Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

PERMIT FACT SHEET

MONTANA GROUND WATER POLLUTION CONTROL SYSTEM (MGWPCS)

Permittee:	Four Corners Water & Sewer District (FCWSD)
Permit Number:	MTX000110
Permit Type:	Domestic wastewater
Application Type:	Modification
Facility Name:	Four Corners Water & Sewer District Wastewater System
Facility Location:	SE ¼ Section 23, Township 02S, Range 04E, Lot 4UL-3, Plat J-316, Elk Grove Subdivision Phase 1. Latitude: 45.644430°, Longitude: -111.19035°; Gallatin County, Montana
Facility Address:	495 Quail Run Road, Bozeman, MT 59718
Facility Contact:	Phil George, General Manager Larry Powers, Chief Operator Brad Hammerquist – Engineer – Morrison Maierle
Treatment Type:	Level 2
Receiving Water:	Class I Ground Water
Number of Outfalls:	3 Discharge structures
Outfall / Type:	Subsurface drainfields, infiltration ponds and spray irrigation
Effluent Type:	Domestic and commercial wastewater
Mixing Zone:	Standard
Effluent Limit Type:	WQBEL
Effluent Limits:	Total nitrogen: 31 lbs/day (Outfall 001) 128 lbs/day (Outfall 003)
Flow Rate:	Design maximum Outfall 001: 100,000 gallons per day (gpd) Design maximum Outfall 003: 1.4 million gallons per day (MGD)
Effluent sampling:	Quarterly: EFF-001, EFF-003
Ground water sampling:	Quarterly: MW-4, MW-4A, MW-4C, MW-2 , MW-2A, MW-2B, MW-3B
Fact Sheet Date:	November - December 2020
Prepared By:	Darryl Barton

1.0 PERMIT INFORMATION

DEQ issues MGWPCS permits for a period of five years. The permit may be reissued at the end of the period, subject to reevaluation of the receiving water quality and permit limitations. This fact sheet provides the basis for DEQ's decision to modify a MGWPCS wastewater discharge permit Four Corners Water & Sewer District for the Four Corners Water & Sewer District wastewater treatment system.

1.1 APPLICATION

DEQ received an application and verification of fees submitted for modification of the permit on August 26, 2020. DEQ reviewed the submittal and issued a completeness letter on September 24, 2020.

1.2 PERMIT HISTORY

Modifications to the system have routinely preceded the expiration date of the permit. This is the case for the current permit that is set to expire in 2023.

The current permit became effective March 1, 2018. Its expiration is February 28, 2023. This Fact Sheet and Permit is in response to a modification of the current permit.

This permit modification addresses:
- Increased discharge capacity of Outfall 003 to 1.4 MGD and replacement of subsurface RI with open I/P basins.
- Sequencing Batch Reactor construction with discharge capacity of 1.2 MGD.
- Outfall 002 will be eliminated.

Permit history details for Four Corners Water and Sewer District:

Date	**Effluent Limits**	**Groundwater Limits**
2001 – 2005	Nitrogen	None
2005 – 2006	Nitrogen, Phosphorus, Fecal Coliform Bacteria	Nitrate, Fecal Bacteria
2006 – 2010	Nitrogen, Phosphorus, Fecal Coliform Bacteria	Nitrate, Fecal Bacteria
2010 – 2015	Nitrogen, Phosphorus, Fecal Coliform Bacteria	Nitrate, Fecal Bacteria
2015 – 2018	Total Nitrogen, Total Phosphorus	TN, *E. coli*
2018 – 2023	Total Nitrogen, Total Phosphorus	TN, *E. coli*

1.3 CHANGES TO THIS PERMIT

FCWSD is in the process of constructing the first two phases of the new Four Corners Water Reclamation Facility (WRF) which consists of a sequencing batch reactor with a design capacity of 0.4 MGD. The WRF is designed to be capable of expanding incrementally to an ultimate capacity of 1.2 MGD. The new WRF will operate concurrently with the existing 0.3 MGD Elk Grove Wastewater Treatment Plant. The District currently has four permitted discharges as summarized in **Table 1**. However, Outfall 002 has not been constructed and is no longer a planned point of discharge.

Table 1. Outfall Summary

Effluent Outfall	Location	Type	Capacity	Status
001	Elk Grove Subdivision UL-2	Subsurface Infiltration/Percolation	100,000 gpd	Constructed
002	Rainbow Subdivision Lot C1-A, 195, 196, 199, and 200	Subsurface Pressure Dosed	35,537 gpd	Not Constructed
003	Rainbow Subdivision Lots 190-195, 199-203, 208-212, 214-215	Subsurface Rapid Infiltration and open IP Basins	540,000 gpd	Constructed
004	Elk Grove Subdivision RT-1	Spray Irrigation	25,000 gpd	Not Constructed

It is proposed to increase the permitted discharge quantity at Outfall 003 to 1.4 MGD and replace the existing subsurface rapid infiltration system with open infiltration percolation basins. There are no proposed changes to permitted Outfalls 001 and 004. Outfall 002 will be eliminated as it has never been constructed and a portion of the Outfall 002 area will be occupied by the new Four Corners WRF. Engineering plans and specifications are being submitted to DEQ separately for the Outfall 003 Improvements to replace the existing RI system with IP basins. These improvements will provide additional future capacity and provide the operators with access for cleaning and scarifying the basins.

Outfall 003 currently consists of subsurface Rapid Infiltration (RI) basins and open Infiltration Percolation (IP) basins with a permitted capacity of 200,000 gpd and 340,000 gpd, respectively. The existing subsurface RI basins are composed of 12 zones with manufactured infiltrator chambers, discharge piping in the chambers with orifices, actuated butterfly valves at each zone, transport piping, a submersible dose pump station, and buried fiberglass storage tanks with 22,000 gallons of volume. A controls system monitors the storage tank water levels, runs the dose pumps, monitors and records pumped flow, and controls zone valves. A rotation through the 12 zones is automated by the valves and programmable at the control panel to produce wetting and drying schedules. Existing disposal infrastructure at Outfall 003 was constructed in 2006 and began receiving effluent in 2011 when UV improvements were completed at the treatment plant. The existing RI basin infrastructure was designed and permitted in 2004 under previous rules that did not include the current Section 122.22 requirements for subsurface absorption cells. The existing open IP basins are composed of three basins which were constructed in 2015 in accordance with Section 122.1. The IP basins utilize the same treated effluent storage tanks and submersible dose pump station described above. A separate building houses the valves that control dosing to each of the basins.

In summary the permit modification addresses:

- Increase discharge capacity of Outfall 003 to 1.4 MGD and replace subsurface rapid infiltration galleries (RI) with open infiltration/percolation basins (I/P).
- Use of a Sequencing Batch Reactor to treat wastewater.
- Outfall 002 will be eliminated

As the modifications to the system constitute an increased discharge, DEQ performed new nonsignificance determinations to meet nondegradation requirements.

Effluent limitations have been updated using current water quality data.

2.0 FACILITY INFORMATION

2.1 LOCATION

The Four Corners Water and Sewer District (FCWSD) wastewater treatment system is located in the Four Corners area of the Gallatin Valley, which is about 5 miles west of Bozeman and about 6.5 miles south of Belgrade (**Figure 1**). The system serves a population of about 22,000 people, and 168 commercial / industrial connections. The area has seen extensive growth and development over the past two decades and looks to see more in the future. **Figure 2** depicts the FCWSD service area and **Figure 3** shows the components of the wastewater system.

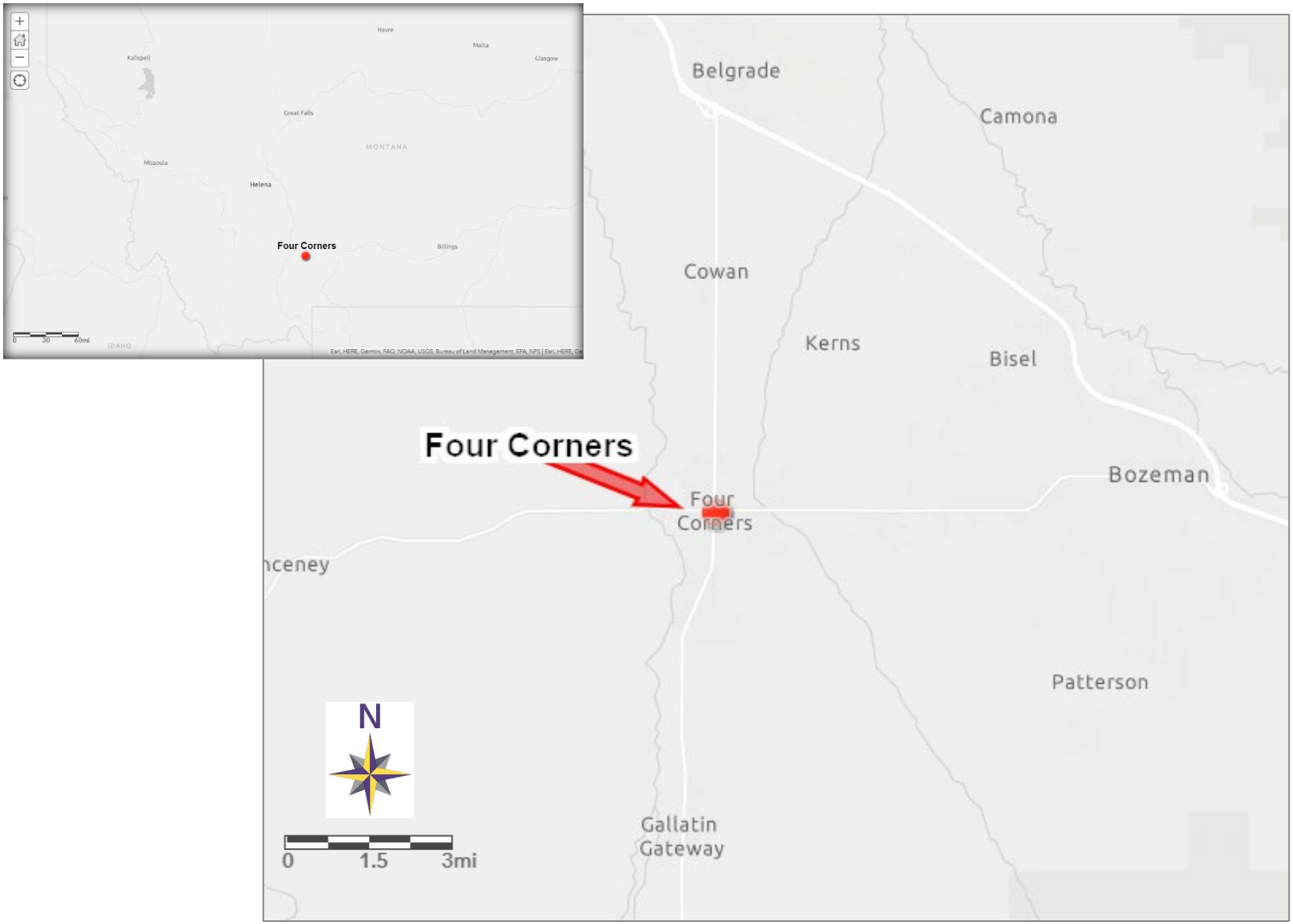
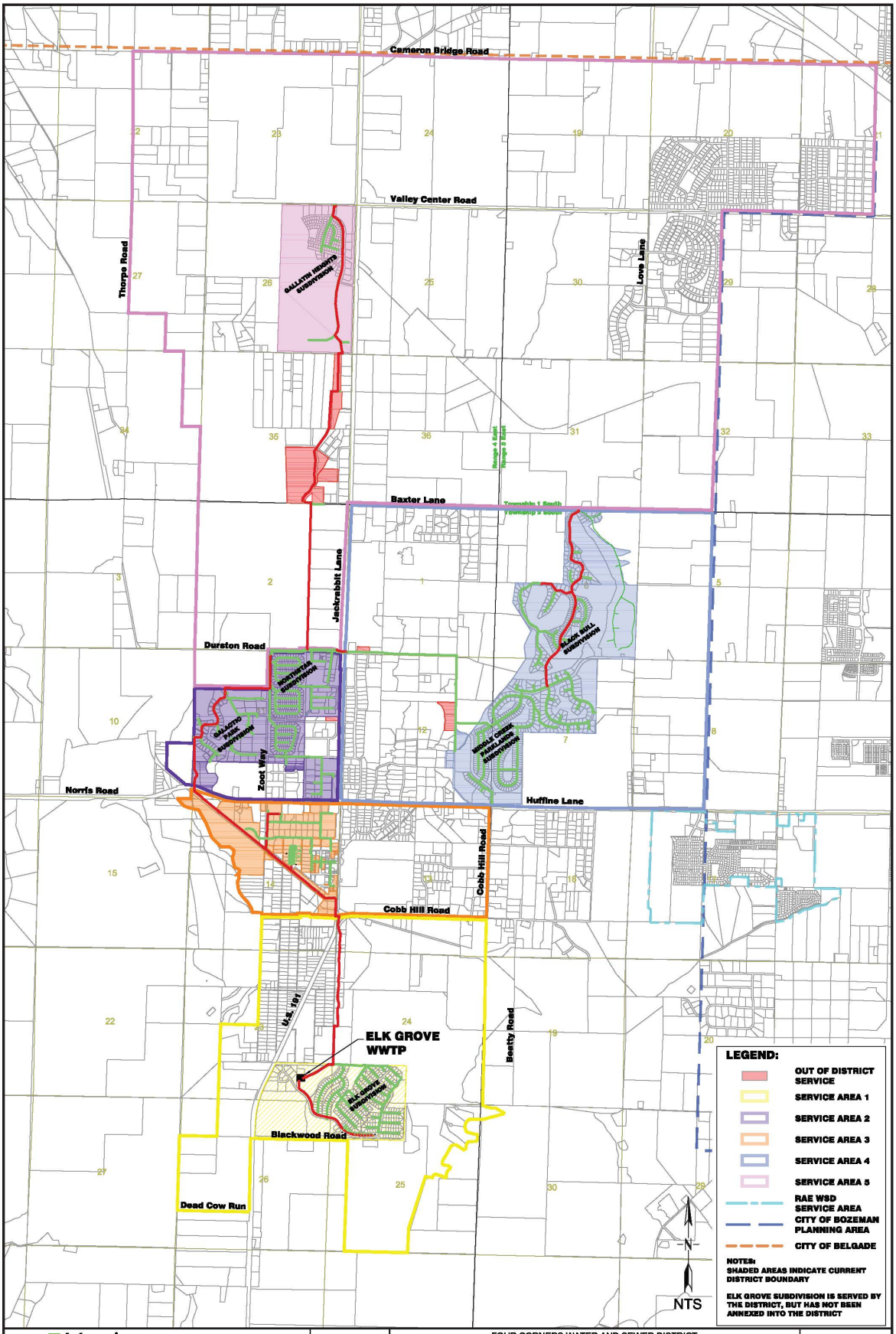


