



August 29, 2016

FINDING OF NO SIGNIFICANT IMPACT

TO ALL INTERESTED GOVERNMENTAL AGENCIES AND PUBLIC GROUPS

As required by state and federal rules for determining whether an Environmental Impact Statement is necessary, an environmental review has been performed on the proposed action below:

Project	Cascade County Vaughn Water and Sewer District Wastewater System Improvements
Location	Vaughn, Montana
Project Number	C304227
Total Cost	\$2,904,743

The Cascade County Vaughn Water & Sewer District, through a preliminary engineering report (PER) written in 2015 and revised in 2016, identified the need to upgrade its wastewater treatment facility (WWTF). Vaughn's aerated, three-cell lagoon was constructed in 1997 and has not been consistently meeting the secondary standards in its Montana Pollutant Discharge Elimination System (MPDES) permit. The district's WWTF effluent is not disinfected before it is discharged to the Sun River.

The current MPDES permit went into effect on December 1, 2012, with interim limits effective immediately and final effluent limits effective October 1, 2017. The existing lagoon design is not capable of complying with the new ammonia final effluent limits. In addition, the *E. coli* limits in that permit necessitate disinfection of the wastewater. Nutrient limits become effective in 2022, and will require either a variance or additional treatment to remove Total Nitrogen (TN) and Total Phosphorus (TP).

Because of MPDES numeric permit limit exceedances, as well as monitoring and reporting violations, the Montana Department of Environmental Quality (DEQ) issued the district an Administrative Order on Consent (AOC) in 2010. The order requires the city to complete construction and commence operation of an improved WWTF by July 31, 2018. The chosen treatment alternative will enhance existing wastewater facilities so that current numeric permit limits and the new ammonia limit can be met.

Wastewater treatment system improvements consist of installation of a new and improved lagoon aeration system, construction of a submerged attached growth reactor (SAGR™) following the existing lagoon cells, and the addition of ultraviolet (UV) disinfection. The proposed project also includes video inspection of sewer mains in the older sections of town and replacement of the existing lift station. Sludge from the existing lagoon cells will be removed and land-applied in accordance with Federal 40 CFR 503 sludge disposal regulations, or landfilled if a suitable sludge disposal site is not found. The existing discharge to the Sun River will be maintained. The project is proposed for construction in 2017.

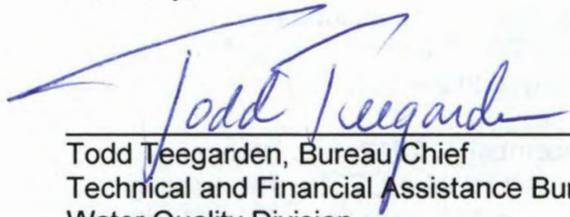
Federal and State grant/loan programs will fund the project. Environmentally sensitive characteristics such as wetlands, floodplains, threatened or endangered species, and historical sites are not expected to be adversely impacted as a result of the proposed project. Public participation during the planning process demonstrated support for the selected alternative. No significant long-term environmental impacts were identified. An environmental assessment (EA), which describes the project and analyzes the impacts in more detail, is available for public scrutiny on the DEQ web site <http://deq.mt.gov/Public/ea> and at the following locations:

Department of Environmental Quality
1520 East Sixth Avenue
Helena, MT 59620-0901
mmarsh@mt.gov

Cascade County Vaughn Water and Sewer
District
1161 6th Avenue
Vaughn, MT 59487

Comments on the EA may be submitted to the Department of Environmental Quality at the above address. After evaluating comments received, the department will revise the environmental assessment or determine if an environmental impact statement is necessary. If no substantive comments are received during the comment period, or if substantive comments are received and evaluated and the environmental impacts are still determined to be non-significant, the agency will make a final decision. No administrative action will be taken on the project for at least 30 calendar days after release of the Finding of No Significant Impact.

Sincerely,



Todd Teegarden, Bureau Chief
Technical and Financial Assistance Bureau
Water Quality Division

CASCADE COUNTY VAUGHN WATER & SEWER DISTRICT
WASTEWATER SYSTEM IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT

I. COVER SHEET

A. PROJECT IDENTIFICATION

Applicant: Cascade County Vaughn Water and Sewer District
Address: 1161 6th Avenue
Vaughn, MT 59487
Project Number: SRF Project # C304227

B. CONTACT PERSON

Name: Cory Eli, Interim Board President
Address: 1161 6th Avenue
Vaughn, MT 59487
Telephone: (406) 964-8880

C. ABSTRACT

The Cascade County Vaughn Water and Sewer District, through a preliminary engineering report (PER) written in 2015 and revised in 2016, identified the need to upgrade its wastewater treatment facility (WWTF). Vaughn's aerated, three-cell lagoon was constructed in 1997 and replaced a two-cell aerated lagoon that was originally constructed in 1974. The district's WWTF effluent is not disinfected before it is discharged to the Sun River under a Montana Pollutant Discharge Elimination System (MPDES) permit.

The current permit went into effect on December 1, 2012, with interim limits effective immediately and final effluent limits effective October 1, 2017. The existing lagoon design is not capable of complying with the ammonia final effluent limits. In addition, the *E. coli* limits in that permit necessitate disinfection of the wastewater. Nutrient limits become effective in 2022, and will require either a variance or additional treatment to remove Total Nitrogen (TN) and Total Phosphorus (TP). In addition to the inability to comply with the new MPDES permit limits, the district has had continual problems with meeting secondary standards for Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). Another problem is that the lift station discharging to the lagoon is unreliable and beyond its useful life, and has been the cause of sewage backups into homes. There are also sections of deteriorated, older sewer pipes in the collection system.

Because of MPDES numeric permit limit exceedances, as well as monitoring and reporting violations, the Montana Department of Environmental Quality (DEQ) issued the district an Administrative Order on Consent (AOC) in 2010. The order requires the district to complete construction and commence operation of an improved WWTF by July 31, 2018. The chosen treatment alternative will enhance existing wastewater facilities so that current numeric permit limits and the new ammonia limit can be met. It will also provide a foundation for addressing nutrient limits effective in 2022.

The proposed project consists of video inspection of sewer mains in the older sections of town, replacement of the existing lift station, installation of a new lagoon aeration system, construction of a submerged attached growth reactor (SAGR™) after the existing lagoon cells, and the addition of ultraviolet (UV) disinfection. Sludge from the existing lagoon cells will be removed and land-applied on nearby farmland in accordance with Federal 40 CFR 503 sludge disposal regulations or hauled to a landfill, if land application is not a viable option. The existing discharge to the Sun River will be maintained. The project is proposed for construction in 2017.

