

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

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

Permit Fact Sheet Montana Ground Water Pollution Control System (MGWPCS)

Applicant: AquaFlo, LLC

Permit Number: MTX000121

Facility Name: Skyview & NW Subdivisions Community Water and Sewer Utility
(a.k.a. Skyview Phases I, II, & III, & IV, and Northwest Major & Minor Subdivisions)

Facility Location: NE 1/4 Section 7, Township 11 North, Range 3 West;
Lewis & Clark County, Montana
Latitude: 46.728611° Longitude: -112.024722°

Facility Address: 1065 Avian Drive,
Helena, Montana, 59602

Facility Contact: John Maxness, Manager
2430 Airport Road
Helena, Montana 59601

Receiving Water: Class I Ground Water

Number of Outfalls: 1 (one)

Outfall/Type: 002 – Subsurface Pressure Dosed Drainfield
Residential Type Septage

I. PERMIT STATUS

The following fact sheet outlines the basis for renewing the MGWPCS wastewater discharge permit to AquaFlo, LLC (applicant) for the Skyview Water & Sewer Utility wastewater collection and treatment system (facility) located in the northern Helena Valley, north of the City of Helena, Montana. The MGWPCS permit application and supplemental materials provide the information that serves as the basis for the development of the effluent limits and the monitoring requirements outlined within this fact sheet. The scope of this permitting action is for the construction, operation, and maintenance of the wastewater treatment and disposal system.

A. Application Info

Currently the wastewater treatment system (WWTS) is operating under a MGWPCS permit that DEQ issued in 2010. An application for renewal of the permit was received by DEQ on 30 January 2015 along with renewal application fees. The submittal was reviewed and DEQ issued a completeness letter on February 13 2015.

B. Permit Changes

This is a permit renewal of the existing MGWPCS permit. Applicant did not propose changes to the existing permit. In 2014 AquaFlo established an existing domestic well OBS1 as an upgradient monitoring well. This well has provided water level measurements and water quality data for 2014-2015. DEQ proposes the following for the upcoming permit cycle (2016-2021):

- DEQ requests clarification of the depth of OBS1 and any construction details that can be derived from it, along with the establishment of an adequate well log registered in the Montana Bureau of Mines and Geology – Ground Water Information Center database.
- The above will be followed by bi-annual water quality sampling of OBS1. The data generated from this well will help in future permitting of this WWTS.
- There are Interim Effluent Limits, which are the same as the limits in the previous permit cycle.
- 4 years after the effective date of this permit, Final Effluent Limits will go into effect that are Water Quality Based Effluent Limits.

II. FACILITY INFORMATION

A. Facility Location

The AquaFlo / Skyview W&S WWTS is located in the northern portion of the Helena Valley (Figure 1). The Skyview Phases I, II, III, and IV; Northwest Major & Minor subdivisions are located approximately 1.3 miles north of the intersection of Lincoln Road and North Montana Avenue. The subdivisions are located southwest of the intersection of Prairie Road and North Montana Avenue. The subdivision currently consists of 143 single family residences and 6 small business or other non-residential operations (a mechanical engineering company, daycare, offices, and a church). Water is provided to the

subdivisions by the Skyview Water and Sewer Utility PWS (public water supply) # MT0004039. This PWS provides its drinking water from 2 water wells located in western portion of the subdivision identified as Well 1 and Well 2 (refer to Figure 1).