Figure 1. Location of Four Corners Water & Sewer District



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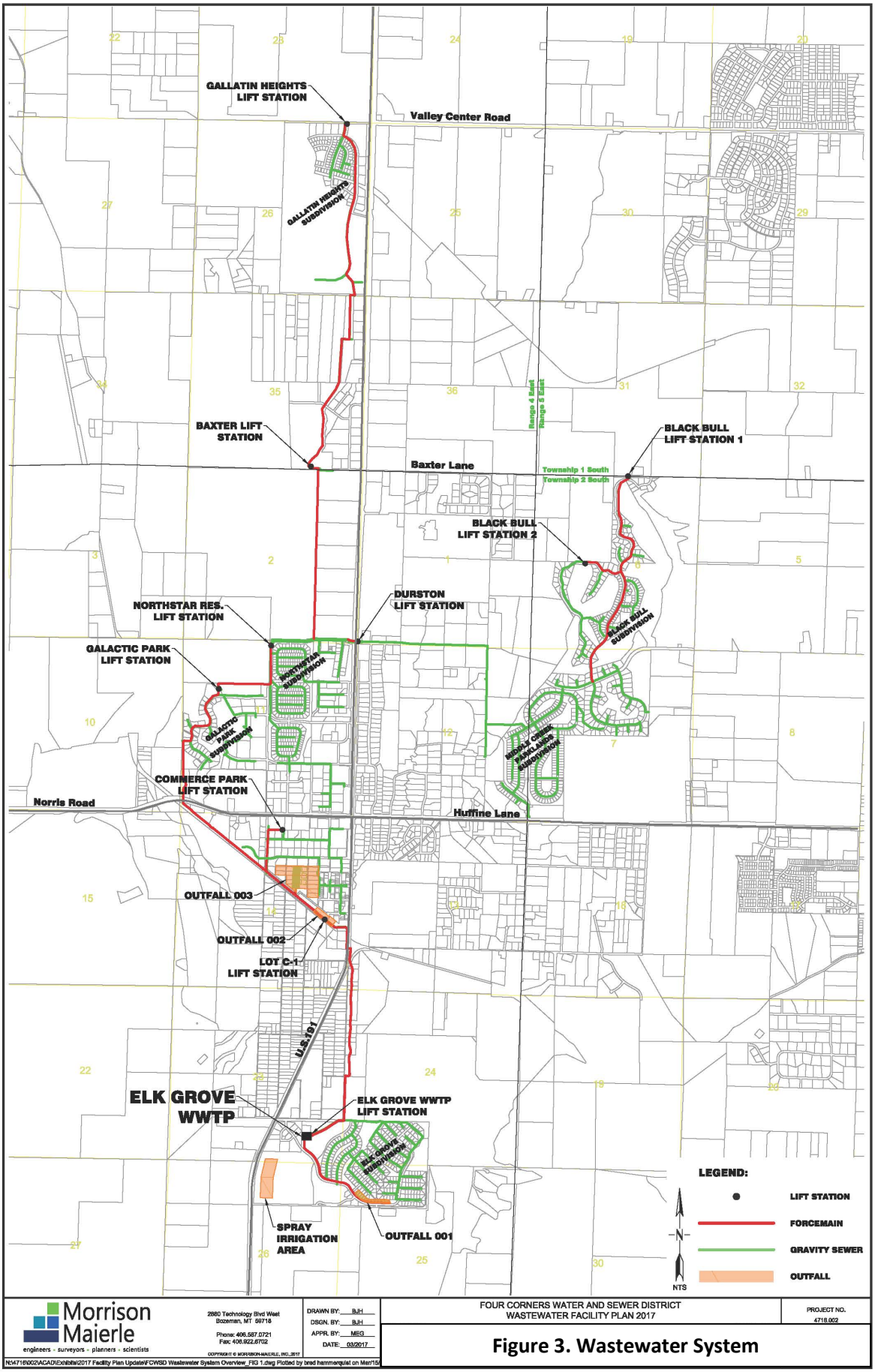
N:\4715\002\ACAD\Exhibits\2017 Facility Plan Update\FCWSD District Boundary and Service Areas_FIG 3.dwg Fig May 30, 2017

DRAWN BY: MET
DSGN. BY: BJH

FOUR CORNERS WATER AND SEWER DISTRICT
WASTEWATER FACILITY PLAN 2017

PROJECT NO.
4715.002

Figure 2. Four Corners Water & Sewer District Service Area


GALLATIN HEIGHTS LIFT STATION
Valley Center Road
GALLATIN HEIGHTS SUBDIVISION
BAXTER LIFT STATION
Baxter Lane
BLACK BULL LIFT STATION 1
BLACK BULL LIFT STATION 2
BLACK BULL SUBDIVISION
DURSTON LIFT STATION
NORTHSTAR RES. LIFT STATION
NORTHSTAR SUBDIVISION
GALACTIC PARK LIFT STATION
GALACTIC PARK SUBDIVISION
MEDLEY CREEK PARKLANES SUBDIVISION
COMMERCE PARK LIFT STATION
Norris Road
Huffine Lane
OUTFALL 003
OUTFALL 002
LOT C-1 LIFT STATION
U.S. 191
ELK GROVE WWTP
ELK GROVE WWTP LIFT STATION
ELK GROVE SUBDIVISION
SPRAY IRRIGATION AREA
OUTFALL 001
Township 1 South
Township 2 South
Range 4 East
Range 3 East
LEGEND:
LIFT STATION
FORCEMAIN
GRAVITY SEWER
OUTFALL
N
NTS
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APPR. BY: MEG
DATE: 03/2017
FOUR CORNERS WATER AND SEWER DISTRICT
WASTEWATER FACILITY PLAN 2017
PROJECT NO. 4718.002
Figure 3. Wastewater System

2.2 OPERATIONS

System operations are summarized in **Table 2**.

Table 2. Collection, Treatment, and Disposal System Summary

Elk Grove Wastewater Treatment Plant - Domestic Wastewater/Sewerage

Sewage is collected from Elk Grove Subdivision, Northstar Subdivision, Galactic Park Subdivision, Four Corners Minor Subdivision, Rainbow Subdivision, Black Bull Subdivision, Middle Creek Parklands Subdivision, Gallatin Heights Subdivision, and many small commercial/business parks.

Four Corners W&S Distr. WWTP Location. Address: 195 Elk Grove Lane, Bozeman, MT 59718.
Latitude: 45.64443º Longitude: -111.19035º
NW ¼ SE ¼ Section 23, Township 02S, Range 04E, Lot 4, Platt J-316, Elk Grove Subdivision Phase 1
Contributing Sources of Wastewater: Residential and limited commercial / industrial (domestic strength wastes).

Daily Maximum Design Flow (gallons/day): 700,000 (ft^3/day): 116,970

Treatment: Level 2 via a closed loop reactor with extended aeration, secondary clarification, and aerobic sludge digestion. Refer to **Figure 4** for the WWTP processes.

Outfall 001 - Domestic Wastewater/Sewerage

Method of Disposal: Infiltration/percolation to ground water.

Disposal Structure: Subsurface dosed infiltration/percolation cells (Outfall 001).
673 Elk Grove Lane, Bozeman, MT 59718
Latitude: 45.63933º Longitude: -111.18276º,
SW 1/4 NW 1/4 of Section 25, Township 02 South, Range 04 West, Elk Grove Subdivision Ph. 1, Lot 02.
Contributing Sources of Wastewater: Residential and limited commercial / industrial (domestic strength wastes).

Daily Maximum Design Flow (gallons/day): 100,000 (ft^3/day): 13,368

Treatment: Level 2 via a closed loop reactor with extended aeration, secondary clarification, and aerobic sludge digestion. Refer to **Figure 4** for the WWTP processes.

Outfall 002 - Domestic Wastewater/Sewerage

Outfall 002 discharge has not been installed. Outfall 002 is no longer intended to be a point of wastewater discharge.

Outfall 003 - Domestic Wastewater/Sewerage

Method of Disposal: Infiltration to ground water

Disposal Structure: Subsurface Rapid Infiltration and Infiltration Percolation Basins (Outfall 003).

Latitude: 45.66597º Longitude: -111.19117º
NE 1/4 of Section 14, Township 02 South, Range 04 East, Rainbow Subdivision Lots 190-196, 199-203, & 208-212, Plat D-42.
Contributing Sources of Wastewater: Residential and limited commercial / industrial (domestic strength wastes).

Daily Maximum Design Flow (gallons/day): 540,000 current, (ft^3/day): 90,241 current; 1.4 MGD new

Treatment: Level 2 via a Sequencing Batch Reactor.
Refer to **Figure 4** for the WWTP processes

Outfall 004 - Domestic Wastewater/Sewerage

Method of Disposal: Spray Irrigation to the ground surface; applied at agronomic rates.
This Outfall is not regulated by this 2020 DEQ MGWPCS Permit.

Disposal Structure: Surface application of effluent at agronomic rates (Outfall 004).
These structures have not been installed and are not currently discharging effluent to the ground surface.

Latitude: 45.64076º Longitude: -111.19485º
W 1/2 NW 1/4 NE 1/4 of Section 26, Township 02 South, Range 04 East, Elk Grove Subdivision Ph. 4, Tract 1, Plat J-394.
Contributing Sources of Wastewater: Residential and limited commercial / industrial (domestic strength wastes).