The estimated project cost (including administration, engineering, and construction) is \$2,904,743. The city will fund these project costs through a \$750,000 grant from the Treasure State Endowment Program (TSEP); a \$10,000 grant from the Department of Natural Resources and Conservation; and a loan in the amount of \$2,144,743 from the Water Pollution Control State Revolving Fund (WPCSRF) Program. Of the WPCSRF funds provided, \$400,000 of the loan will be forgiven, with the remaining \$1,744,743 having an interest rate of 2.5% and a term of 25 or 30 years.

Environmentally sensitive characteristics such as wetlands, floodplains, threatened or endangered species, and historical sites are not expected to be adversely impacted as a result of the proposed project. Additional environmental impacts related to land use, water quality, air quality, public health, energy, noise, growth, and sludge disposal were also assessed. No significant long-term environmental impacts were identified.

Under Montana law, (75-6-112, MCA), no person may construct, extend, or use a public sewage system until DEQ has reviewed and approved the plans and specifications for the project. Under the Montana Water Pollution Control State Revolving Fund Act, DEQ may loan money to municipalities for construction of public sewage systems.

The DEQ, Technical and Financial Assistance Bureau, has prepared this Environmental Assessment to satisfy the requirements of the Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA).

D. COMMENT PERIOD

Thirty (30) calendar days.

II. PURPOSE OF AND NEED FOR ACTION

Wastewater facilities for the unincorporated community of Vaughn are owned, operated, and maintained by the Cascade County Vaughn Water and Sewer District. The original lagoon and collection system were installed around 1974. Major rehabilitation of the wastewater treatment facility (WWTF) occurred in 1997 when the two-cell, aerated lagoon was changed to a three-cell, aerated lagoon. At that time the surface water discharge point was moved from the Vaughn Slough, a backwater channel, to a location directly on the Sun River. The gravity collection system is constructed of clay tile and PVC pipes and does not experience excessive infiltration and inflow. However, there are a few known areas of structural deficiencies such as sags and offset joints. Older sections of sewer main need to be TV-inspected so that rehabilitation needs can be identified and prioritized for future repairs. There is one lift station located just prior to the lagoon that has reached the end of its useful life and is in need of major upgrade. Sewage backups into homes have been attributed to failures of the lift station.

The Montana Department of Environmental Quality (DEQ) issued an Administrative Order on Consent (AOC) to the Cascade County Vaughn Water and Sewer District on August 6, 2010. The AOC was issued due to a series of Montana Pollutant Discharge Elimination System (MPDES) numeric permit limit exceedances during the period of April 2007 through May 2010 for Biochemical Oxygen Demand (BOD₅), Total Suspended Solids (TSS), and pH, and failure to properly monitor and report. The district pursued solutions to its problems through the Preliminary Engineering Report (PER) process.

In addition to repeated noncompliance with its MPDES permit, the existing lagoon system is also not capable of meeting its new ammonia limit (effective October 1, 2017) or upcoming nutrient standards for Total Nitrogen (TN) and Total Phosphorus (TP), which become effective in 2022. The current project focuses on correction of WWTF deficiencies needed to achieve compliance with existing MPDES permit limits, as well as the ammonia standard. Compliance with the nutrient standards will be addressed later as the 2022 deadline approaches, either by obtaining a variance or adding a treatment strategy. The AOC requires the district to complete construction and commence operation of its new WWTF by July 31, 2018.

The proposed wastewater treatment plant improvements will address long-standing lift station and MPDES permit compliance challenges, as well as the new ammonia limit in the permit. The proposed Vaughn wastewater treatment plant project entails:

- TV Inspection of older sections of the collection system.
- Replacement of the existing lift station.
- Installation of a new lagoon aeration system.
- Removal and disposal of sludge from the existing lagoon.
- Installation of a submerged attached growth reactor (SAGR™).
- Installation of an ultraviolet disinfection (UV) process.

III. ALTERNATIVES INCLUDING THE PROPOSED ACTION AND COSTS

The PER looked at various alternatives for wastewater collection, lift station replacement, and treatment.

A. COLLECTION SYSTEM ALTERNATIVES

Three collection system alternatives – no action, replacement and rehabilitation of known collection system problem areas, and TV inspection and development of a long-term rehabilitation plan – were considered:

ALTERNATIVE 1 – NO ACTION – There are no known capacity-limiting sections of sewer main, but there are a few known areas with structural deficiencies, such as sags and offset joints. The clay tile pipe in the system is close to 40 years old and may be nearing the end of its useful life. The no-action alternative is not considered further, since, as a minimum, a detailed investigation of the collection system is warranted.

ALTERNATIVE 2 – REPAIR OF KNOWN COLLECTION SYSTEM DEFICIENCIES – This alternative involves the repair of known sewer system problems, similar to what the district recently completed using DNRC grant funds. While correction of known sewer main problems is a good idea, it does not include the identification and prioritization of all problem areas, which is necessary to assure that limited district funds are spent where they are most needed. This alternative was not considered further.

ALTERNATIVE 3 - COLLECTION SYSTEM TV INSPECTION AND DEVELOPMENT OF LONG-TERM PIPE REHABILITATION PROGRAM – The major sections of older sewer pipes would be TV-inspected as part of this project. Rehabilitation needs would then be identified and prioritized. In the future remaining portions of the collection system would be identified. Needed improvements would be implemented every two years using grant funds. This is the selected collection system alternative.

B. LIFT STATION ALTERNATIVES

Three different types of lift stations were considered – suction lift, wet well/dry well design, and submersible pump package lift station.

ALTERNATIVE 1 – SUCTION LIFT STATION – Suction lift stations typically consist of solids-handling pumps constructed at-grade. While there are advantages to this type of pump, such as easy accessibility, there is the disadvantage of losing prime and breaking suction. This alternative was not considered further due to its being less reliable than its equal-cost alternative, a submersible package lift station.

ALTERNATIVE 2 – WET WELL/DRY WELL LIFT STATION – This alternative consists of both a wet well and a dry vault located below-grade. The two below-ground structures make this a more costly option and raise concerns of confined space entry. Due to the higher cost and concerns with entering the dry well for operation and maintenance duties, this alternative was not considered further.

ALTERNATIVE 3 – PACKAGE SUBMERSIBLE LIFT STATION – This type of lift station consists of a below-ground wet well with two submersible pumps in it. There is an enclosed structure with valves and controls above the vault. The pumps are accessed by bringing them up on slide rails. Because this is the most

reliable, safe, and cost-effective alternative available, it was selected for replacement of the existing lift station.