B. Facility and Operations

The WWTS has a design capacity of 30,660 gallons/day. The septic lines are gravity fed from 143 individual residential and 6 commercial septic tanks. These lines lead to the Pump Station #1 that then sends the influent to the Sewer Control Building. This facility then distributes the influent to 3 different Recirculation Tanks, each with an associated Recirculating Sand Filter which can accommodate 10,220 gallons/day/sand filter. The sand filters then pass their partially treated influent collectively to Pump Station #2. Pump Station #2 splits the pumped wastewater to 2 lines that pass through a vault containing 2 flow meters (a meter for each of the 2 lines). One (1) flow meter measures water that goes to the Original 8,600 gallon Dose Tank. A different effluent line with a dedicated 2nd flow meter sends effluent to a Distribution Valve Vault that splits the effluent to 3 different lines, each ending up at a Dose Tank (which are designated as Dose Tanks A, B, and C). There are a total of 4 Dose tanks on this system that send effluent to their respective drainfield zones (4 zones total) under pressure. The 4 zones of the pressure dosed drainfield (designated as Outfall 002) are arranged in a line that end-to-end stretches for approximately 1,795 feet along the south border of the subdivision and directly south of the Sewer Control Building, the 3 Recirculation Tanks, and 3 Sand Filters. Please refer to Figures 1, 2, and 5 (which are maps of the site). Figures 3 & 4 are line drawings of the treatment process. It appears that ground water is characterized as flowing S30°W across the site. This has the mixing zone oriented in that direction southwest from the long drainfield. The mixing zone does extend 500 feet S30°W beneath the homes on either side of Antares Road, which is part of the North Star Subdivision.

Proterozoic (PreCambrian) to Cretaceous age. In the northern portion of the valley and specifically around the Skyview subdivision, the geology is mapped as argillite and siltite, with thin limestone inter-beds, which is part of the Spokane Formation (a member formation of the Belt Supergroup) which was originally deposited in the middle Proterozoic. The bedrock in the area of the subdivision is mapped as having a thin veneer of alluvium or colluvium covering the shallow competent bedrock. This was discussed at length in the USGS's Hydrogeology of Helena Area Bedrock 1993-1998. A review of the well logs for wells surrounding the subdivision (attached to this document and mapped on Figure 5) confirm that bedrock is generally at or less than 4 feet beneath the surface soils. The soils beneath this area have been identified as part of the Musselshell-Crago soil complex, which are described as derived from colluvium and alluvium that rests unconformably on bedrock. This soil is generally well drained, with moderate to low water holding capacity, and has a typical profile of very gravelly sandy loam texture to 34-60 inches deep (NRCS, 2009). Multiple well logs in the area suggest that clay or clay rich sediments are present near the surface with some of the clay extending to depth. It should be noted that within the Helena Valley, clay rich layers are generally not present which result from normal fluvial deposition that is seen elsewhere in Western Montana. The so-called clay in the area of this subdivision isn't a result of glacial lakebed sedimentation as seen in the Flathead Valley or volcanic ash and other marine sedimentary deposits as seen north of Great Falls. The clay rich or clay-like material beneath the WWTS is basically a result of faulting along several subparallel faults that are subsidiary to the major Valley Fault. The main trace of that fault has been mapped directly north of the subdivision. The Valley Fault Zone is probably around 1-2 miles wide and extends south of the main fault trace. Several of these smaller faults (south of the main fault trace) within the Valley Fault Zone have been clearly mapped across this area. The material that has been identified in local well logs as clay is basically fractured, crushed, and ground up argillite and siltite (muddy sandstone and mudstone/shale) bedrock that is trapped between more competent bodies of bedrock that have experienced extensive movement relative to each other along a fault zone. This fault zone is expected to contain a chaotic mixture of material that ranges in size to include cobbles, sand, silt, and clay; all of these represent the local bedrock that has been mechanically ground within the fault zone. These materials may also have experienced secondary weathering or alteration subsequent to active faulting that could potentially reduce particle size and increase the percentage of silt and clay sized particles in the sediment/non-competent rock. These assorted materials appear to be what is represented in many of the area well logs and the wide variety of depths to competent bedrock identified by the drillers.