Daily Maximum Design Flow (gallons/day): 25,000 (ft^3/day): 3,342

Treatment: Level 2 via a closed loop reactor with extended aeration, secondary clarification, and aerobic sludge digestion. The effluent that is sent to Outfalls 003 and 004 is disinfected with UV Radiation. Phosphorous removal is achieved by chemical precipitation. Refer to **Figure 4** for the WWTP processes.

Table 2. Collection, Treatment, and Disposal System Summary
Status: Not currently being used for wastewater disposal.

Four Corners has been a growing area over the past few decades. The system is designed to be able to accommodate an increase in service area and connections. The existing Elk Grove Wastewater Treatment Plant (WWTP) is a closed loop reactor with extended aeration, secondary clarification, aerobic sludge digestion, and ultraviolet (UV) disinfection. Biosolids are land applied. A dewatering facility (screw press) reduces biosolids hauling costs. The Four Corners Water Reuse Facility (WRF) is under the first phase of construction (0.4 MGD capacity). It is a Sequencing Batch Reactor (SBR) with ultraviolet (UV) disinfection. Biosolids will be dewatered (screw press) and taken to the Logan Landfill for use in their compost program. The Four Corners WRF is designed to be capable of incremental expansion up to an ultimate capacity of 1.4 MGD. Overall, Level 2 treatment is achieved.

Monitoring and sampling requirements are discussed in **Section 6**.

Figure 4 is a line drawing of the collection, treatment, and disposal process.

2.2.1 EFFLUENT DISCHARGE STRUCTURES

Table 1 describes discharge structures. **Figures 2 and 3** show each on a map.

- Outfall 001 is the historic outfall for the Elk Grove WWTP and is located south of the Elk Grove Subdivision. It consists of subsurface discharge by infiltration/percolation cells.
- Outfall 002 was planned and not built. It will not be an outfall.
- Outfall 003 consists of rapid infiltration galleries (RI) and infiltration/percolation basins. These are installed and currently being used for subsurface effluent disposal. This permit modification increases discharge capacity of Outfall 003 to 1.4 MGD and replaces subsurface RI with open I/P basins.
- Outfall 004 will be an area where effluent is discharged to the ground surface through sprinklers. The permittee is required to land apply treated wastewater at agronomic rates in accordance with Department review and any subsequent updates issued by the Department. In general, the permittee is prohibited from:
    1. Applying above agronomic rates that may lead to an unauthorized infiltration of pollutants to state ground water; and,
    2. Operating in a manner that results in standing wastewater or overland flow.

  Although the effluent flow and quality will be monitored, this discharge is not regulated through a MGWPCS permit. This irrigation system has not been installed.

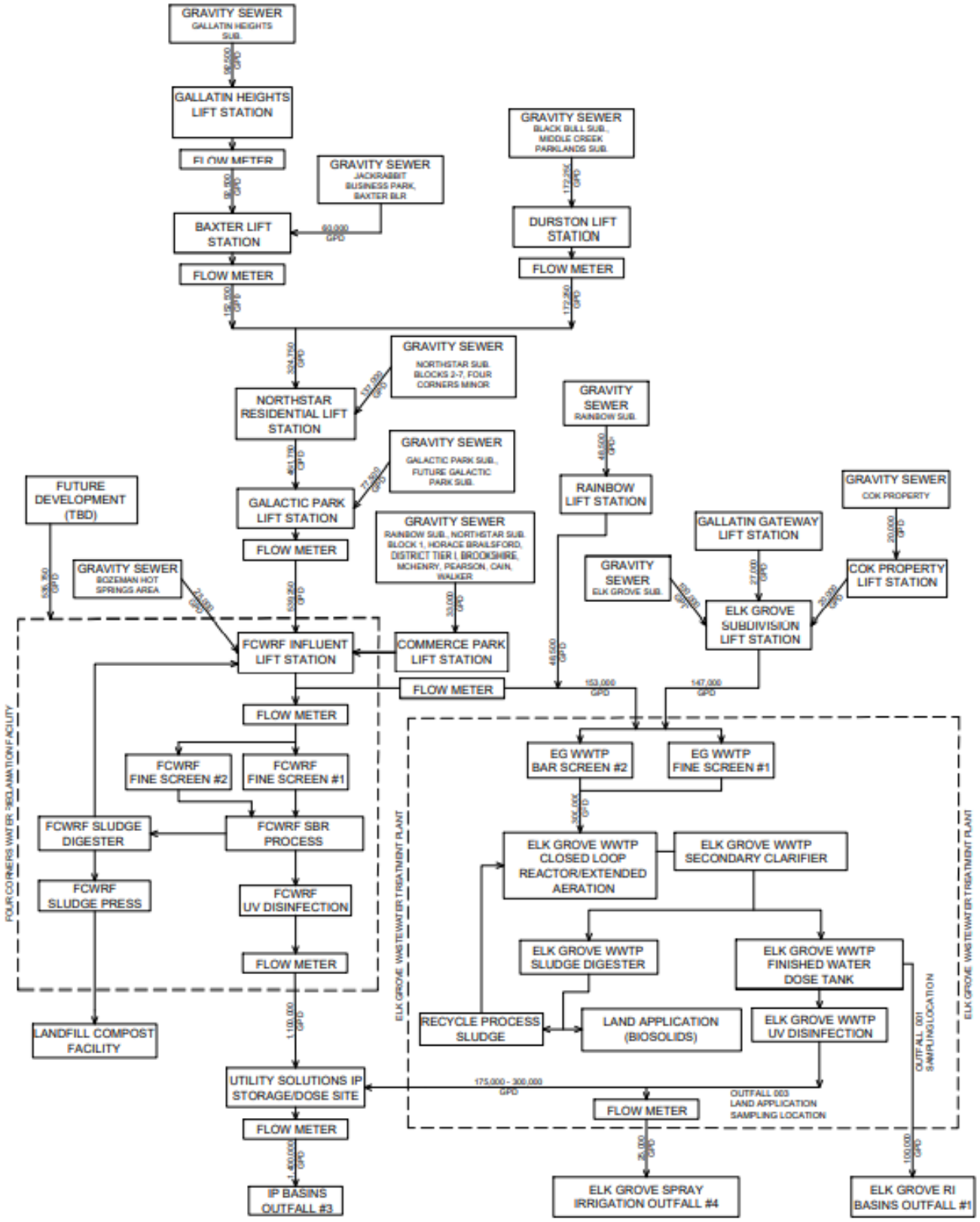


Figure 4. Wastewater System Line Diagram.

2.3 EFFLUENT CHARACTERISTICS

DEQ requires a permit applicant to disclose the quality of the effluent so that DEQ may evaluate the potential for pollution of state water. During the previous permit cycle, the facility sampled and reported effluent quality criteria to DEQ in the form of discharge monitoring reports (DMRs). These data are summarized below in **Table 3**. The majority of the concentrations are reported in units of milligrams per liter (mg/L), which is equivalent to one part per million.

Table 3: Effluent Quality – Outfall 003. DMR Results

Parameter[1]	Location	Units	Reported Minimum Value	Reported Average Value	Reported Maximum[2] Value	# of Samples
BOD, 5-day	EFF-003	mg/L	1.50	7.07	23.0	31
Chloride	EFF-003	mg/L	117	182	216	31
E. coli	EFF-003	cfu/100mL	1	32	318	31
Flow rate, Discharge	FM-003	gpd	251,613	283,116	355,000	31
Nitrogen, Nitrate + Nitrite (as N)	EFF-003	mg/L	2.87	6.83	10.7	31
Nitrogen, Ammonia	EFF-003	mg/L	0.06	0.17	0.50	31
Nitrogen, Total Kjeldahl (as N)	EFF-003	mg/L	1.00	2.43	5.50	31
Nitrogen, Total (as N) [3]	EFF-003	mg/L	3.05	8.65	13.2	31
		lbs/day	6.99	20.9	32.3	31
Phosphorus, Total (as P) [4]	EFF-003	mg/L	0.12	0.70	1.89	31
		lbs/day	0.25	1.69	4.79	31
Total Suspended Solids (TSS)	EFF-003	mg/L	5.0	11.4	55.0	31

Footnotes:
DMR = Self-Reported Discharge Monitoring Reports
EFF-003: Effluent sample site located after UV disinfection prior to discharge.
FM-003: Effluent flow meter located after UV disinfection prior to discharge.
Period of Record: 03/01/2018 through 09/30/2020.
(1) Conventional and nonconventional pollutants only, table does not include all possible toxics.
(2) Maximum value recorded of all quarterly reported Daily Maximum Values.
(3) Effluent limit for Total Nitrogen is 44.4 lbs/day
(4) Effluent limit for Total Phosphorus is 18.2 lbs/day

2.4 GEOLOGY

The Gallatin Valley is a topographic and structural intermontane basin bounded by folded and faulted sedimentary, metamorphic, and igneous rocks ranging from Precambrian to Cretaceous age. The Gallatin valley is in the Three Forks structural basin which includes the Gallatin Valley, the Madison Valley, and the lower Jefferson River Valley. The Gallatin valley today is a remnant of a combination of early Tertiary Laramide compressional uplift and mid to late Tertiary Basin and Range extensional movement. The Laramide uplift folded and faulted the crust forming the ancestral Rocky Mountains. Subsequent extensional movement reactivated Laramide faults and pulled the ancestral Rockies apart, leaving a series of basins separated by north to south trending mountain ranges. The Gallatin Valley, along with the Madison and lower Jefferson Valleys of today are each a portion of one of these large basins; the Three Forks structural basin. The Three Forks Basin continued to gradually subside throughout mid to late Tertiary times and includes a large volume of erosional debris from the bounding

highlands and a considerable amount of volcanically derived sediments as well. Sediments within the basin vary compositionally from Archean gneisses and schists to Paleozoic carbonates and sandstones to reworked early to mid-Tertiary mudstones, sandstones, and conglomerates.

The discharge structures and irrigation area are all located in the alluvial deposits of the nearby West Gallatin River. Based on the Natural Resource Conservation Service mapping, the soils in this area consist primarily of sandy, gravelly, and cobbly loams. The local soils have developed on the valley fill stream and alluvial fan deposits of the Gallatin River. These deposits are approximately 200 feet thick and are composed of silt, sand, and gravel that were derived from the Gallatin Range to the south. This area is located directly east of the Gallatin River and its current floodplain.

2.5 HYDROGEOLOGY

An alluvial aquifer begins at the mouth of the Gallatin Canyon about 4 miles southwest of Gallatin Gateway. The aquifer extends north through the Four Corners area beyond Belgrade along the Gallatin River. It exits the valley northwest of Manhattan where the Gallatin River concludes forming the Missouri River. Ground water in this area has been monitored to better understand the water quality characterization and meet permit requirements. Ground water is present in the shallow unconfined alluvial aquifer beneath this area. Ground water flow direction is generally between North 3° West and North 16° West. Ground water gradients are reported to be between 0.0066 and 0.0068 feet/feet. The hydraulic conductivity beneath Outfall 001 has been characterized as 877 feet/day and beneath Outfall 003 as 567 feet/day. The depth to the water table averages 19 feet bgs (below ground surface) in the Outfall 001 area, 11 feet bgs at Outfall 003, and 6 feet bgs in the land application site (Outfall 004). Important hydrogeologic characteristics are summarized below in **Table 4**.

Table 4. Hydrogeologic Summary

Average depth to ground water	19 feet (Outfall 001), 11 feet (Outfall 003), 6 feet (Outfall 004)
General ground water flow direction	N3°W to N16°W
Hydraulic conductivity	877 feet per day (Outfall 001), 567 feet per day (Outfall 003)
Hydraulic gradient	0.0066 feet/feet (Outfall 001) and 0.0068 feet/feet (Outfall 003)
Nearest downgradient surface water	Gallatin River (2,300 feet from Outfall 001) (3,100 feet from Outfall 003)

2.6 GROUND WATER MONITORING WELLS

There are 7 monitoring wells actively being used in relation to this permit (10 wells on the site). MW-4 and MW-4A are downgradient of Outfall 001; MW-4C is upgradient of Outfall 001. MW-2 and MW-2A are downgradient of Outfall 003; MW-2B is upgradient of Outfall 003. MW-3B is upgradient of Outfall 004. Monitoring well construction details are provided below in **Table 5**. Monitoring well maps and driller's logs are attached as **Appendix A**.