C. TREATMENT ALTERNATIVES

Fifteen wastewater treatment alternatives, including the No-Action option, were considered in the PER:

- Alternative 1 – No Action
- Alternative 2 – Partial Mix Mechanically Aerated Lagoon
- Alternative 3 – Total Retention Ponds
- Alternative 4 – High-Rate Land Application
- Alternative 5 – Storage and Irrigation
- Alternative 6 – Activated Sludge Mechanical Plant
- Alternative 7 – Package Membrane Bioreactors
- Alternative 8 - Package Sequencing Batch Reactor
- Alternative 9 – Package Oxidation Ditch
- Alternative 10 – Package Extended Aeration Activated Sludge (Biolac™)
- Alternative 11 – Buried Vessel MBBR-MLE (Magellan™ by Contech)
- Alternative 12 – Advantex™ Packed Bed
- Alternative 13 – In-Stream Mixing Diffuser with Mixing Zone Study
- Alternative 14 – Constructed Wetlands
- Alternative 15 – Enhanced Lagoon Technologies
 - 15a. Complete Mix/Partial Mix Aerated Lagoons with Polishing Reactor (Lemna™)
 - 15b. Partial Mix Lagoon with Submerged Aerated Gravel Reactor (SAGR™)
 - 15c. Partial Mix Lagoon with Bio-Dome Polishing Reactors

ALTERNATIVE 1 - NO ACTION - The no-action alternative entails making no improvements to the district's lagoon, which has been out-of-compliance with the secondary effluent standards in its MPDES permit and is not capable of meeting its new ammonia or *E.coli* limits. The District must take some action in order to satisfy its Administrative Order on Consent (AOC) and not face fines. Therefore, the no-action alternative was not considered to be a viable option, and was given no further consideration.

ALTERNATIVE 2 - PARTIAL MIX MECHANICALLY AERATED LAGOON – This is the technology currently employed to treat Vaughn's wastewater and this alternative would employ upgrading the aeration system and continuing to use the Vaughn lagoon cells. This technology is not adequate to remove ammonia or nutrients, nor does it consistently reduce pathogens to the level required by the MPDES permit. Because of the treatment limitations of this alternative, it will not be considered further as a stand-alone technology.

ALTERNATIVE 3 – TOTAL RETENTION LAGOON - Approximately 52 acres of lined lagoon cells would be needed to employ total retention. Because of this high land requirement and associated cost, a total retention lagoon will not be considered further.

ALTERNATIVE 4 – HIGH-RATE LAND APPLICATION – This alternative would require a Montana Ground Water Pollution Control System (MGWPCS) permit for disposal of the wastewater into infiltration ponds or drainfield lines. Depending on proximity of the infiltration area to the Sun River and other environmental factors, a high level of treatment prior to disposal is likely required. The expenses and complexities of this alternative preclude it from being a viable option deserving of further attention.

ALTERNATIVE 5 – STORAGE AND IRRIGATION – This alternative eliminates the surface water discharge, with its accompanying MPDES requirements. It entails reuse of the existing lagoon system, with the addition of a 19 million gallon storage pond, and spray application of the wastewater effluent on 38 acres or more of nearby farmland. Most soils around Vaughn are rated as very limited for irrigation by the Natural Resources Conservation Service. Due to the unavailability of a suitable irrigation site, large land requirement for the storage cell, and high associated costs, this alternative might be difficult to implement. However, because it directly addresses issues with the discharge permit and provides beneficial reuse, it will be considered in more detail.

ALTERNATIVE 6 – ACTIVATED SLUDGE MECHANICAL PLANT – While an activated sludge wastewater treatment plant can provide high quality effluent with respect to secondary standards, it is not designed for Total Nitrogen (TN) and Total Phosphorus (TP) removal which will be required in the future. Ammonia removal might be implemented, but is better achieved with other treatment processes. This alternative will not be considered further due to its high relative cost and inability to treat for nutrients.

ALTERNATIVE 7 – PACKAGE MEMBRANE BIOREACTOR (MBR) – This type of mechanical plant uses membrane filters to provide a very high level of wastewater treatment. While there is a space savings with the membrane treatment process itself, this is offset by additional space needs for a headworks building, solids handling facilities, etc. Due to the high capital cost and complex operational and maintenance requirements, this alternative will not be considered further.

ALTERNATIVE 8 – PACKAGING SEQUENCING BATCH REACTOR (SBR) – The SBR process uses one basin for all of the treatment processes. Like the MBR, there is a space savings that is somewhat offset by ancillary buildings and processes. The SBR has much higher capital and operation and maintenance costs than other feasible alternatives and will not be considered further.

ALTERNATIVE 9 – PACKAGE OXIDATION DITCH – This mechanical plant is more operator-friendly than most and produces a stable sludge. It can be controlled in a manner so as to achieve TN removal. The oxidation ditch has a higher capital cost than other mechanical alternatives considered in the PER, and so was not considered further.

ALTERNATIVE 10 – PACKAGE EXTENDED AERATION ACTIVATED SLUDGE (BIOLAC™) SYSTEM – This is an extended aeration activated sludge process within a single aeration basin that could be located in the footprint of one of the existing lagoon cells. Ancillary basins for headworks equipment, clarification, solids handling, etc., would be needed. TN removal can be achieved by adjusting

mechanical aeration to create alternating oxic and anoxic conditions. TP could also be removed to a sufficient level. This alternative is considered further due to a reasonable cost and the ability to meet treatment needs.

ALTERNATIVE 11 – BURIED VESSEL MOVING BED BIOREACTOR-MODIFIED LUDZACK AND ETTINGER (MBBR-MLE) (MAGELLAN™ BY CONTECH) – This treatment process incorporates biological nutrient removal into a moving bed bioreactor that consists of floating fixed-film media. It could be located in the footprint of one of the existing lagoon cells. Ancillary basins for headworks equipment, clarification, solids handling, etc., would be needed. This alternative is considered to be a viable option.

ALTERNATIVE 12 – ADVANTEX™ PACKED BED – This treatment alternative utilizes a fixed film, packed bed treatment system to treat wastewater to secondary standards. It is also capable of removing ammonia. Due to its very high cost when compared to the other viable treatment alternatives, it will not be considered further.

ALTERNATIVE 13 - IN-STREAM MIXING DIFFUSER WITH MIXING ZONE STUDY - This alternative consists of completion of a mixing zone study and construction of a diffuser at the end of the lagoon outfall to provide the necessary mixing to eliminate the need for an ammonia limit in the MPDES permit. The existing, aerated lagoon system would continue in operation. Because the cost of the diffuser and mixing zone study is as expensive as other viable treatment options that also provide improved BOD and TSS removal, this alternative is not considered further.

ALTERNATIVE 14 – CONSTRUCTED WETLANDS – Artificially constructed wetlands can be used to remove nutrients and use both aerobic and anaerobic biological processes. Given the effluent limits in Vaughn's MPDES permit, wetlands could not be used as a stand-alone process and were not evaluated further in the PER.

