.00	
USDA Loan	$118,936.75	$238,819.14	$9,514,939.85	$9,552,765.58	
		DEQ Annual		**USDA-Annual**	**Total**
Annual Debt Service		$0.00		$238,819.14	$238,819.14
Monthly Debt Service		$0.00		$19,901.59	$19,901.59
Current # Users		182		182	
Monthly Debt Service per User		$0.00		$109.35	$109.35
Monthly Debt Service Reserve (10%)		$0.00		$10.93	$10.93
Monthly Capital Reserve (10%)					$0.00
thly Fixed Costs (Debt+Reserves) per User		$0.00		$120.28	$120.28
Monthly Operations and Maintainance		$0			$0.00
Monthly O&M per User		$0.00		$0.00	$0.00
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Fixed Costs per User		$0.00		$120.28	$120.28
Total Monthly Variable Costs per User		$0.00		$0.00	$0.00
Total Monthly Cost per User		**$0.00**		**$120.28**	**$120.28**

IDAHO PUBLIC WASTEWATER COLLECTION SYSTEM CLASSIFICATION WORKSHEET

INTERNAL USE ONLY
DON'T WRITE HERE
System Class
Approved by: ___________
Date: ___________
EDMS #: 2023AFQ5

Name of System: City of Lewisville Collection System

Legal Owner of Collection System: City of Lewisville

System Address: 3455 E 480 N

City: Lewisville **State:** Idaho **Zip Code:** 83431

Contact Person: Curtis Thomas **Title:** Mayor

Business Phone Number: (208) 754-8608 **Email:** mayorlewisville@gmail.com

Collection System Classification Worksheet is (check one):

☑ **Initial System Rating** ☐ **System Upgrade** ☐ **Standard 5 yr. Rating**

Date of last system classification rating (if applicable): ______________

Collection System – Design Flow/Actual Flow: 0.067 MGD / ______________

Item		Points	Your System
System Size (minimum 3 points)			
Miles of Line		1 point/10 miles or part	1
Number of Connections = (use connection equivalencies)		1 point/250 or part	1
Number of Manholes		1 point/150 or part	1
Lift Stations		1 point/each	2
Miles of Force Mains		1 point/mile or part	2
Odor Abatement			
Chemical Feed System		2 points	0
Air Entrainment System		2 points	0
Bio-filter System		2 points	0
Maintenance Management System			
Manual Maintenance Management System		3 points	3
Manual Mapping System		3 points	3
Computerized Maintenance Management System		5 points	0
Computerized Mapping System		5 points	0
Alarm or SCAD System for Lift Stations		5 points	5
		TOTAL POINTS FOR YOUR SYSTEM	18

System Classification Key		Your Classification
System size subtotal of 6 points or less, 500 or fewer connections, and associated treatment system also meets the definition of a very small wastewater system (VSWWS).		VSWWS
	0-30 points	☑ Class I
	31-55 points	☐ Class II
	56-75 points	☐ Class III
	76 or greater	☐ Class IV

_________________________________ / ______________

Signature of Legal Owner or Owner's Representative Date

Mail form to Idaho Department of Environmental Quality, 1410 N. Hilton St. Boise, ID 83706
Attn: Amy Southern or Amy.Southern@deq.idaho.gov