Table 5. Monitoring Well Summary

Monitoring Well: MW-2
MBMG GWIC ID: 224342
Constructed on 03/16/2006
Location: 100 Shepherd Trail, midway between Graves Trail and Shepherd Trail.
This well is collocated with MW-2a.
Latitude: 45.66832º Longitude: -111.191021º
Representation: Used as a downgradient water table monitoring point from Outfall 003. This is the shallow well of the well pair at this site.

Monitoring Well: MW-2A
MBMG GWIC ID: 224341
Constructed on 03/14/2006.
Location: 100 Shepherd Trail, midway between Graves Trail and Shepherd Trail.
This well is collocated with MW-2.
Latitude: 45.66832º Longitude: -111.191021º
Representation: Used as a downgradient water table monitoring point from Outfall 003. This is the deeper well of the well pair at this site.

Monitoring Well: MW-2B
MBMG GWIC ID: 224343
Constructed on 03/17/2006.
Location: Just north of 1981 Milwaukee Road, and just east of the Effluent Force Main and Dose Tanks for Outfall 003.
Latitude: 45.66832º Longitude: -111.191021º
Representation: Used as an up-gradient shallow water table monitoring point from Outfall 003.

Monitoring Well: MW-2C
MBMG GWIC ID: 224344
Constructed on 03/17/2006. **Not currently used.**
Location: In the north central portion of 213 Milwaukee Road and northwest of the Effluent Force Main and Dose Tanks for Outfall 003.
Latitude: 45.66832º Longitude: -111.191021º
Representation: Used as a side-gradient monitoring point from Outfall 003 and possible side or upgradient shallow water table monitoring point from Outfall 002A (when it is brought on-line).

Monitoring Well: MW-3
MBMG GWIC ID: 240500
Constructed on 12/12/2007. **Not currently used.**
Location: downgradient end of Outfall 004 (the land application site).
Representation: Downgradient from Outfall 004.

Monitoring Well: MW-3B
MBMG GWIC ID: 240498
Constructed on 12/11/2007.
Location: Situated southwest of the Elk Grove Subdivision 14 Blackwood Road. It is northeast of the intersection between Gallatin Road (Highway 191) and Blackwood Road.
Latitude: 45.45.63908º Longitude: -111.19462º
Representation: Up-gradient monitoring well end of the land application site.

Monitoring Well: MW-4 MBMG GWIC ID: 240503 Constructed on 12/18/2007. Location: In the southwest portion Elk Grove Subdivision near 16 East Clara Court and north of Outfall 001. Well is collocated with MW-4A. Latitude: 45.64022º Longitude: -111.18369º Representation: Used as a downgradient water table monitoring point from Outfall 001. It is likely that this is the shallower of the well pair at this site.
Monitoring Well: MW-4A MBMG GWIC ID: 240505 Constructed on 12/18/2007. Location: In the southwest portion Elk Grove Subdivision near 16 East Clara Court and north of Outfall 001. Well is collocated with MW-4. Latitude: 45.64022º Longitude: -111.18369º Representation: Used as a downgradient water table monitoring point from Outfall 001. It is likely that this is the deeper of the well pair at this site.
Monitoring Well: MW-4B MBMG GWIC ID: 240502 Constructed on 12/14/2007. **Not currently used.** Location: In the southwest portion Elk Grove Subdivision near 388 Pavilion Lane and west of Outfall 001. Latitude: 45.63906º Longitude: -111.18454º Representation: Used as a side-gradient water table monitoring point from Outfall 001.
Monitoring Well: MW-4C MBMG GWIC ID: 240501 Constructed on 12/13/2007. Location: In the south portion the Elk Grove Subdivision near 12 Gloria Court and east of Outfall 001. Latitude: 45.63891º Longitude: -111.17993º Representation: Used as a side or up-gradient water table monitoring point from Outfall 001.
Footnotes: GWIC well logs and well locations are found in **Appendix A**.

If a DEQ-approved monitoring well is abandoned, destroyed or decommissioned, or is no longer able to be sampled due to fluctuations in the ground water table, the permittee must install or designate a new well to replace the abandoned, destroyed, decommissioned, or non-viable well.

2.7 GROUND WATER QUALITY CHARACTERISTICS

Water sampling results from upgradient wells MW-4C, MW-2B and MW-3B provide an average of 468 microsiemens per centimeter (µS/cm) specific conductance. Therefore, the receiving water is Class I ground water. Class I ground water has a specific conductivity of less than or equal to 1,000 µS/cm (µmhos/cm) at 25° C.

Total nitrogen (TN) and *Escherichia coli* bacteria were monitored groundwater limits. TN limit is 7.5 mg/L and *Escherichia coli* bacteria is 1 CFU/100L. For all the wells, *Escherichia coli* bacteria results averaged less than 1 CFU/100 ml in all the quarterly sampling cycles. Total nitrogen was below 7.5 mg/L in all quarterly samples. **Table 6** summarizes the concentration of TN found in ambient and downgradient monitoring wells relative to the outfalls.

Table 6. Ground Water Monitoring Results – Summary of Total Nitrogen

Outfall	Monitoring Well	Representation	Units	Reported Average Value[(1)]
001	MW-4	downgradient from 001	mg/L	2.90
	MW-4A	downgradient from 001	mg/L	2.45
	MW-4C	upgradient from 001	mg/L	1.38
003	MW-2	downgradient from 003	mg/L	3.59
	MW-2A	downgradient from 003	mg/L	4.02
	MW-2B	upgradient from 003	mg/L	2.42
004	MW-3B	upgradient from 004	mg/L	3.45

Footnotes:

For all the wells, *Escherichia coli* bacteria results averaged < 1 CFU/100 ml.

(1) Data from Self-Reported Discharge Monitoring Reports (DMR)

3.0 WATER QUALITY STANDARDS AND NONDEGRADATION

Part of DEQ's mission is to protect, sustain, and improve the quality of state waters. Water quality standards provide the basis for effluent limits that DEQ applies to discharge permits (**Section 5**). These standards include three components: designated uses, water quality criteria, and nondegradation policy. DEQ protects all designated uses of state water by basing effluent limits on the most restrictive water quality limitations, intended to protect the most sensitive uses.

3.1 DESIGNATED USES

With a specific conductivity of 468 µS/cm, the receiving water is Class I ground water and therefore a high-quality water of the State. Class I ground waters must be maintained suitable for the following uses with little or no treatment:

- Public and private drinking water supplies
- Culinary and food processing purposes
- Irrigation
- Drinking water for livestock and wildlife
- Commercial and industrial purposes

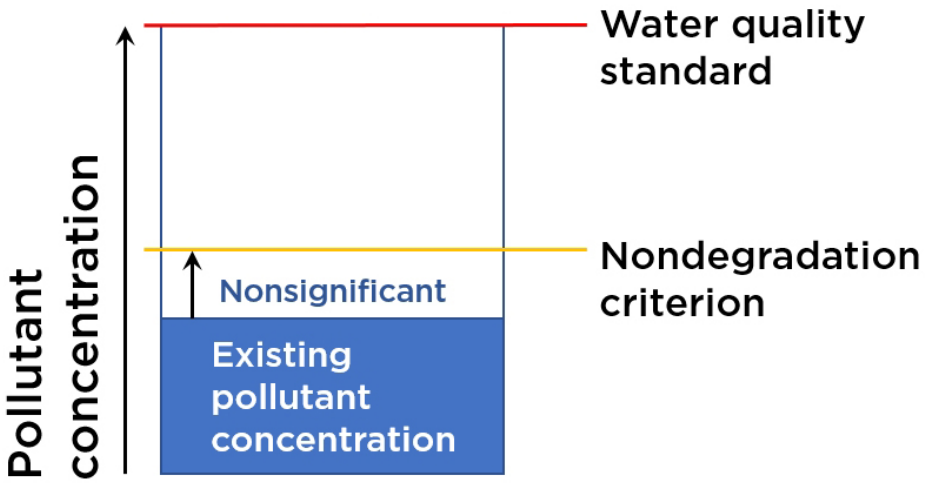
DEQ protects all the assigned beneficial uses by protecting the most sensitive. Drinking water is the most sensitive use of this receiving water.

3.2 WATER QUALITY CRITERIA

Montana has water quality standards for both surface water and ground water. The numeric criteria for each are different because they must support different uses. DEQ writes permits to protect the most sensitive, thereby protecting all uses. DEQ's ground water standard for nitrate is 10.0 mg/L, as is the standard for nitrate + nitrite (as nitrogen). Class I ground water must be maintained suitable for use as a drinking water supply with little or no treatment, and therefore must meet the corresponding human health standard of 10.0 mg/L total nitrogen. These water quality standards may not be exceeded outside a designated mixing zone (**Section 4**).

3.3 NONDEGRADATION

Montana's nondegradation policy is intended to preserve the existing condition of high-quality state waters. Any water whose existing condition is better than the water quality standards must be maintained in that high quality. Nondegradation policy allows discharges to cause only nonsignificant changes in water quality. Changes in water quality that are deemed significant require an authorization to degrade. An authorization to degrade is not an authorization to pollute; the water quality standard must not be exceeded.



DEQ must determine whether the proposed discharge will result in significant changes in water quality.

3.4 NONSIGNIFICANCE

The proposed activity is a NEW OR INCREASED source resulting in a change of existing water quality occurring on or after April 29, 1993 (ARM 17.30.702). The applicable water quality standards for Class I ground water and nonsignificance projections are provided in **Appendix B**. Discharges in compliance with the limitations of this permit are considered nonsignificant. The permit includes monitoring, reporting and corrective action requirements to establish, confirm, and maintain compliance with the permit limits. DEQ must determine whether these water quality changes are significant. Some nonsignificant activities are specified in the Administrative Rules of Montana; other activities are evaluated for significance according to a process provided in the Rules. DEQ evaluated the significance of this discharge using the criteria and methods described below.

For this discharge to ground water, the following nonsignificance criteria are relevant:

Nitrogen

Under Montana statute, ground water total nitrogen at or below 7.5 mg/L at the downgradient end of the mixing zone (see **Section 4**) is a nonsignificant change in water quality, so long as the discharge does not cause degradation of surface water. Evaluation of the effects to surface water are discussed below in **Section 3.4.2**. Using the nonsignificance criterion of 7.5 mg/L, DEQ established effluent limits that cause the discharge to comply with ground water nonsignificance/nondegradation criteria at the end of the mixing zone. This is discussed in detail in **Section 5.1**.

Phosphorus

A total phosphorus surface water breakthrough time of greater than 50 years is a nonsignificant change in water quality. The phosphorus criterion requires an analysis to determine a breakthrough time. Breakthrough occurs when the subsurface soils lose their capability to adsorb any more phosphorus, and it reaches surface water.

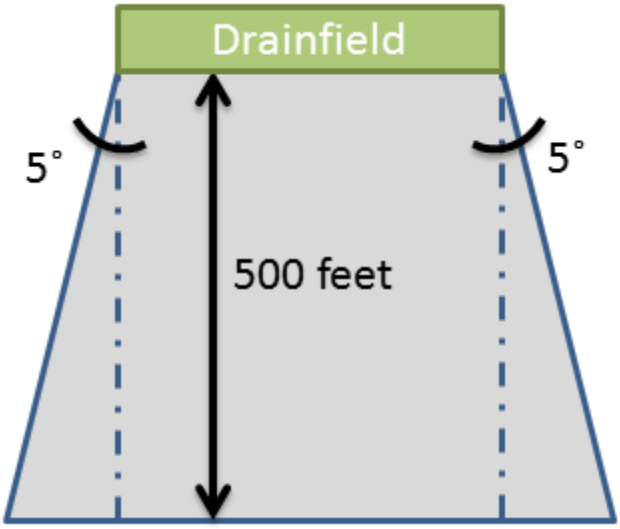
DEQ's phosphorus breakthrough analysis estimates that phosphorus discharged to ground water from Outfall 001 may reach surface water in 110 years and from Outfall 003 in 159 years. Predicted phosphorus breakthrough greater than 50 years is considered nonsignificant. The previous permit included an effluent limit to reduce the amount of phosphorus discharged. Phosphorus discharge history according to DMR. The phosphorus breakthrough calculations are found in **Appendix B**.

Ground water discharges meeting these criteria are nonsignificant, so long as they do not cause degradation of surface waters.