ALTERNATIVE 15A - COMPLETE MIX/PARTIAL MIX AERATED LAGOONS WITH POLISHING REACTOR (LEMNA™) – This lagoon process includes prescreening, a complete mix zone/partial mix lagoon, polishing reactors, and clarifier or effluent filters. This technology would greatly improve BOD and TSS removal and would remove ammonia. TN and TP would not be removed and would require an additional treatment strategy. The high power costs associated with this technology when compared to other viable alternatives preclude it from further consideration.

ALTERNATIVE 15B PARTIAL MIX LAGOON WITH SUBMERGED AERATED GRAVEL REACTOR (SAGR™) – This treatment alternative utilizes the existing lagoons with improved aeration, followed by a submerged, aerated gravel bed to remove ammonia and provide better TSS and BOD removal. TN and TP would not be removed by the SAGR™; however, five different add-on strategies were considered that could do this. This is a viable alternative worthy of detailed consideration.

ALTERNATIVE 15C - PARTIAL MIX LAGOON WITH BIO-DOME POLISHING REACTORS – The existing lagoon cells would continue to be utilized after the

addition of an improved aeration system. Approximately 65 aerated, fixed film devices would be placed in the third cell of the Vaughn lagoon to facilitate ammonia removal and enhance BOD and TSS removal. Because this technology is more expensive than the SAGR™ alternative that accomplishes the same purposes, it will not be considered further.

The only five alternatives considered in more detail, for reasons given above, were: (1) Existing Aerated Lagoons with Storage and Irrigation, (2) Buried Vessel Package Treatment Plant – MLE/MBBR, (3) Extended Aeration Activated Sludge Package Plant (Biolac™), (4) Existing Aerated Lagoon with SAGR™ and Lagoon Variance, and (5) Existing Aerated Lagoon with SAGR™ and Seasonal Storage. These alternatives were relabeled in the PER as T1, T2, T3, T4A, and T4D, respectively.

D. COST COMPARISON - PRESENT WORTH ANALYSIS

The present worth analysis is a means of comparing alternatives in present day dollars and can be used to determine the most cost-effective alternative. An alternative with low initial capital cost may not be the most cost-efficient project if high monthly operation and maintenance costs occur over the life of the alternative. A calculated discount rate over the 20-year planning period was used in the analysis. Table 1 provides a summary of the present worth analysis of the five feasible alternatives. The cost to replace the lift station is included within each alternative's costs listed below, since the lift station will be replaced regardless of which treatment alternative is selected.

TABLE 1 - ECONOMIC EVALUATION OF TREATMENT SYSTEM ALTERNATIVES

Alternative	Total Capital Cost *	Present Worth of Annual O&M Cost	Present Worth of Salvage Value	Present Worth of O&M plus Capital
Alternative T1 – Existing Aerated Lagoon with Storage and Irrigation	\$5,418,000	\$1,623,000	\$747,500	\$6,293,500
Alternative T2 – Buried Vessel Package Treatment Plant – MLE/MBBR	\$4,353,000	\$2,474,500	\$380,100	\$6,447,400
Alternative T3 – Extended Aeration Activated Sludge Package Plant (Biolac)	\$4,338,000	\$2,343,500	\$452,600	\$6,228,900
Alternative T4A – Existing Aerated Lagoon with SAGR and Lagoon Variance	\$2,800,000	\$1,819,500	\$199,000	\$4,420,500
Alternative T4D – Existing Aerated Lagoon with SAGR and Seasonal Storage	\$3,900,000	\$1,892,200	\$308,600	\$5,483,600

* Capital costs include engineering, administration, and construction costs.

E. BASIS OF SELECTION OF PREFERRED ALTERNATIVE

To assist in selection of a preferred wastewater treatment alternative, a qualitative ranking process was utilized. The five viable alternatives were compared with respect to technical feasibility, financial feasibility, environmental impacts, operation and maintenance, sustainability, and public opinion. Each alternative was given a score ranging from 0 to 10 for each criterion, with 0 having a negative impact and 10 representing the maximum benefit to the community. The criteria were also weighted in relation to each other, with the criteria most important to the district receiving higher weights. The five most preferred treatment alternatives are scored for comparison in the matrix below:

TABLE 2 – WASTEWATER TREATMENT ALTERNATIVES RANKING

Criterion	Criterion Weight	Alternative T1		Alternative T2		Alternative T3		Alternative T4A		Alternative T4D	
		Score	Points	Score	Points	Score	Points	Score	Points	Score	Points
Technical Feasibility	10	8	80	8	80	9	90	10	100	9	90
Financial Feasibility (Life Cycle) Cost	10	3.65	37	3.42	34	3.72	37	6.57	66	4.78	48
Environmental Impacts	8	8	64	8	64	8	64	8	64	8	64
Operation and Maintenance	10	9	90	7	70	8	80	10	100	9	90
Sustainability	4	8	32	8	32	8	32	8	32	8	32
Public Opinion	8	8	64	7	56	7	56	10	80	9	72
TOTAL SCORE			367		336		359		442		396

The decision matrix shows that the preferred alternative is Alternative T4A, continued use of the existing lagoon with improved aeration, followed by a submerged aerated gravel reactor (SAGR™) and ultraviolet (UV) disinfection. Under this alternative, the district would apply for a lagoon variance to postpone implementation of the nutrient limits for 20 years. This alternative scored 442 points, which is 20 percent higher than the closest non-SAGR™ alternative. If a lagoon variance cannot be obtained, the district will implement Alternative T4D, which scored 396 points and is identical to T4A, except that seasonal storage with winter discharge will be used to meet the nutrient limits by not discharging to surface water during the summer months. The primary factors influencing selection of T4A as the preferred alternative are technical feasibility, simplicity of operation and maintenance, and its low present-worth cost.

In addition to the wastewater treatment plant improvements, the project includes replacement of the existing lift station with a new submersible lift station and video inspection of sewer mains in the oldest sections of the collection system.

The total project cost is broken down into administrative/finance and activity costs in Table 4. The administrative and finance costs now include the bond reserve, and the activity costs include the costs for TV inspection and increased engineering costs. As a result, the estimated total cost is now higher than what was presented in the PER.

Table 4 - ESTIMATED PREFERRED ALTERNATIVE COSTS

Components	Estimated Costs
Administrative/Finance Costs	\$121,743
Activity Costs	\$2,783,000
Total Project Cost	\$2,904,743

The estimated project cost (including administration, engineering, and construction) is \$2,904,743. The city will fund these project costs through a \$750,000 grant from the Treasure State Endowment Program (TSEP); a \$10,000 grant from the Department of Natural Resources and Conservation; and a loan in the amount of \$2,144,743 from the Water Pollution Control State Revolving Fund (WPCSRF) Program. Of the WPCSRF funds provided, \$400,000 of the loan will be forgiven, with the remaining \$1,744,743 having an interest rate of 2.5% and a term of 25 or 30 years.