G. Hydrogeologic Characteristics

The receiving water for Outfall 002 has been characterized as an unconfined aquifer. This aquifer is present within what is best characterized as highly fractured sedimentary bedrock. The unconfined aquifer appears to be laterally continuous across the area of the Outfall and to the south beneath the mixing zone. Water levels in wells vary, but the depth to static water seems to average between 68-72 feet below ground surface (2015 application, attached GWIC well logs). The hydraulic gradient across the site has been estimated to be 0.023 ft/ft and the ground water flow direction appears to be S30°W. The hydraulic conductivity (K) of the sediment was characterized as 15 ft/day (2009 DEQ

Statement of Basis and 2015 permit renewal application). Based on ground water flow direction, the nearest surface water is the Helena Valley Irrigation Canal which is located approximately 6,000 feet downgradient (S30°W) from the subdivision and Outfall 002. It appears that the canal is unlined and considered to be losing water in this area. The next nearest downgradient surface water body is Silver Creek, which is 14,700 feet southwest of the outfall. A summary table is provided within Appendix IV.

H. Ground Water Monitoring Wells

There were 2 monitoring wells mentioned in historic correspondence, MW2 and OBS1. Both of these wells are plotted on Figure 1 along with the 2 Public Water Supply (PWS) wells that supply the Skyview Water & Sewer Utility with drinking water. The 2015 Permit Renewal Application, supplemental information, and data provided by the applicant have identified OBS1 as likely representing background ground water conditions beneath the site. This well is located along Pintail Court / Road within the northern portion of the subdivision. Little is known about this well, other than it is a retired domestic well in the neighborhood (see Figure 1). OBS1 is in a location suitable to represent the receiving water up-gradient (north) of the Outfall. Information regarding this monitoring well is summarized and listed in Appendix II.

I. Ground Water Quality Characteristics

ARM 17.30.1006 delineates the classifications, beneficial uses, and applicable standards for ground water. It also states that Class I ground waters are those with a natural specific conductance that is less than or equal to 1,000 microSiemens/cm ($\mu\text{S}/\text{cm}$) at 25°C. Water sampling results from OBS1 (samples collected in 2014-2015) are displayed in Table 7 Appendix III. The natural specific conductance in OBS1 samples ranged from 758-1250 $\mu\text{S}/\text{cm}$, with an average of 992 $\mu\text{S}/\text{cm}$. That average is just below 1,000 $\mu\text{S}/\text{cm}$, which is the dividing line between Class I and Class II ground water. Based on the 992 $\mu\text{S}/\text{cm}$ specific conductance of water from OBS1, the receiving water for the WWTS is considered to be Class I. This water was characterized as Class I on previous DEQ Statements of Basis (2002, 2004, 2005, and 2009). The most recent (2014-2015) water sampling was of OBS1. Prior sampling and analysis was from a nearby Skyview PWS well (GWIC ID 220272). All of the past sampling events' data appear to adequately represent the receiving water. Ground water quality results from the 2014-2015 sampling of OBS1 are summarized in Appendix III.

III. MIXING ZONE

The Montana Water Quality Act (75-5-103, Montana Code Annotated (MCA)) states that a mixing zone is an area of the receiving water, established in a permit, where the water quality standards may be exceeded. The applicant has requested a standard mixing zone in their 2015 application for renewal of the existing permit. DEQ will be reauthorizing a mixing zone within this permit. The mixing zone rationale is further discussed in Appendix IV.

IV. RATIONALE FOR PROPOSED DISCHARGE LIMITATIONS AND CONDITIONS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. Section IV presents the basis for discharge limitations in accordance with the requirements at ARM 17.30.1006, ARM 17.30.1031 and ARM 17.30.715. The bases for deriving and establishing effluent limitations are further discussed in Appendix V. Based on the information and analyses presented in Sections III and IV, pursuant to ARM 17.30.1031, DEQ proposes the following numerical effluent limitations:

Table 2

| Interim Effluent Limits – Outfall 002. AquaFlo - Skyview & NW Subdivisions Effective Dates: From the Effective Date of this Permit until 4 years after the Effective Date of the Permit. | | | | |
|---|----------|------------------------------|-------------------------------|--|
| Parameter | Units | Effluent Limitations | | Rationale |
| | | Daily Maximum ⁽¹⁾ | Annual Maximum ⁽¹⁾ | |
| Nitrogen, Total (as N) | mg/L | 26 ⁽²⁾ | - | Previous Permit Limit This value is a Design Based Effluent Limit (DBEL) Nondegradation Significance Criteria ARM 17.30.715(1)(c) |
| | lbs/day | 5.1 ⁽³⁾ | - | Previous Permit Limit This value is a Water Quality Based Effluent Limit (WQBEL) Nondegradation Significance Criteria ARM 17.30.715(1)(d)(i) or (ii) or (iii) or (iv) |
| Phosphorus, Total (as P) | lbs/year | - | 985 ⁽⁴⁾ | Previous Permit Limit Nondegradation Significance Criteria ARM 17.30.715(1)(e) |

Footnotes:

Beneficial Uses: ARM 17.30.1006

1) See definition in Part V of permit.

2) From the previous permit cycle Design Based Effluent Limit (DBEL). The DBEL listed in the 2010 Permit was 26 mg/L, the maximum allowable discharge concentration. The value represents a concentration of 24 mg/L plus 7% additional nitrogen removal, which results in the final concentration of 26 mg/L. The credit for an additional 7% removal of nitrogen in the drainfield is no longer granted by DEQ.

3) From the previous permit cycle Water Quality Based Effluent Limit (WQBEL). This WQBEL represents the allowable discharge concentration of Nitrate + Nitrite = 18.2 mg/L. The calculated maximum allowable concentration of 18.2 mg/L is based on the ambient ground water N+N concentration of 3.0 mg/L. The 2010 permit limit (of 20 mg/L) was based on 18.2 mg/L + 7% allowance = 20 mg/L. The 20 mg/L was converted to an N + N load = 5.1 lbs/day. The credit for an additional 7% removal of nitrogen in the drainfield is no longer granted by DEQ.

4) From previous permit cycle: (2.7 lbs/day) x (365 days) = Annual Maximum lbs/yr.

The above Interim Effluent Limits (Table 2) are taken directly from the 2010 MGWPCS Permit for AquaFlo, LLC / Skyview Water & Sewer Utility. These Limits are currently in effect and will remain in effect until 4 years after the effective start date of this permit. This means that the quality of effluent discharged through Outfall 002 shall, at a minimum, meet the limitations as set forth in Table 2. The Final Effluent Limits go into effect 4 years after the effective start date of this permit. The Final Effluent Limits are presented in Table 3 below.

The above Interim Effluent Limit expressed as a concentration (mg/L) represents the previous permit's Design Based Effluent Limit (DBEL) or the allowable discharge concentration of Nitrate + Nitrite. The DBEL listed in the 2010 Permit was actually 26 mg/L (refer to Table 2 Final Numeric Effluent Limits – Outfall 002 in the 2010 Permit). That value represents a concentration of 24 mg/L + 7% additional nitrogen removal, which results in the final concentration of 26 mg/L. The credit for an additional 7% removal of nitrogen in the drainfield is no longer granted by DEQ.

The above Interim Effluent Limit expressed as a load (lbs/day) represents the previous permit's Water Quality Based Effluent Limit (WQBEL), or the allowable discharge concentration, of Nitrate + Nitrite (refer to Table 2 Final Numeric Effluent Limits – Outfall 002 in the 2010 Permit). The calculated maximum allowable concentration of 18.2 mg/L is based on the ambient ground water N+N concentration of 3.0 mg/L. The 2010 limit (of 20 mg/L) was based on 18.2 mg/L + 7% additional nitrogen removal = 20 mg/L. That addition of the 7% nitrogen removal resulted in the final allowable concentration of 20 mg/L. The 20 mg/L was then converted to a N + N load = 5.1 lbs/day. The credit for an additional 7% removal of nitrogen in the drainfield is no longer granted by DEQ.