4.0 MIXING ZONE

DEQ authorizes standard mixing zones for total nitrogen discharged from Outfall 001 and Outfall 003. A mixing zone is a specifically defined area of the receiving water where water quality standards may be exceeded. DEQ evaluates the suitability according to criteria established in the Administrative Rules of Montana. The mixing zone is then defined in the permit. The applicant requested a standard mixing zone for this discharge, consistent with previous permit cycles.

A standard mixing zone extends 405 feet downgradient from Outfall 001 and 500 feet downgradient of Outfall 003. The upgradient boundary is equal to the width of the source (measured perpendicular to the of ground water flow direction). The mixing zone widens in the downgradient direction by 5° on either side. The width of the downgradient boundary is calculated by adding the increased width for each side (the tangent of 5° (0.0875) times the mixing zone length) to the width of the upgradient boundary. Standard mixing zones extend 15 feet below the ground water table.



The volume of ground water (Q_{GW}) available to mix with the effluent is calculated using Darcy's Equation: $Q_{GW} = KIA$

Where:
Q_{GW} = ground water flow volume (feet^3/day)
K = hydraulic conductivity (feet/day)
I = hydraulic gradient (feet/feet)
A = cross-sectional area (feet^2) at the downgradient boundary of the mixing zone.

Table 7 summarizes the variables used in Darcy's equation and the resulting volume of ground water available to mix at Outfall 001. **Table 8** applies to Outfall 003. These values are drawn from the permit application.

Table 7. Hydrogeologic and Mixing Zone Information - Outfall 001

Parameter	Units	Value
Mixing Zone Type	-	Standard
Authorized Parameters	-	Total Nitrogen
Ambient Ground Water Concentrations, Total Nitrogen (TN)	mg/L	2.42
Ground Water Flow Direction	azimuth/bearing	N16°W
Length of Mixing Zone	feet	405
Thickness of Mixing Zone	feet	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	800
Width of Mixing Zone at Down Gradient Boundary	feet	870.875
Cross Sectional Area of Mixing Zone (A)	ft^2	13063.125
Hydraulic Conductivity (K)	feet/day	877
Hydraulic Gradient (I)	ft/ft	0.0068
Volume of Ground Water Available for Mixing (Q_{gw})	ft^3/day	77,903

Table 8. Hydrogeologic and Mixing Zone Information - Outfall 003		
Parameter	**Units**	**Value**
Mixing Zone Type	-	Standard
Authorized Parameters	-	Total Nitrogen
Ambient Ground Water Concentrations, Total Nitrogen (TN)	mg/L	1.38
Ground Water Flow Direction	azimuth/bearing	N3°W
Length of Mixing Zone	feet	500
Thickness of Mixing Zone	feet	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	1121
Width of Mixing Zone at Down Gradient Boundary	feet	1208.5
Cross Sectional Area of Mixing Zone (A)	ft^2	18127.5
Hydraulic Conductivity (K)	feet/day	877
Hydraulic Gradient (I)	ft/ft	0.0066
Volume of Ground Water Available for Mixing (Q_{gw})	ft^3/day	104,926

To determine whether a mixing zone is allowable, DEQ calculates a predicted concentration at the downgradient end of the mixing zone. This mixing calculation follows the following procedure:

- Volume of ground water times the concentration of the parameter = existing load.
- Volume of discharge times the concentration of the parameter = waste load; and
- (Existing load + waste load) / total volume = predicted concentration.

Because the predicted concentration must satisfy the most stringent nonsignificance criterion (**Section 3**), DEQ can calculate water quality based effluent limits (WQBELs) by rearranging the equation and solving for the effluent concentration (**Section 5**).

5.0 PERMIT CONDITIONS

Discharge permits include conditions that ensure compliance with the Montana Water Quality Act and the regulations used to implement it. These conditions include effluent limits as well as any special conditions that DEQ deems necessary to protect the quality of the receiving water.

Montana's numeric water quality standards are published in Circular DEQ-7. Water quality criteria applicable to this permit are summarized below in **Table 9**. The permit establishes effluent limits that will meet water quality standards and nondegradation criteria, thereby protecting beneficial uses and existing high-quality waters. The most restrictive criteria in **Table 9** provide the basis for the effluent limits.

Table 9. Applicable Ground Water Quality Standards

Parameter(1)	Human Health Standard(2)	Nondegradation Significance Criteria(3) (4)
Total Nitrogen	10.0 mg/L	7.5 mg/L
Phosphorus, Total Inorganic	-	Surface water breakthrough time greater than 50 years

Footnotes:
(1) Includes parameters of concern only.
(2) Circular DEQ-7 (2019)
(3) Changes in water quality that do not comply with the listed criteria are significant degradation.
(4) Changes in receiving ground water quality are not significant if water quality protection practices approved by DEQ have been fully implemented and if the listed significance criteria are met (ARM 17.30.715).

This discharge permit includes numeric WQBELs that restrict the strength and volume of the discharge. The ground water nonsignificance criteria provide the basis for the limits. DEQ calculates WQBELs by rearranging the mixing zone equation (**Section 4**) and solving for the effluent concentration that satisfies the water quality criteria. DEQ evaluates and recalculates the limits using updated water quality data as part of every permit renewal cycle. In this way, DEQ protects the receiving water quality by continually assessing cumulative impacts to the receiving water.

DEQ calculated the effluent limits using the same method as for the previous permit. DEQ uses updated ambient ground water quality data to re-evaluate the receiving water quality and the assimilative capacity for dilution.

5.1 TOTAL NITROGEN EFFLUENT LIMIT

The nonsignificance criterion of 7.5 mg/L is the most restrictive of the water quality criteria applicable to this permit; therefore, it is the water quality target for this effluent limit. DEQ established the final WQBEL for this discharge by back calculating the effluent concentration that results in 7.5 mg/L at the end of the mixing zone, given the available dilution. Available dilution is determined by recent ground water quality sampling of the receiving water. DEQ calculates an effluent limit that protects receiving water quality and beneficial uses according to the following equation:

$$L_{EFF} = [C_{STD}(Q_{GW} + Q_{EFF})]X - C_{AMB}Q_{GW}X$$

Where:

L_{EFF} = daily maximum load (lbs/day)
C_{STD} = most stringent applicable ground water quality standard (mg/L)
C_{AMB} = ambient ground water concentration (mg/L) of total nitrogen (as N)
Q_{GW} = ground water volume (gpd) available for mixing at the end of the mixing zone
Q_{EFF} = volume of effluent (gpd)
X = $8.34x10^{-6}$, the conversion factor that converts concentration (mg/L) and flow (gpd) into load (lbs/day)

Ambient total nitrogen averaged 2.42 mg/L for Outfall 001.
Ambient total nitrogen averaged 1.38 mg/L for Outfall 003.

Outfall 001 L_{EFF} = [7.5 mg/L(582,755 gpd + 100,000 gpd)]8.34x10^{-6}] – (2.42 mg/L)(582,755 gpd)(8.34x10^{-6})

L_{EFF} = **31 lbs/day.** Thus, the WQBEL for Outfall 001 is **31 lbs/day** total nitrogen.

Outfall 003 L_{EFF} = [7.5 mg/L(784,901 gpd + 1,400,000 gpd)]8.34x10^{-6}] – (1.38 mg/L)(784,901 gpd)(8.34x10^{-6})

L_{EFF} = **128 lbs/day.** Thus, the WQBEL for Outfall 003 is **128 lbs/day** total nitrogen.

Outfall 004 is a spray irrigation system that is not yet in use. This type of discharge is not regulated by this permit.

Effluent limitations are expressed in load limits of pounds per day. Load limits are more appropriate for discharges to ground water since the long-term loading is the greater concern in absence of aquatic life considerations. Additionally, load limits inherently control both the strength and volume of the discharge.

5.2 TOTAL PHOSPHORUS EFFLUENT LIMIT

DEQ determined that phosphorous discharged from Outfall 001 would reach the Gallatin River in 110 years and from Outfall 003 in 159 years. A phosphorous breakthrough time of more than 50 years is considered nonsignificant. There will not be an effluent limit for phosphorus in this permit. The phosphorus breakthrough calculations are found in **Appendix B**.

Based on the information and analyses presented, DEQ proposes the following numerical effluent limitations in **Table 10**.

Table 10. Proposed Final Effluent Limits

Outfall	Parameter	Units	Monthly Avg.	Rationale
001	Nitrogen, Total (as N)	lbs/day	31	Current Limitations Updated
003			128	Current Limitations Updated

5.3 SPECIAL CONDITIONS

The following special conditions will be included in the permit.

1. **Monitoring Wells**. Monitoring wells are installed in areas to characterize aquifers and ground water in the vicinity of each permitted outfall and mixing zone. The wells are generally located in both Up- and Down-gradient locations. Locations of the existing monitoring wells are depicted in **Appendix A**. These wells provide water quality data to ensure permit compliance and to provide protection of downgradient drinking water sources.

- Monitoring wells are required to monitor the mixing zones for any active outfalls.
- The design and installation of any new wells should conform to past installations.
- The sampling schedule and analytic parameters should conform to those listed in **Table 13**.
- Reporting of analytic data for all wells must be done using the DMRs.

Table 11. Proposed Ground Water Standards – For Monitoring Wells

Parameter	Units	Ground Water Standard in Monitoring Wells[1][2][3]	Rationale
		30-Day Average	
Nitrogen, Total (as N)	lbs/day	7.5	Previous Permit Limit Ground Water Characterization
Escherichia coli Bacteria	CFU /100mL	<1	

Footnotes:

The above limits are carried over from the 2018 DEQ MGWPCS Permit without change.

These standards establish the maximum allowable changes in ground water quality. They are also the basis for limiting discharges to ground water, ARM 17.30.1005(1); Circular DEQ-7 (2019) and ARM 17.30.715(1)(d).
Effluent discharge limits are detailed in Table 10.
CFU = Colony Forming Unit

Beneficial Uses are detailed in ARM 17.30.1006

(1) The list only includes identified parameters of interest.

(2) See definition in Part V of permit. The 24-hour geometric mean shall not exceed this value.

(3) Changes in receiving ground water quality are not significant if water quality protection practices approved by the DEQ have been fully implemented and if the listed nonsignificance criteria are met.

2. **Progress Reporting**. Submit a report to DEQ at the end of each calendar year summarizing the progress made on the work planned or completed on any modifications to the Four Corners Water and Sewer District Wastewater System.

6.0 MONITORING AND REPORTING REQUIREMENTS

DEQ requires effluent and ground water monitoring to assure compliance with the effluent limitations and therefore water quality standards. Effluent monitoring and ground water monitoring is required as a condition of this permit. All monitoring and sampling required by this permit must be representative; therefore, the permit identifies specific monitoring locations. Monitoring requirements and rationale are summarized below.

6.1 EFFLUENT MONITORING

This permit includes numeric effluent limitations with specific magnitudes and durations to ensure the discharge will not cause or contribute to an exceedance of an applicable water quality standard (**Section 3**). Accordingly, the permittee is required to monitor and report at a specified frequency to demonstrate compliance with these limitations. Effluent samples and discharge flow measurements must be representative of the nature and volume of the effluent. The effluent sample locations (EFF-001)(EFF-003) and (EFF-004) correspond to Outfall 001, 003 and 004. The permittee is required to report DMR's for all active outfall discharges. The permittee is required to install, maintain, and report flow measurements using a flow-measuring device capable of measurements that are within 10 percent of the actual flow. The flow measuring devices (FM-001)(FM-003) and (FM-004) correspond to Outfall 001, 003 and 004. The flow measuring device must be installed and in operating condition prior to discharge.

Effluent monitoring and reporting requirements are summarized in **Table 12**.