The residential sewer rate in Vaughn is \$36.90 per month and the commercial rate is \$40.00 per month. The average residential monthly sewer rate will increase \$43.70 per month as a result of the proposed project, resulting in a rate of \$80.60. This is an increase of 218 percent. The financial impact of this project on the system users is shown in Table 3. The proposed project will result in a monthly sewer cost per household that is 3.1% of the monthly median household income. Based on EPA guidance for project affordability, the increased sewer rate may pose an economic hardship on households. While \$80.60 is the best estimate at this time, the end user rate will depend upon the final funding package and contractor's construction bid.

TABLE 3 - PROJECT AFFORDABILITY

Monthly sewer user cost	\$80.60
Monthly median household income (mMHI) ¹	\$2,604
User rate as a percentage of mMHI	3.1%

¹Based on US Census Bureau data (in 2013 inflation-adjusted dollars)

IV. AFFECTED ENVIRONMENT

A. PLANNING AREA AND MAPS

The community of Vaughn is unincorporated and is located approximately 8 miles northwest of the City of Great Falls, in Cascade County. It is located on Highway 89, just west of Interstate 15 (see Figure 1). Because it is unincorporated, Vaughn's sewer facilities are owned, operated, and maintained as the Cascade County Vaughn Water and Sewer District. Most of the land within the district boundaries is privately-owned, residential land. The district is bounded

by Muddy Creek to the east, the Sun River to the south, and the railroad to the north. The district boundary and planning area are shown in Figure 2. The existing wastewater treatment facility for the community of Vaughn is shown in Figure 3. The new wastewater treatment facility will utilize the existing lagoon and will be followed by a submerged aerated gravel reactor (SAGR™) and ultraviolet disinfection (see Figure 4).

B. POPULATION AND FLOW PROJECTIONS

The current population served by the Vaughn wastewater treatment facility is based on 2.4 people for each residential service and consideration of the number of employees at each commercial building, resulting in a current population of 630. Examination of Cascade County and Vaughn census information and projected development was used to estimate a 20-year design population. A 2% per year growth rate was used to calculate a design population of 975.

The current average daily flow was calculated from main lift station hour meter readings to be 57,000 gallons per day (gpd). This value correlates well with data from winter water usage records and wastewater system flow monitoring conducted in 2014. Per capita water usage is 90 gpcd based on the current population and this 57,000 gpd flow. The projected flow is based on the 2035 population of 975 and a more conservative usage of 100 gpcd. Table 4 summarizes current and projected population and average daily flow data.

TABLE 4 – EXISTING AND PROJECTED POPULATION AND WASTEWATER FLOWS

Year	Population	Average Daily Flow
		(gal/day)
2015	630	57,000
2035	975	98,000

C. NATURAL FEATURES

The community of Vaughn discharges its wastewater lagoon effluent to the Sun River, located to the south. The Sun River drainage is bordered by the Continental Divide to the west, the Teton River drainage to the north, and the Dearborn River drainage to the south.

Area soils consist of clays and loams, which are generally very limited for irrigation. Topography within the planning area is relatively flat, with slopes trending to the south and east. The elevation of the town is approximately 3,340 feet. Most of the land surrounding Vaughn is primarily agricultural.

Average annual precipitation in Vaughn is approximately 12 inches, with the wettest months typically being May and June. Historical records show that the average maximum temperature for July is 83 degrees Fahrenheit and the average minimum temperature in January is 11.6 degrees Fahrenheit.

V. ENVIRONMENTAL IMPACTS OF PROPOSED PROJECT

A. DIRECT AND INDIRECT ENVIRONMENTAL IMPACTS

1. Land Use/Prime Farmland – The wastewater treatment system improvements will occur within the footprint of the existing lagoon system on property owned by the district, with a small land purchase adjacent to the lagoon for location of the SAGR™ system. This land is characterized as Havre Loams Saline, which is not prime farmland. As part of the project's scope, approximately 144,000 gallons of sludge will be removed from the existing lagoon cells. Disposal of the sludge will occur on an estimated 2 to 11 acres of suitable agricultural land in the vicinity of Vaughn if Federal 40 CFR 503 sludge disposal regulations can be met. The amount of acreage needed is dependent on the amount of TN in the sludge and the crop that will be planted on the acreage. The productivity of that land will be enhanced by the application of the biosolids.
2. Floodplains – According to Federal Emergency Management Area (FEMA) mapping, the lagoon area and proposed project area are within a provisionally accredited levee (PAL) for a 100-year floodplain for the Sun River. Currently the levee is overdue for an engineering evaluation needed before it can be recertified by the US Army Corps of Engineers. The wastewater project will need to be closely coordinated with the levee certification and ultimate levee accreditation process. See Section X: Agencies Consulted of this report for comments with respect to floodplain impacts.
3. Wetlands – There are no wetlands or riparian areas mapped in the vicinity of the project area.
4. Cultural Resources and Historical Sites – No impacts to cultural resources are anticipated. The proposed improvements should not impact historic or cultural resources since all new facilities will be constructed within the previously disturbed area of the existing lagoon and on a small land purchase adjacent to the lagoon. The State Historic Preservation Office (SHPO) reviewed the proposed project and their comments are summarized in Section X: Agencies Consulted of this report.
5. Fish and Wildlife – Wildlife in the area is typical of that on the east side of the Rocky Mountains, e.g., mule deer, whitetail deer, antelope, coyotes, rabbits, skunks, weasels, and rodents. The US Fish and Wildlife Service (FWS) listed the following species as threatened, endangered, and candidate species: Canada Lynx, Wolverine, Red Knot, and Sprague's Pipit. Common birds to the area are robins, magpies, sparrows, raptors, and game birds. According to the Montana Natural Heritage Program, the animal (fish) species of concern are the Burbot and the Brassy Minnow. Bird species of concern in the area are the Great Blue Heron and Chestnut-collared Longspur. According to the State of Montana's Sage Grouse Program's website, there are not general or connectivity sage grouse areas within the vicinity of Vaughn. Given that the construction will occur at the existing lift station and lagoon sites, no impacts to any fish or

wildlife are anticipated. Improved wastewater quality from the lagoon after improvements are met will enhance fish habitat. See Section X: Agencies Consulted of this report for a summary of wildlife agency comments.