Table 3

| Final Effluent Limits – Outfall 002. AquaFlo - Skyview & NW Subdivisions Effective Dates: From the date 4 years after the Effective Date of the Permit until the Term of the Permit. | | | | |
|---|----------|------------------------------|-------------------------------|---|
| Parameter | Units | Effluent Limitations | | Rationale |
| | | Daily Maximum ⁽¹⁾ | Annual Maximum ⁽¹⁾ | |
| Nitrogen, Total (as N) | lbs/day | 2.9 ⁽²⁾ | - | This is a Water Quality Based Effluent Limit, expressed as a load. Nondegradation Significance Criteria ARM 17.30.715(1)(d)(i) or (ii) or (iii) or (iv) |
| Phosphorus, Total (as P) | lbs/year | - | 985 ⁽³⁾ | Nondegradation Significance Criteria ARM 17.30.715(1)(e) & Previous Permit Limit |

Footnotes:
 Beneficial Uses: ARM 17.30.1006
 1) See definition in Part V of permit.
 2) This is the Water Quality Based Effluent Limit (WQBEL), which is the maximum allowable discharge. It is calculated based on the ambient groundwater Total N, which is Nitrate + Nitrite + Total Kjeldahl Nitrogen (samples collected in 2014 and 2015). **Ambient Total N was 5.96 mg/L. Based on the ambient ground water value of 5.96 mg/L, the maximum allowable concentration was calculated to be 11.2 mg/L. The concentration of 11.2 mg/L is presented as a load of 2.9 lbs/day.**
 3) From previous permit cycle, (2.7 lbs/day) x (365 days) = Annual Maximum lbs/yr.= 985 lbs/year.

The Final Effluent Limits in Table 3 above go into effect 4 years after the effective date of this permit. The above Final Effluent Limits expressed above as a load (lbs/day) represents this permit’s calculated Water Quality Based Effluent Limit, or allowable discharge concentration, of Total Nitrogen (as N), which is Nitrate + Nitrite + Total Kjeldahl Nitrogen. This calculation was based on water quality sampling data of the receiving water in 2014 and 2015. Ambient Total N averaged 5.96 mg/L (refer to Table 7 in Appendix III). Using the ambient ground water concentration of 5.96 mg/L, the calculated maximum allowable concentration is 11.2 mg/L Total N. This value of 11.2 mg/L is presented in Table 3 above as a load limit of 2.9 lbs/day.

V.RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. ARM 17.30.1031 requires that all issued MGWPCS permits contain monitoring requirements that assure compliance with the developed numeric effluent limitations and therefore water quality standards. Effluent monitoring will be required as a condition of this permit. Monitoring requirements and respective rationale is summarized in Appendix VII.

VI.SPECIAL CONDITIONS

In accordance with ARM 17.30.1031 this section contains the basis for special permit conditions that are necessary to assure compliance with the ground water quality standards and the Montana Water Quality Act. The following special condition(s) will be included in the permit.

- A. The well identified as OBS1 has been designated by the applicant as a useful location and depth to provide representative samples of ambient ground water quality. Unfortunately no well log exists for this well. To build a defensible well log for the permittee, DEQ requests a better physical description of the well.

Within 1 year of the effective date of the permit, the permittee shall collect and submit to DEQ the following information on the well:

- Type/material of well casing (PVC, Steel, other);
- Nominal diameter of casing;
- Type of well cap;
- Depth of the well;
- Static water level;
- Well ID (in this case it is OBS1);
- Proposed use of the well (this will be Monitoring Well);
- Owner of the well; and
- Location of the well (this needs 2 types of locational data: Lat./Long and street address). The Lat./Long. were already established in this permit.

This information can be determined concurrent with the first water sampling event. The above information will be used by the Montana Bureau of Mines & Geology (MBMG) GWIC, who will assign the well a GWIC ID# and generate a well log that is available online. This information shall be provided to DEQ in the form of a letter report. This report on the well is due on or before the 28th day of the month following the completion date of the initial water sampling (discussed below).