Table 12. Effluent Monitoring and Reporting Requirements – All Active Outfalls, Separately

Parameter	Monitor Location	Units	Sample Type(1)	Minimum Sample Frequency	Reporting Requirements(1)(2)(3)(4)	Report Freq.	Rationale
Flow Rate, Effluent(4)	FM-001 FM-003 FM-004	Gallons /day	Continuous	Continuous	Daily Maximum 30 Day Average Quarterly Average	Monthly	Permit Compliance
Escherichia coli Bacteria	EFF-001 EFF-003 EFF-004	CFU/ 100mL	Grab	Monthly	Daily Maximum Quarterly Average(4)	Monthly	Permit Compliance
Total Suspended Solids (TSS)		mg/L	Composite	Monthly	Daily Maximum Quarterly Average(5)	Monthly	Permit Compliance
Biological Oxygen Demand		mg/L	Composite	Monthly	Daily Maximum Quarterly Average	Monthly	Permit Compliance
Chloride		mg/L	Composite	Monthly	Daily Maximum Quarterly Average	Monthly	Permit Compliance
Nitrogen, Nitrite + Nitrate (as N)		mg/L	Composite	Monthly	Daily Maximum Quarterly Average	Monthly	Permit Compliance
Nitrogen, Total Ammonia (as N)		mg/L	Composite	Monthly	Daily Maximum Quarterly Average	Monthly	Permit Compliance
Nitrogen, Total Kjeldahl (TKN)(as N)		mg/L	Composite	Monthly	Daily Maximum Quarterly Average	Monthly	Permit Compliance
Nitrogen, Total (as N)(5)		mg/L	Calculate	Monthly	Daily Maximum Quarterly Average	Monthly	Permit Compliance
		lbs/day (6)	Calculate	Monthly	Daily Maximum(7) Quarterly Average(8)	Monthly	
Phosphorus, Total (as P)		mg/L	Composite	Monthly	Daily Maximum Quarterly Average	Monthly	Permit Compliance

Footnotes:

CFU = Colony Forming Units
If no discharge occurs during the reporting period, "no discharge" shall be recorded on the effluent Discharge Monitoring Report (DMR) report forms.
Grab samples will each represent concentration for a 24-hour period.
Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above.
(1) See definitions in Part V of the permit.
(2) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report (DMR) form.
(3) The geometric mean must be reported if multiple samples are taken during a reporting period. This is used for bacterial sampling.
(4) Requires recording device or totalizing meter, must record daily effluent volume.
(5) Total Nitrogen is the sum of Nitrate + Nitrite + Total Kjeldahl Nitrogen.
(6) Load Calculation: lbs/day = (mg/L) x flow (gpd) x [8.34 x 10^{-6}].
(7) Daily Maximum Load Calculation: lbs/day = the maximum of all Calculated individual daily average loads (lbs/day) recorded during the period.
(8) Quarterly Average Load Calculation: lbs/day = the average of all Calculated individual daily average loads (lbs/day) recorded during the period.
(9) Annual Load Calculation: lbs/year = (mg/L) x flow (gpd) x [8.34 x 10^{-6}] x 365 (days/year).
(10) Annual Load Calculation: lbs/year = the total average of all Calculated individual daily average loads (lbs/day) recorded during the calendar year, multiplied by 365 (days/year).
(11) Annual maximum load shall be reported (DMR) on an annual basis (due January 28 each year of the permit cycle).

6.2 GROUND WATER MONITORING

Ground water monitoring was established by the previous permit and will continue in the current permit. Ground water monitoring includes both water quality sampling and water level monitoring.

This permit requires ground water monitoring to provide long term ambient and downgradient characterization of the aquifer. Ground water monitoring will be required at monitoring wells MW-4, MW-4A, MW-4C, MW-2, MW-2A, MW-2B, and MW-3B. Data collected via ground water monitoring will be used for mixing zone evaluation and aquifer characterization in future permit renewals, and for compliance monitoring. Ground water monitoring and reporting requirements are summarized in the table below. Sampling and reporting requirements shall commence upon the effective date of the permit.

Ground water monitoring and reporting requirements are summarized in **Table 13**. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

Table 13. Ground Water Monitoring and Reporting Requirements (For Monitoring Wells)

Parameter /Method	Monitor Location(1)	Units	Sample Type(2)	Minimum Sampling Frequency	Reporting Requirements (2)(3)	Reporting Frequency	Rationale
Escherichia coli Bacteria	MW-2, MW-2A, MW-2B, MW-3B, MW-4, MW-4A, & MW-4C	CFU /100ml	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly	Aquifer Characterization and Sentry Wells for surrounding subdivisions
Chloride (as Cl)		mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly	
Nitrogen, Total (as N)		mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly	
Nitrate, (as N)		mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly	
Specific Conductivity @ 25°C		µS/cm	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly	
Static Water Level (SWL)(4)		ft-bmp	Instantaneous	1/Quarter	Daily Maximum Quarterly Average	Quarterly	

Footnotes:

This permit will require monitoring the shallow aquifer up-gradient of any active outfalls and beyond the downgradient edge of the Mixing Zone.

CFU = Colony Forming Units

ft-bmp = feet below measuring point

s.u. = standard units

Monitoring of wells shall commence in the quarter prior to the quarter in which the Outfall begins service.

Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above.

See definitions in Part V of the permit.

(1) Refer to Appendix A of the Fact Sheet for the location of monitoring wells.

(2) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report (DMR).

(3) The geometric mean must be reported if more than one sample is taken during a reporting period.

(4) Measuring point (point of reference) for SWL measurements shall be from top of casing and measured to within 1/100th of one foot.

COMPLIANCE SCHEDULE

The actions listed in **Table 14** below must be completed on or before the respective scheduled completion date. A report documenting each respective action must be received by DEQ on or before the scheduled reporting date. Completion of all actions or deliverables must be reported to DEQ in accordance with Part II.D and Part IV.G of the permit.

Table 14. Compliance Schedule

Action	Freq.	Scheduled Completion Date of Action(1)	Scheduled Report Due Date.(2)
Effluent sampling will be conducted for each unique waste stream if it differs in source, nature, or degree of treatment.	Quarterly sampling	Ongoing for all unique active waste streams going to outfalls.	Submit analytic data to NetDMR prior to the beginning of the quarter following the sampling event. Include an initial report to DEQ with mapped locations of sampling sites.
Submit a report to DEQ summarizing progress made on work planned or completed on construction of modifications to the system.	Yearly	At the end of each year	Before the end of the 1st quarter of the following year.

Footnotes:
(1) The actions must be completed on or before the scheduled completion dates.
(2) Reports must be received by DEQ on or before the scheduled report due dates. The reports must include all information as required for each applicable action.

PUBLIC NOTICE

Legal notice information for water quality discharge permits are listed at the following website: http://deq.mt.gov/Public/notices/wqnotices. Public comments on this proposal are invited any time prior to close of business on February 11, 2021. Comments may be directed to:

DEQWPBPublicComments@mt.gov

or to:

Montana Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments pertinent to this permitting action and may issue a final decision within thirty days of the close of the public comment period.

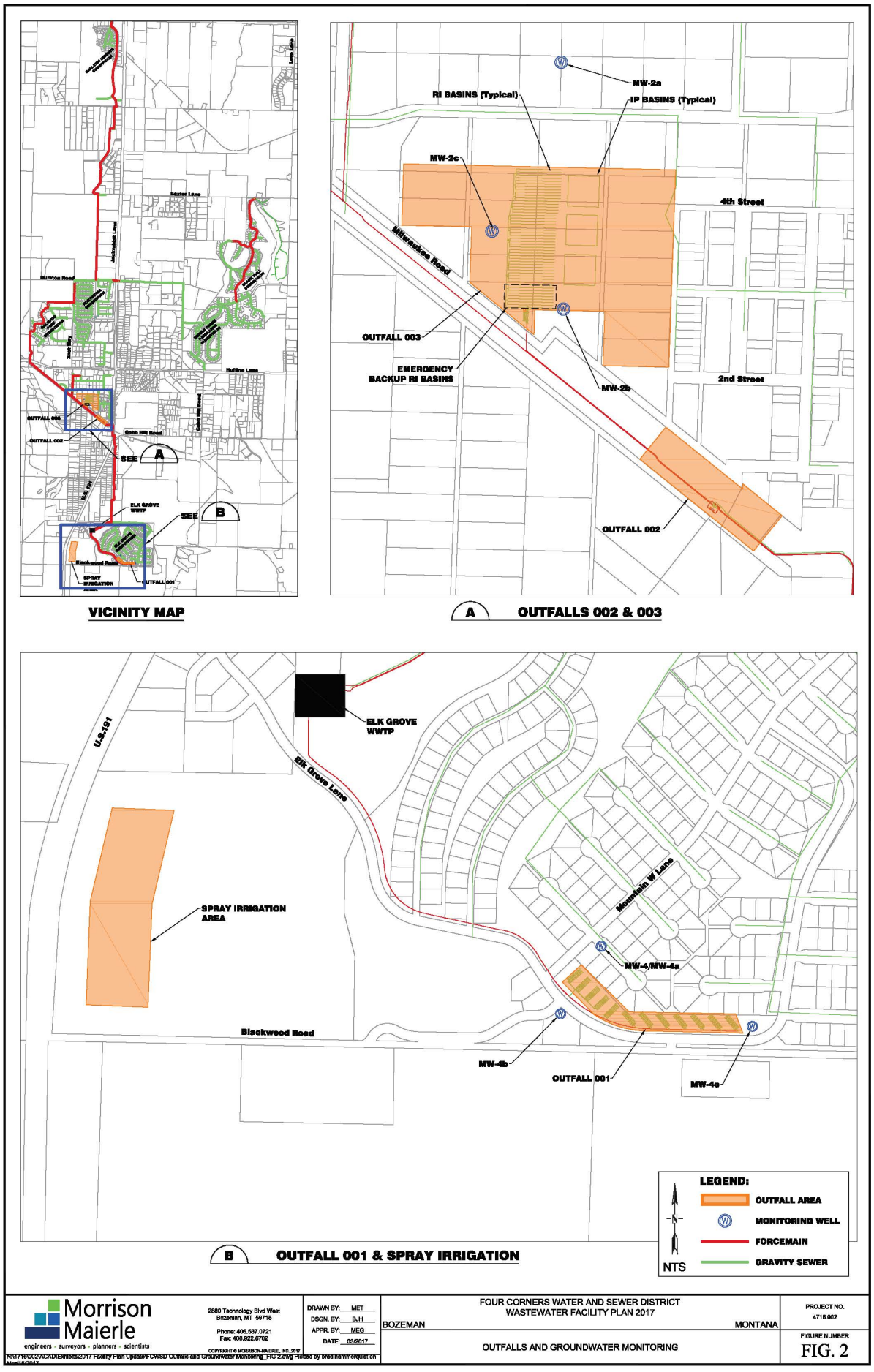
All persons, including the applicant, who believe any condition of the draft permit is inappropriate, or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing). All public comments received for this draft permit will be included in the administrative record and will be available for public viewing during normal business hours.

Copies of the public notice are mailed to the applicant, state, and federal agencies, and interested persons who have expressed interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this draft permit. Electronic copies of the public notice, draft permit, fact sheet, and draft environmental assessment are available at the following website: http://deq.mt.gov/Public/notices/wqnotices.