6. Water Quality – The wastewater treatment plant discharges to the Sun River at a point 1.7 miles above the confluence with Muddy Creek. The receiving water has a B-1 Montana Water Use Classification. B-1 waters are to be maintained suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply. The 2016 303(d) list states that the Sun River between Gibson Dam and Muddy Creek does not support its aquatic life beneficial uses. Probable causes are unnatural flow regimes, altered vegetative cover, and temperature fluctuations due to channelization and dam flow fluctuations; and sedimentation and siltation due to grazing and agriculture. Stream impairment is not attributed to the WWTP.

The current MPDES permit used 0.053 mgd (design population of 530 people at a design contribution of 100 gallons per person per day) to determine nondegradation allocated loads of 13.3 lb/day BOD and 44.2 lb/day TSS. Discharge Monitoring Report (DMR) data shows that the lagoon system has easily met its BOD and TSS effluent load limits in past years. Given this history and the addition of a submerged aerated gravel reactor (SAGR) for additional treatment, meeting the BOD and TSS nondegradation load limits in the future is not expected to be a problem. The increase in design flow and design population for the proposed improvements project over the values set in the current MPDES permit will be reflected in future effluent limits.

The Total Maximum Daily Load (TMDL) for the Sun River Watershed was approved by the US EPA in February 2005. Vaughn received an approved waste load allocation (WLA) of 9.4 lb/day TN and 0.9 lb/day TP for the summer months. Control of TN and TP is essential to diminishing algal growth and protecting the aquatic environment. The MPDES permit for the Vaughn WWTP includes TN and TP limits effective in 2022.

The MPDES permit also includes an ammonia limit that is effective October 1, 2017. Control of ammonia is necessary to prevent eutrophication of the river, prevent anoxic conditions, and protect aquatic organisms from toxicity. The proposed project will provide ammonia removal through the addition of the SAGR™. It will also result in enhanced BOD and TSS removal. The new ultraviolet light disinfection system will be operated at all times the system is discharging and will be designed to meet standards for *E. coli* bacteria stipulated in the district's MPDES permit. The proposed improvements to the wastewater treatment system will result in a much better quality effluent discharging to the Sun River.

7. Air Quality – Short-term negative impacts on air quality are expected to occur during construction from heavy equipment in the form of dust and exhaust fumes. Proper construction practices will minimize this problem.

Project specifications will require dust control. As a long-term air quality benefit, installation of a more efficient and effective aeration system in the lagoon should improve odor control at the WWTF.

8. Public Health – Public health will not be negatively affected by the proposed project. The improved wastewater treatment system will reduce the potential to pollute surface water. Wastewater will be treated to the limits required by the district's MPDES permit prior to disposal. Ultraviolet disinfection of the lagoon discharge will decrease the potential of human exposure to pathogenic organisms in the wastewater effluent.
9. Energy – The consumption of energy resources directly associated with construction of the recommended improvements is unavoidable, but will be a short-term commitment. Upgrades to the lagoon aeration system and lift station will result in improved energy efficiency. The addition of ultraviolet (UV) disinfection with its housing (lighting, heating, ventilation, effluent flow meter) will require additional energy, but will be minimized as much as possible through the use of energy-efficient equipment.
10. Noise – Short-term impacts from excessive noise levels may occur during construction activities. The construction period will be limited to normal daytime hours to avoid early morning or late evening construction disturbances. No significant long-term impacts from noise should occur. The new blowers and lift station pumps will be quieter than the old equipment and will be housed within structures to help minimize noise.
11. Sludge Disposal – It is intended that all sludge (biosolids) will be dredged from the existing cells and land-applied in accordance with Federal 40 CFR 503 sludge disposal regulations in a one-time application. The Part 503 regulations contain specific numerical limits and other requirements for heavy metals, pathogens, and vector attraction. A potential contractor must perform verification of sludge quantity, in-place sludge nutrient content, identification of a disposal site, and nutrient testing of soils at the application site. The final sludge disposal plan utilizing this information must be submitted to the DEQ for review and approval prior to sludge disposal.

The sludge would be removed as a liquid using a dredge; dewatered; transported to appropriate, nearby farmland; and land-applied by surface incorporation. With an estimated 144,000 gallons of "wet" sludge, approximately 2 to 11 acres of rangeland is required, depending on the crop. The district's engineer has identified two potential sludge disposal sites within 5 miles of the existing lagoon. The landowners of these areas have not yet been contacted to verify that they would accept the sludge if it proves suitable to apply it on their land in accordance with Part 503 regulations. Soils in the Vaughn area are not generally suitable for sludge application, according to Natural Resources Conservation Service (NRCS) data. If a suitable land application site cannot be found, the sludge will be hauled to a landfill, presuming it meets the paint-filter liquids test and other requirements of the Part 258 Landfill Rule. The closest landfill to Vaughn that can accept wastewater sludge is Highplains Landfill north of Great Falls, approximately 25 miles from Vaughn.

12. Environmental Justice – Environmental Justice Executive Order 12898: The proposed project will not result in disproportionately high or adverse human health or environmental effects on minority or low income populations. All base sewer rates will be increased equally. No disproportionate effects among any portion of the community would be expected.
13. Wild and Scenic River Act – The proposed project will not impact any rivers designated as wild and scenic by Congress or the Secretary of the Interior.
14. Growth –The proposed wastewater improvements will be designed to serve the projected 2035 population of 975, an increase of 2 percent per year over the current population. This growth is estimated from historical population levels in Cascade County and within the Vaughn Census Designated Place and projected development.
15. Cumulative Effects – The increased capacity at the wastewater treatment plant may result in secondary and/or cumulative impacts due to growth of the community and expansion of the service area. Secondary impacts associated with housing, commercial development, solid waste, transportation, utilities, air quality, water utilization, and possible loss of agricultural and rural lands may occur. These secondary impacts are uncertain at this time, and therefore, cannot be directly addressed in the EA. However, these impacts will need to be managed and minimized as much as possible through proper community planning. There are several existing district, county and state regulations already in place (i.e., zoning regulations, comprehensive planning, subdivision laws, etc.) that control the density and development of property with regards to water supply, sewage disposal, solid waste disposal, transportation, and storm drainage.

B. UNAVOIDABLE ADVERSE IMPACTS

Short-term construction-related impacts (i.e., noise, dust, etc.) will occur, but should be minimized through proper construction management. Energy consumption during construction cannot be avoided.

VI. PUBLIC PARTICIPATION

During the 2012 Preliminary Engineering Report (PER) process, several public meetings were held to discuss possible wastewater treatment alternatives. A public work session was held in 2014 and several technical sessions were held for the district's board members during this period of time to better understand and evaluate feasible treatment technologies. On October 5, 2015, a public hearing was held to present a summary of the 2015 PER, and to discuss the alternatives considered and the impact on sewer user rates. Seventeen people attended the meeting. Some people expressed support for the submerged aerated gravel reactor (SAGR) since it was the lowest cost and simplest technology. Others at the meeting supported the storage and spray irrigation alternative

since it eliminated the surface water discharge and concern over stricter, future MPDES limits. Concern was also expressed over minimizing odors.