- B. Within 1-year of the effective date of the permit, the permittee shall conduct water sampling from OBS1, followed by repeat water sampling events at least every 6-months. This water quality data will help with the future MGWPCS permit renewal process.
- C. Analytic data from the water sampling will be submitted to DEQ utilizing Discharge Monitoring Reports (DMRs). The analytic data reporting is due on or before the 28th day of the month following the completion date.
- D. Submit a letter report to DEQ at the end of each calendar year summarizing the steps taken by the permittee that will bring the WWTS incrementally closer to being able to meet the final effluent limits that begin 4 years after the effective date of this permit.

Reporting requirements are further described in Appendix XI. The commencement date for the monitoring well sampling and reporting is listed in Section VII.

VII.COMPLIANCE SCHEDULE

A compliance schedule is included to allow a reasonable opportunity for the permittee to attain compliance with permit requirements and to stay in compliance with the Water Quality Act and the Administrative Rules of Montana. The actions listed in the table 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.

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Table 4

| Compliance Schedule AquaFlo - Skyview & NW Subdivisions | | | | |
|---|--|---|---|--|
| Authority | Action | Frequency | Scheduled Completion Date⁽¹⁾ | Scheduled Report Due Date⁽²⁾ |
| ARM 17.30.1031 | Interim Effluent Limit for Outfall 002 goes into effect with the initial date of this permit | Per the Effluent Monitoring Requirements, Table 10 | Interim Effluent Limits in effect until 4 years after permit goes into effect. | Data reporting is through the DMRs. |
| ARM 17.30.1031 | Complete the task of collecting and compiling the needed information on OBS1. | Single event | Within 1-year of the effective date of the permit. | This information collection can be concurrent with the initial water sampling event below. Reporting is due on or before the 28 th day of the month following the initial sample analysis date for samples from OBS1. |
| ARM 17.30.1031 | Begin water sampling from OBS1, with ongoing sampling events every 6-months thereafter. | Per ground water monitoring requirements, Table 11. | First sample event within 1-year of the effective date of the permit. Subsequent sampling events will be conducted every 6-months thereafter. | The reporting on the well information and the water sampling are due on or before the 28 th day of the month following the sample analysis date. Water quality data reporting will be done using DMRs. |
| ARM 17.30.1031 | Submit report to DEQ outlining steps taken toward the WWTS meeting the Final Effluent Limits that will go into effect 4-years after the permit goes into effect. | 1 report / year | 1 report / year until the Final Effluent Limits are achieved. | End of each calendar year. |
| ARM 17.30.1031 | Final Effluent Limits go into effect 4 years after permit goes into effect. | Per the Effluent Monitoring Requirements, Table 10 | Through the end of the permit. | Data reporting is through the DMRs. |
| Footnotes: | | | | |
| 2) The actions must be completed on or before the scheduled completion dates. | | | | |
| 3) The report must be received by DEQ on or before the scheduled report due date and must include all information as required. | | | | |
| 4) The written report documenting monitoring well (OBS1) characteristics must include location (address and coordinates), well construction materials, casing diameter, well cap type, depth to water, and total depth of the well. | | | | |

NONSIGNIFICANT DETERMINATION

DEQ has determined (DEQ 2003 and 2009) that the discharge constitutes a new source and is subject to the Montana Nondegradation Policy (75-5-303, MCA; ARM 17.30.702). The applicable water quality standards for Class I or II ground water and nondegradation-nonsignificance criteria are summarized in Appendix V. 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.

VIII. 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 **September 28, 2016**. Comments may be directed to:

DEQWPBPublicComments@mt.gov

or at:

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 were 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) 444-3080 or email DEQWPBPublicComments@mt.gov. All inquiries will need to reference the permit number (MTX000121), 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.

Note: This Statement of Basis (Fact Sheet) for the 2016 Permit Renewal was completed by Jeffrey Frank Herrick, Water Protection Bureau, Montana DEQ July 2016.

FIGURES TO SUPPORT THIS DOCUMENT

See the following pages.