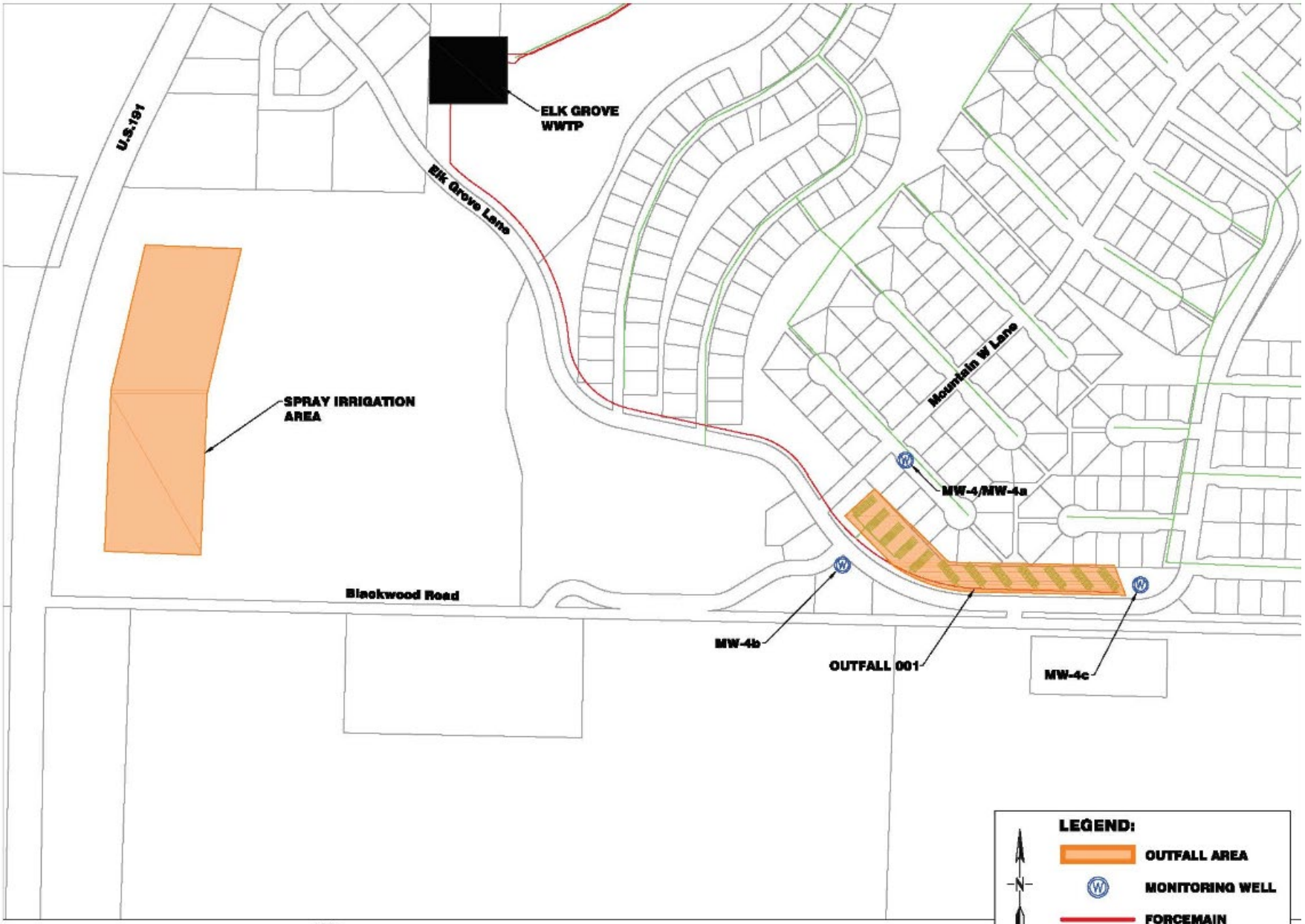
Any person interested in being placed on the mailing list for information regarding this permit may contact the DEQ Water Protection Bureau at (406) 444-5546 or email DEQWPBPublicComments@mt.gov. All inquiries will need to reference the permit number (MTX000110), and include the following information: name, address, and phone number.

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing.

APPENDIX A – MONITORING WELL INFORMATION


VICINITY MAP
SEE A
SEE B
OUTFALL 003
OUTFALL 002
ELK GROVE WWTP
SPRAY IRRIGATION
OUTFALL 001
A OUTFALLS 002 & 003
MW-2a
RI BASINS (Typical)
IP BASINS (Typical)
MW-2c
46th Street
Milwaukee Road
EMERGENCY BACKUP RI BASINS
MW-2b
2nd Street
OUTFALL 002
B OUTFALL 001 & SPRAY IRRIGATION
U.S.191
ELK GROVE WWTP
Elk Grove Lane
SPRAY IRRIGATION AREA
Mountain View Lane
MW-4/MW-4a
Blackwood Road
MW-4b
OUTFALL 001
MW-4c
LEGEND:
OUTFALL AREA
MONITORING WELL
FORCEMAIN
GRAVITY SEWER
NTS
Morrison Maierle
engineers • surveyors • planners • scientists
2880 Technology Blvd West
Bozeman, MT 59718
Phone: 406.587.0721
Fax: 406.922.6702
DRAWN BY: MET
DSGN. BY: BJH
APPR. BY: MEG
DATE: 03/2017
FOUR CORNERS WATER AND SEWER DISTRICT
WASTEWATER FACILITY PLAN 2017
BOZEMAN MONTANA
OUTFALLS AND GROUNDWATER MONITORING
PROJECT NO. 4718.002
FIGURE NUMBER FIG. 2

A **OUTFALLS 002 & 003**



B **OUTFALL 001 & SPRAY IRRIGATION**

MW-2

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Site Name: UTILITY SOLUTIONS, .
GWIC Id: 224342

Section 1: Well Owner(s)

1) UTILITY SOLUTIONS (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [03/16/2006]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	14	SE¼ NW¼ NE¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.668311	-111.190922	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
NORTH STAR		

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Thursday, March 16, 2006

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	25	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	3	6	0.250		WELDED	A53B STEEL
-2	10	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
10	25	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	7	BENTONITE	
7	25	SAND	

Section 7: Well Test Data

Total Depth: 25
Static Water Level: 13
Water Temperature:

Air Test *

15 gpm with drill stem set at 20 feet for 0.25 hours.
Time of recovery 0.25 hours.
Recovery water level 13 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

MW-2

Section 9: Well Log

Geologic Source
Unassigned

From	To	Description
0	5	TOPSOIL
5	12	GRAVEL
12	25	SANDY GRAVEL

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 3/16/2006

MW-2A

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS, .
GWIC Id: 224341

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [03/14/2006]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	14	SE¼ NW¼ NE¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.668311	-111.190922	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
NORTH STAR		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Tuesday, March 14, 2006

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	40	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	3	6	0.250		WELDED	A53B STEEL
-2	25	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
25	40	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	21	BENTONITE	
21	40	SAND	

Section 7: Well Test Data

Total Depth: 40
Static Water Level: 13
Water Temperature:

Air Test *

20 gpm with drill stem set at 35 feet for 0.25 hours.
Time of recovery 0.25 hours.
Recovery water level 13 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
MW-2A

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	5	TOPSOIL
5	35	GRAVELLY SAND
35	40	SAND

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 3/14/2006

MW-2B

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS, .
GWIC Id: 224343

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [03/17/2006]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	14	SE¼ SW¼ NE¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.664664	-111.190922	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
NORTH STAR		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Friday, March 17, 2006

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	25	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	4	6	0.250		WELDED	A53B STEEL
-2	10	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
10	25	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	7	BENTONITE	
7	25	SAND	

Section 7: Well Test Data

Total Depth: 25
Static Water Level: 13
Water Temperature:

Air Test *

15 gpm with drill stem set at 20 feet for 0.25 hours.
Time of recovery 0.25 hours.
Recovery water level 13 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
MW-2B

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	5	TOPSOIL
5	8	GRAVEL
8	25	GRAVELLY SAND

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 3/17/2006

MW-2C

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS, .
GWIC Id: 224344

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [03/17/2006]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	14	NE¼ SW¼ NE¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.666487	-111.190922	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
NORTH STAR		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Friday, March 17, 2006

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	25	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	3	6	0.250		WELDED	A53B STEEL
-2	10	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
10	25	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	7	BENTONITE	
7	25	SAND	

Section 7: Well Test Data

Total Depth: 25
Static Water Level: 13
Water Temperature:

Air Test *

15 gpm with drill stem set at 20 feet for 0.25 hours.
Time of recovery 0.25 hours.
Recovery water level 13 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
MW-2C

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	5	TOPSOIL
5	10	GRAVEL
10	25	GRAVELLY SAND

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 3/17/2006

MW-3

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS LLC.
GWIC Id: 240500

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS, LLC. (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [12/12/2007]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	23	SW¼ SW¼ SE¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.641657	-111.195674	TRS-TWN	NAD27

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
ELK GROVE		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Wednesday, December 12, 2007

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	35	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2.5	3.5	6	0.25		WELDED	A53B STEEL
-2	7.8	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
7.8	27.8	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
-1	5.8	BENTONITE	
5.8	35	10-20 SAND	

Section 7: Well Test Data

Total Depth: 35
Static Water Level: 11.8
Water Temperature:

Air Test *

25 gpm with drill stem set at 30 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 11.8 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
ELK GROVE MW-3

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	4	TOPSOIL
4	35	GRAVEL & SAND

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: KEVIN HAGGERTY
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 12/12/2007

MW-3B

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS LLC.
GWIC Id: 240498

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS, LLC. (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [12/11/2007]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	26	SW¼ NW¼ NE¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.638364	-111.195787	TRS-TWN	NAD27

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
ELK GROVE		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Tuesday, December 11, 2007

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	25	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.5	3.5	6	0.25		WELDED	A53B STEEL
-1	4	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
4	24	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
-1	1.5	BENTONITE	
1.5	25	10-20 SAND	

Section 7: Well Test Data

Total Depth: 25
Static Water Level: 6
Water Temperature:

Air Test *

20 gpm with drill stem set at 20 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 6 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
ELK GROVE MW-3B

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	4	TOPSOIL & SANDY CLAY
4	25	GRAVEL & SAND

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: KEVIN HAGGERTY
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 12/11/2007

MW-4

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS LLC.
GWIC Id: 240503

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS, LLC. (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [12/18/2007]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	25	NE¼ NW¼ NW¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.640079	-111.183252	TRS-TWN	NAD27

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
ELK GROVE		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Tuesday, December 18, 2007

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	63	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	1.5	8				STEEL
0	21	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
21	41	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0.5	1	CEMENT	
1	18	BENTONITE	
18	42	10-20 SAND	
42	45	BENTONITE	
45	63	10-20 SAND	

Section 7: Well Test Data

Total Depth: 63
Static Water Level: 27.3
Water Temperature:

Air Test *

80 gpm with drill stem set at 58 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 27.3 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
ELK GROVE MW-4. FLUSH MOUNT COMPLETION. MW-4 IS NESTED IN SAME BOREHOLE AS MW-4A OR GWIC 240505.

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	16	CLAY
16	63	SAND & GRAVEL

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: KEVIN HAGGERTY
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 12/18/2007

MW-4A

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS LLC.
GWIC Id: 240505

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS, LLC. (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [12/18/2007]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	25	NE¼ NW¼ NW¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.640079	-111.183252	TRS-TWN	NAD27

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
ELK GROVE		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Tuesday, December 18, 2007

Section 6: Well Construction Details
Borehole dimensions

From	To	Diameter
0	63	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	1.5	8				STEEL
0	47	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
47	62	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0.5	1	CEMENT	
1	18	BENTONITE	
18	42	10-20 SAND	
42	45	BENTONITE	
45	63	10-20 SAND	

Section 7: Well Test Data

Total Depth: 63
Static Water Level: 27.3
Water Temperature:

Air Test *

80 gpm with drill stem set at 58 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 27.3 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
ELK GROVE MW-4A. FLUSH MOUNT COMPLETION. MW-4A IS NESTED IN SAME BOREHOLE AS MW-4 OR GWIC 240503.

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	16	CLAY
16	63	SAND & GRAVEL

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: KEVIN HAGGERTY
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 12/18/2007

MW-4B

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS LLC.
GWIC Id: 240502

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS, LLC. (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [12/14/2007]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	25	SW¼ NW¼ NW¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.638197	-111.185891	TRS-TWN	NAD27

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
ELK GROVE		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Friday, December 14, 2007

Section 6: Well Construction Details
Borehole dimensions

From	To	Diameter
0	46	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	6	6	0.25		WELDED	A53B STEEL
-2	17.8	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
17.8	37.8	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
-1	14	BENTONITE	
14	46	10-20 SAND	

Section 7: Well Test Data

Total Depth: 46
Static Water Level: 23.8
Water Temperature:

Air Test *

15 gpm with drill stem set at 41 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 23.8 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
ELK GROVE MW-4B

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	16	CLAY WITH SOME SAND
16	46	SAND & GRAVEL

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: KEVIN HAGGERTY
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 12/14/2007

MW-4C

MONTANA WELL LOG REPORT

Site Name: UTILITY SOLUTIONS LLC.
GWIC Id: 240501

Section 1: Well Owner(s)
1) UTILITY SOLUTIONS, LLC. (MAIL)
P.O. BOX 10098
BOZEMAN MT 59719 [12/13/2007]

Section 2: Location

Township	Range	Section	Quarter Sections
02S	04E	25	SW¼ NE¼ NW¼

County	Geocode
GALLATIN	

Latitude	Longitude	Geomethod	Datum
45.638197	-111.180613	TRS-TWN	NAD27

Ground Surface Altitude	Ground Surface Method	Datum Date

Addition	Block	Lot
ELK GROVE		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Thursday, December 13, 2007

Section 6: Well Construction Details
Borehole dimensions

From	To	Diameter
0	40	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2.5	3	6	0.25		WELDED	A53B STEEL
-2	6	2			FLUSH THREAD	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
6	26	2		.020	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
-1	4	BENTONITE	
4	40	10-20 SAND	

Section 7: Well Test Data

Total Depth: 40
Static Water Level: 14.25
Water Temperature:

Air Test *

15 gpm with drill stem set at 35 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 14.25 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks
ELK GROVE MW4-C

Section 9: Well Log
Geologic Source
Unassigned

From	To	Description
0	12	TOPSOIL & CLAY
12	40	SAND & GRAVEL

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: KEVIN HAGGERTY
Company: KEVIN HAGGERTY DRILLING INC
License No: MWC-94
Date Completed: 12/13/2007

APPENDIX B – NONSIGNIFICANCE PROJECTIONS

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

Montana Ground Water Pollution Control System

Ground Water Dilution Projection (GWDP) - Nondegradation Significance Analysis

These projections estimate the parameter concentrations in the aquifer downgradient of the subsurface discharge. After dilution with ground water, the projected concentration is compared to the respective significance criteria in determining nonsignificant changes in water quality (ARM 17.30.715).