VII. AGENCY ACTION, APPLICABLE REGULATIONS AND PERMITTING AUTHORITIES

All proposed improvements will be designed to meet state standards in accordance with Circular DEQ-2, and will be constructed using standard construction methods. Best management practices will be implemented to minimize or eliminate pollutants during construction. No additional permits will be required from the State Revolving Fund (SRF) section of DEQ for this project after the review of the submitted plans and specifications. However, coverage under the storm water general discharge permit and groundwater dewatering discharge permit, if necessary, must be obtained from the DEQ Water Protection Bureau prior to the beginning of construction. A 124 Permit from the Department of Fish, Wildlife and Parks, a 404 Permit from the U.S. Corps of Engineers, and a 318 Authorization from the Department of Environment Quality will be obtained for any work that occurs in a streambed or (jurisdictional) wetlands, should it become necessary.

VIII. RECOMMENDATION FOR FURTHER ENVIRONMENTAL ANALYSIS

EIS More Detailed EA No Further Analysis

Rationale for Recommendation: Through this EA, DEQ has verified that none of the adverse impacts of the proposed Cascade County Vaughn Water and Sewer District wastewater improvements project are significant. Therefore, an environmental impact statement is not required. The environmental review was conducted in accordance with the Administrative Rules of Montana (ARM) 17.4.607, 17.4.608, 17.4.609, and 17.4.610. The EA is the appropriate level of analysis because none of the adverse effects of the impacts are significant.

IX. REFERENCE DOCUMENTS

The following documents have been utilized in the environmental review of this project and are considered to be part of the project file:

1. Cascade County Vaughn Water & Sewer District Preliminary Engineering Report, November 2015 (June 2016 – Revisions), Prepared by Great West Engineering.
2. Department of Environmental Quality, Permitting and Compliance Division, Montana Pollutant Discharge Elimination System (MPDES) Fact Sheet; August, 2012; Prepared by Christine Weaver.

X. AGENCIES CONSULTED

As part of the Preliminary Engineering Report (PER) process, the following agencies were contacted in regard to the proposed construction of this project:

1. The U.S. Fish and Wildlife Service (Service) was contacted in April 2014 with respect to the proposed project. They listed five threatened and endangered species that may occur within the boundaries of Cascade County. They do not anticipate any adverse effects to these species or their habitat as a result of the proposed project. There are no known bald eagle nests within one mile of the project site. Should eagle nests occur within 0.5 miles of the construction area, temporary seasonal and distance construction buffers are recommended.
2. The Montana Historical Society's State Historic Preservation Office (SHPO) reviewed the proposed project. They indicated that since the project is occurring on previously disturbed ground, there is low likelihood that cultural properties will be impacted. However, should structures need to be altered or cultural materials be inadvertently discovered during the project, SHPO must be contacted and the site investigated.
3. The U.S. Department of the Army Corps of Engineers (USCOE) provided comments on the proposed project. They indicated that no USCOE permit is required for any work within an active sewage lagoon, provided that no fill material will be placed either temporarily or permanently in a water of the United States. If any work is proposed below the ordinary high water mark of stream channels, lakes, or wetlands adjacent to these waters, then a Section 404 permit would apply and authorization from USCOE would be needed. The USCOE recommended that the project area should be evaluated for the presence of wetlands or waters of the US.
4. The Montana Department of Fish, Wildlife and Parks (FWP) commented in 2014 that they would prefer to see a more global approach taken to address wastewater problems in the Vaughn area. They would rather see a comprehensive plan developed for wastewater treatment along the Sun River and implemented for a much greater geographic area than Vaughn. There were no comments from the agency specific to fish and wildlife.
5. The Montana Department of Natural Resources and Conservation (DNRC) was contacted in 2014 with respect to potential floodplain impacts from the proposed wastewater treatment plant project. They noted that a portion of the proposed project may be located in the 100-year floodplain. The recommendation from the DNRC Water Resources Regional Office in Lewistown was that contact should be made with the local floodplain administrator for specific permit requirements.
6. The Cascade County Floodplain Administrator was contacted in May of 2015 with respect to the proposed project, at the recommendation of the DNRC. They verified that the wastewater treatment plant area and proposed facilities are within a Provisionally Accredited Levee and that for the time being the Federal Emergency Management Agency (FEMA) has accepted that the levee is protective of the 100-year flood. The USCOE requires an engineering study before they can review and re-certify the levee. It is not yet known if or when the USCOE, levee owner, or community might perform an engineering study. The wastewater project for Vaughn will need to be closely coordinated with the levee certification and ultimate accreditation process.

EA Prepared by:

Michele Marsh

Michele Marsh, P.E.

8-30-16

Date

EA Reviewed by:

Mike Abrahamson

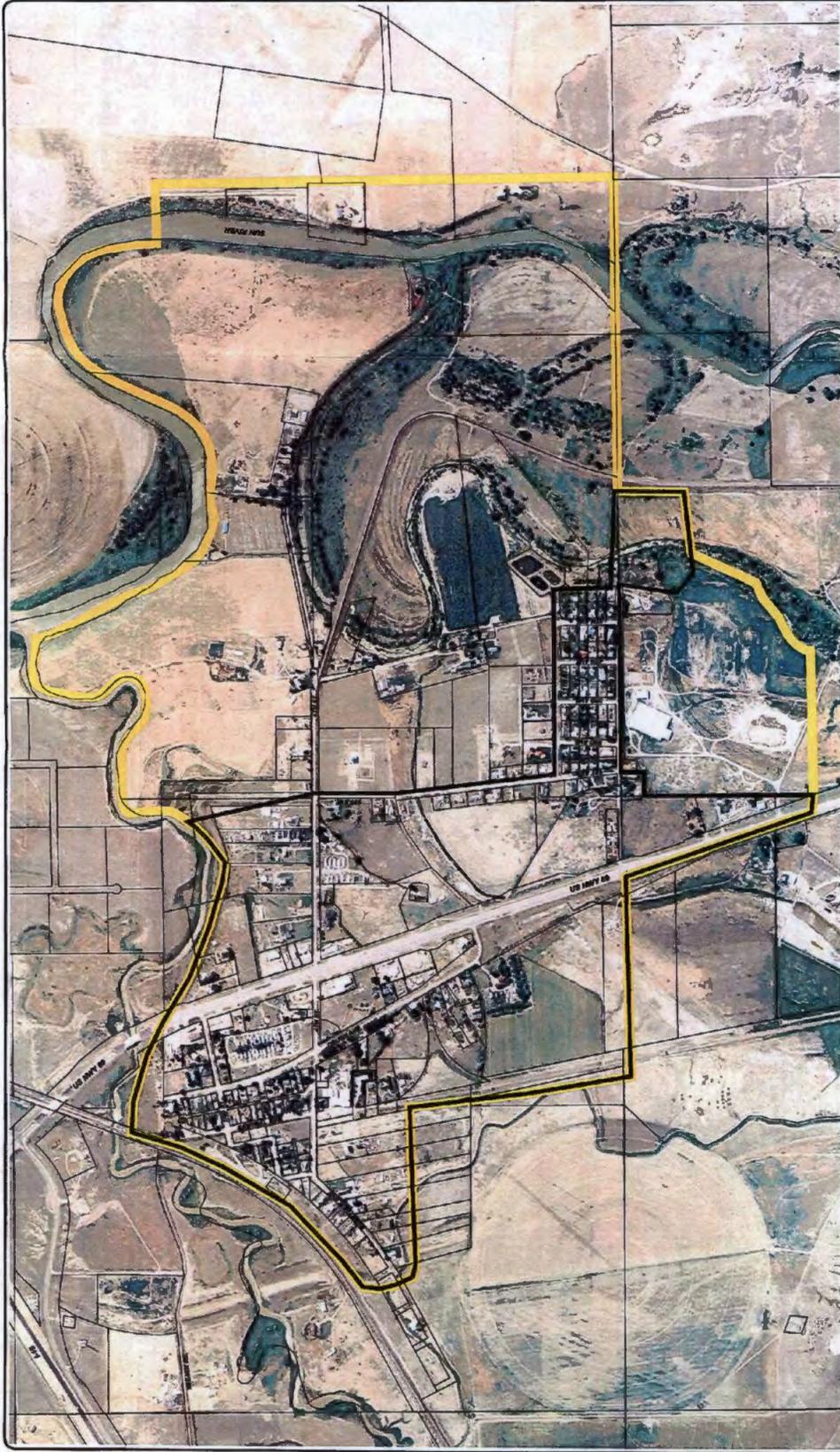
Mike Abrahamson, P.E.

8/30/16

Date



**FIGURE 1
LOCATION MAP**

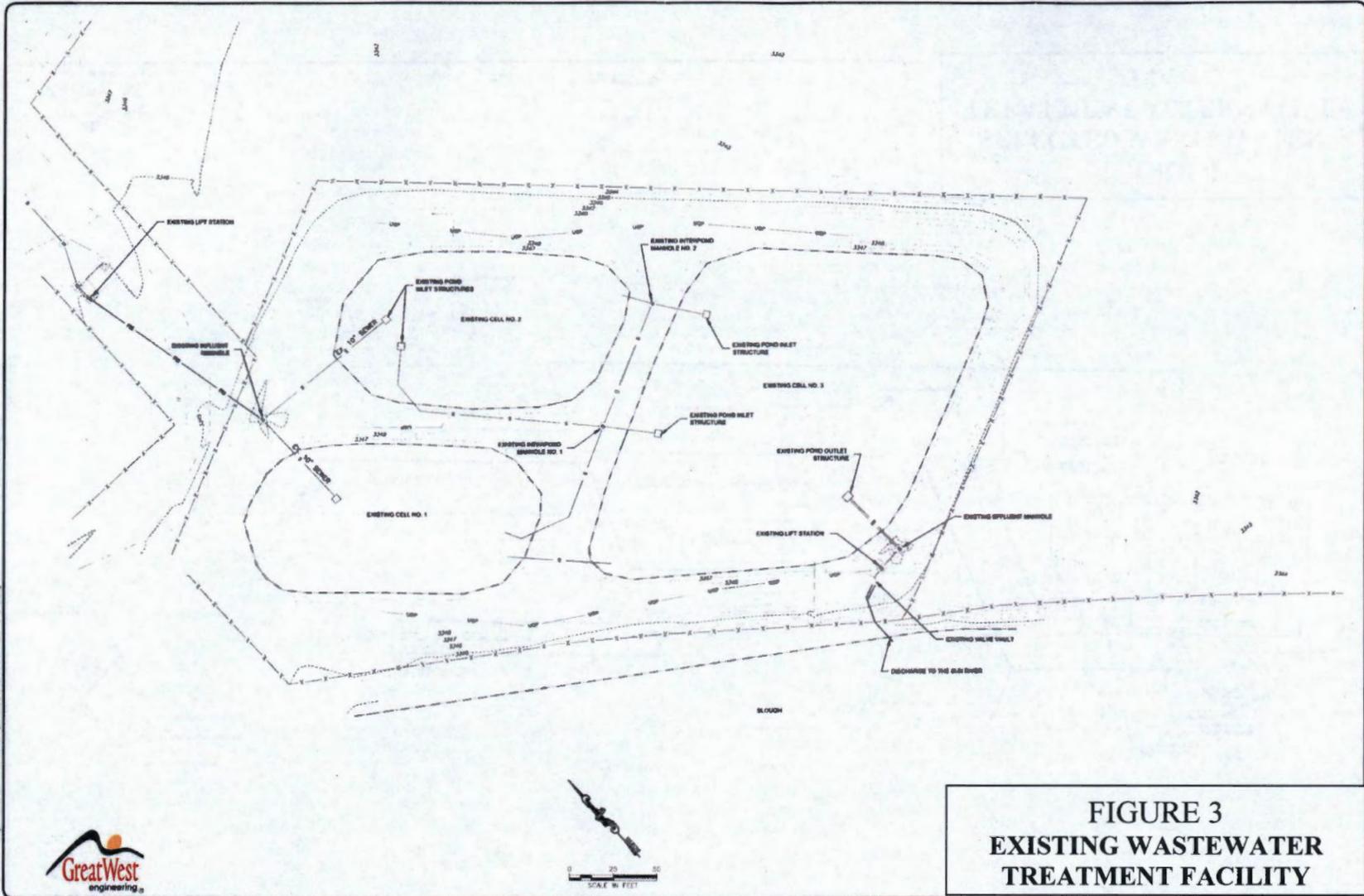


**FIGURE 2
PLANNING AREA BOUNDARY**

LEGEND

- MIDDLE CALIFORNIA COUNTY WATER AND SEWER DISTRICT BOUNDARY
- PLANNING AREA BOUNDARY / POLYLINE - PRELIMINARY BOUNDARIES SUBJECT TO CHANGE
- MIDDLE CALIFORNIA COUNTY WATER AND SEWER DISTRICT WASTEWATER SYSTEM
- PARCEL BOUNDARY (SOURCE: AERIAL PHOTO)





**FIGURE 3
EXISTING WASTEWATER
TREATMENT FACILITY**