Site Name:	Four Corners Water and Sewer District
Location:	Bozeman - Four Corners
Permit #:	MTX000110, Outfall 001
Notes:	Design Capacity = 100,000 gpd; 13,368 ft³/d
	These calculations are for the following parameter of interest: Nitrate
	These calculations use the most restrictive ground water standard.
	These calculations do not credit potential losses due to chemical transformation.
	These calculations do not credit potential losses due to attenuation.

Projected Concentration Calculation

$$Cr = \frac{(Qd)(Cd) + (Qs)(Cs)}{Qd + Qs}$$

The Activity is Not Significant if Cr < Significance Criteria

GWDP(a) - Ground Water Nitrate Projection at the End of the Mixing Zone.

Qd =	**13368**	ft³/d	Design capacity - effluent flow rate
Cd =	**10.0**	mg/L	Concentration - effluent (treated wastewater)
	405	ft	Length of ground water dilution zone
	15	ft	Thickness of dilution zone
	800	ft	Outfall width, perpendicular to ground water flow direction
	871	ft	Projected width of downgradient dilution zone
	13063	ft²	Cross sectional area of dilution zone (A)
	877	ft/d	Hydraulic conductivity (K)
	0.0066	ft/ft	Hydraulic gradient (I)
Qs(Qgw) =	**75612**	ft³/d	Ground water volume (Qgw)
Cs =	**1.43**	mg/L	Ambient nitrate concentration in ground water
Cr =	**2.72**	mg/L	Projected concentration - end of the mixing zone
Sign. Criteria =	**7.5**	mg/L	Nonsignificance Criteria, ARM 17.30.715
Sign. Activity?	**< 7.5**	mg/L	**The activity is not significant**

GWDP(b) - Ground Water Nitrate Projection just prior to the Downgradient Surface Water.

Qd =	**13368**	ft³/d	Design capacity - effluent flow rate
Cd =	**10.0**	mg/L	Concentration - effluent (treated wastewater)
	405	ft	Length of ground water dilution zone
	15	ft	Thickness of dilution zone
	800	ft	Outfall width, perpendicular to ground water flow direction
	871	ft	Projected width of downgradient dilution zone
	13063	ft²	Cross sectional area of dilution zone (A)
	877	ft/d	Hydraulic conductivity (K)
	0.0066	ft/ft	Hydraulic gradient (I)
Qs(Qgw) =	**75612**	ft³/d	Ground water volume (Qgw)
Cs =	**1.43**	mg/L	Ambient nitrate concentration in ground water
Cr =	**2.72**	mg/L	Projected concentration - just prior to surface water
Sign. Criteria =	**7.5**	mg/L	Nonsignificance Criteria, ARM 17.30.715
Sign. Activity?	**< 7.5**	mg/L	**The activity is not significant**

GWDP(c) - Distance in Ground Water from the discharge source where the Significance Criteria for Nitrate is met.

Qd =	**13368**	ft³/d	Design capacity - effluent flow rate
Cd =	**10.0**	mg/L	Concentration - effluent (treated wastewater)
	405	ft	Length of ground water dilution zone
	15	ft	Thickness of dilution zone
	800	ft	Outfall width, perpendicular to ground water flow direction
	871	ft	Projected width of downgradient dilution zone
	13063	ft²	Cross sectional area of dilution zone (A)
	877	ft/d	Hydraulic conductivity (K)
	0.0066	ft/ft	Hydraulic gradient (I)
Qs(Qgw) =	**75612**	ft³/d	Ground water volume (Qgw)
Cs =	**1.430**	mg/L	Ambient nitrate concentration in ground water
Cr =	**2.718**	mg/L	Projected concentration
Sign. Criteria =	**7.5**	mg/L	Nonsignificance Criteria, ARM 17.30.715
Distance =	**0**	ft	**Distance needed to meet the significance criteria**

Projections performed by Darryl Barton on November 5, 2020.

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

Montana Ground Water Pollution Control System

Ground Water Dilution Projection (GWDP) - Nondegradation Significance Analysis

These projections estimate the parameter concentrations in the aquifer downgradient of the subsurface discharge. After dilution with ground water, the projected concentration is compared to the respective significance criteria in determining nonsignificant changes in water quality (ARM 17.30.715).

Site Name:	Four Corners Water and Sewer District
Location:	Bozeman - Four Corners
Permit #:	MTX000110, Outfall 003
Notes:	Design Capacity = 1,400,000 gpd; 187,153 ft³/d
	These calculations are for the following parameter of interest: Nitrate
	These calculations use the most restrictive ground water standard.
	These calculations do not credit potential losses due to chemical transformation.
	These calculations do not credit potential losses due to attenuation.

Projected Concentration Calculation

$$Cr = \frac{(Qd)(Cd) + (Qs)(Cs)}{Qd + Qs}$$

The Activity is Not Significant if Cr < Significance Criteria

GWDP(a) - Ground Water Nitrate Projection at the End of the Mixing Zone.

Qd =	**187153**	ft³/d	Design capacity - effluent flow rate
Cd =	**9.0**	mg/L	Concentration - effluent (treated wastewater)
	500	ft	Length of ground water dilution zone
	15	ft	Thickness of dilution zone
	1121	ft	Outfall width, perpendicular to ground water flow direction
	1209	ft	Projected width of downgradient dilution zone
	18128	ft²	Cross sectional area of dilution zone (A)
	567	ft/d	Hydraulic conductivity (K)
	0.0068	ft/ft	Hydraulic gradient (I)
Qs(Qgw) =	**69892**	ft³/d	Ground water volume (Qgw)
Cs =	**1.43**	mg/L	Ambient nitrate concentration in ground water
Cr =	**6.94**	mg/L	Projected concentration - end of the mixing zone
Sign. Criteria =	**7.5**	mg/L	Nonsignificance Criteria, ARM 17.30.715
Sign. Activity?	**< 7.5**	mg/L	**The activity is not significant**

GWDP(b) - Ground Water Nitrate Projection just prior to the Downgradient Surface Water.

Qd =	**187153**	ft³/d	Design capacity - effluent flow rate
Cd =	**9.0**	mg/L	Concentration - effluent (treated wastewater)
	500	ft	Length of ground water dilution zone
	15	ft	Thickness of dilution zone
	1121	ft	Outfall width, perpendicular to ground water flow direction
	1209	ft	Projected width of downgradient dilution zone
	18128	ft²	Cross sectional area of dilution zone (A)
	567	ft/d	Hydraulic conductivity (K)
	0.0068	ft/ft	Hydraulic gradient (I)
Qs(Qgw) =	**69892**	ft³/d	Ground water volume (Qgw)
Cs =	**1.43**	mg/L	Ambient nitrate concentration in ground water
Cr =	**6.94**	mg/L	Projected concentration - just prior to surface water
Sign. Criteria =	**7.5**	mg/L	Nonsignificance Criteria, ARM 17.30.715
Sign. Activity?	**< 7.5**	mg/L	**The activity is not significant**

GWDP(c) - Distance in Ground Water from the discharge source where the Significance Criteria for Nitrate is met.

Qd =	**187153**	ft³/d	Design capacity - effluent flow rate
Cd =	**9.0**	mg/L	Concentration - effluent (treated wastewater)
	500	ft	Length of ground water dilution zone
	15	ft	Thickness of dilution zone
	1121	ft	Outfall width, perpendicular to ground water flow direction
	1209	ft	Projected width of downgradient dilution zone
	18128	ft²	Cross sectional area of dilution zone (A)
	567	ft/d	Hydraulic conductivity (K)
	0.0068	ft/ft	Hydraulic gradient (I)
Qs(Qgw) =	**69892**	ft³/d	Ground water volume (Qgw)
Cs =	**1.430**	mg/L	Ambient nitrate concentration in ground water
Cr =	**6.94**	mg/L	Projected concentration
Sign. Criteria =	**7.5**	mg/L	Nonsignificance Criteria, ARM 17.30.715
Distance =	**0**	ft	**Distance needed to meet the significance criteria**

Projections performed by Darryl Barton on November 9, 2020.

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME:	Four Corners Water and Sewer District
COUNTY:	Gallatin
Permit #:	MTX000110, Outfall 001
NOTES:	Variables used are based on conservative measurements
	Design Capacity = 100,000 gpd = 13,368 ft³/day
	Phosphorus load from DMR = 0.62 lb/day = 226 lb/year

VARIABLES	DESCRIPTION	VALUE	UNITS
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	800	ft
L	Length of Primary Drainfield's Long Axis	1212	ft
W	Width of Primary Drainfield's Short Axis	31	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	17	ft
D	Distance from Drainfield to Surface Water	700	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils,	1.0	ft
Ne	1.0 ft for fine soils)**		
Sw	Soil Weight (usually constant)	100	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200	ppm
#I	Number of proposed wastewater treatment systems	1	
CONSTANTS			
PI	Phosphorous Load per proposed wastewater treatment system	226	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (PI)(#I)	226	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	63872400	lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	60287500	lbs
P1	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	24832	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	110	years

BY: Darryl Barton
DATE: November 5, 2020

NOTES: ** Depth to limiting layer is typically based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals.*

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME:	Four Corners Water and Sewer District
COUNTY:	Gallatin
Permit #:	MTX000110, Outfall 003
NOTES:	Variables used are based on conservative measurements
	Design Capacity = 100,000 gpd = 13,368 ft³/day
	Phosphorus load from DMR = 8.68 lb/day = 3168 lb/year

VARIABLES	DESCRIPTION	VALUE	UNITS
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	1121	ft
L	Length of Primary Drainfield's Long Axis	1121	ft
W	Width of Primary Drainfield's Short Axis	192.5	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	4	ft
D	Distance from Drainfield to Surface Water	781	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils, 1.0 ft for fine soils)**	1.0	ft
Ne			
Sw	Soil Weight (usually constant)	100	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200	ppm
#I	Number of proposed wastewater treatment systems	1	
CONSTANTS			
PI	Phosphorous Load per proposed wastewater treatment system	3168	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (PI)(#I)	226	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	86317000	lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	92887259	lbs
P1	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	35841	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	159	years

BY: Darryl Barton
DATE: November 9, 2020

NOTES: ** Depth to limiting layer is typically based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals.*

APPENDIX C – REFERENCES

40 CFR § 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants. 2017.

Administrative Rules of Montana, Title 17, Chapter 30, Water Quality:
- Subchapter 2 – Water Quality Permit Fees.
- Subchapter 5 – Mixing Zones in Surface and Ground Water.
- Subchapter 6 – Surface Water Quality Standards and Procedures.
- Subchapter 7 – Nondegradation of Water Quality.
- Subchapter 10 – Montana Ground Water Pollution Control System.
- Subchapter 13 – Montana Pollutant Discharge Elimination System.

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- Circular DEQ-2 – Design Standards for Wastewater Facilities.
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