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Figure 2

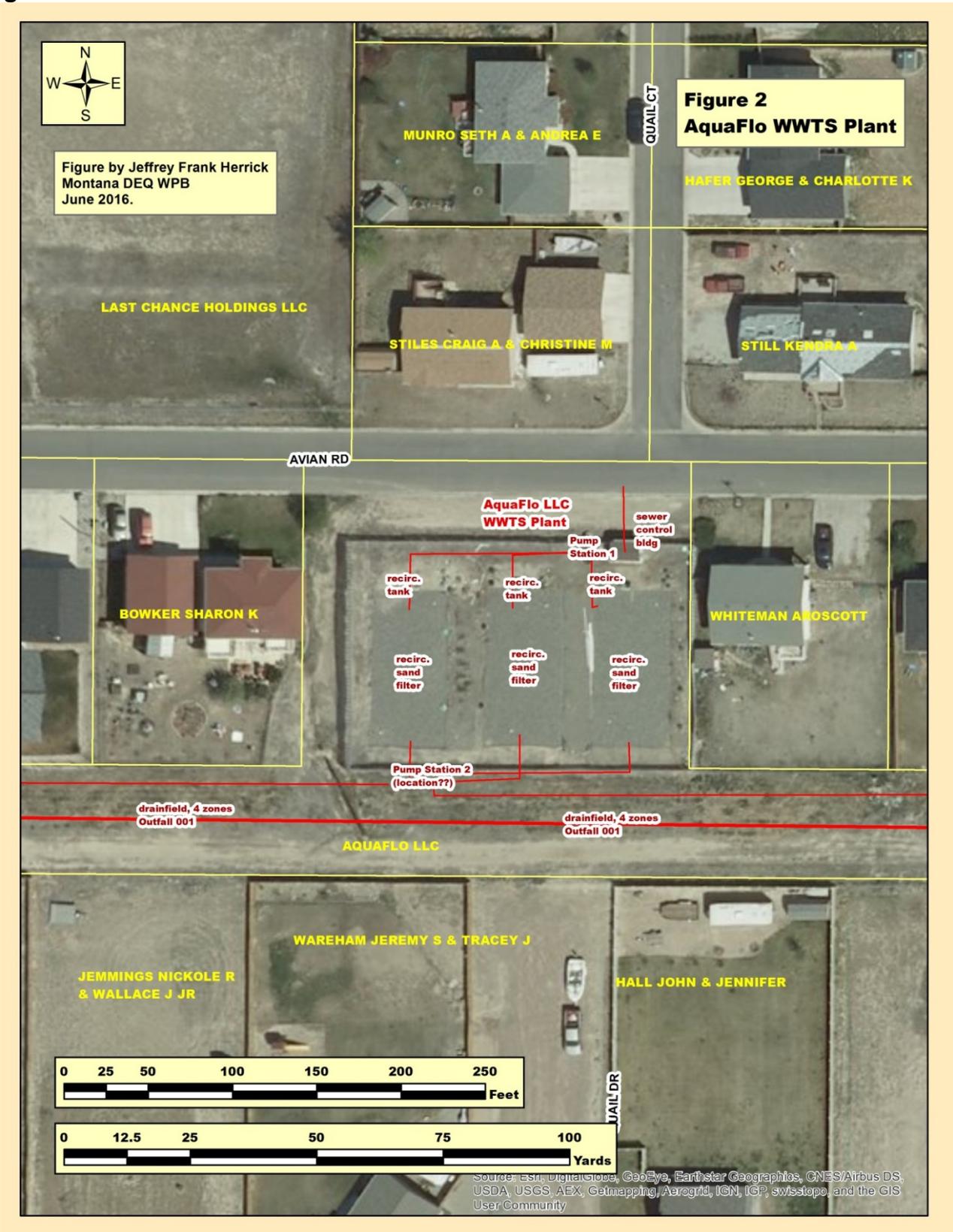


Figure 3

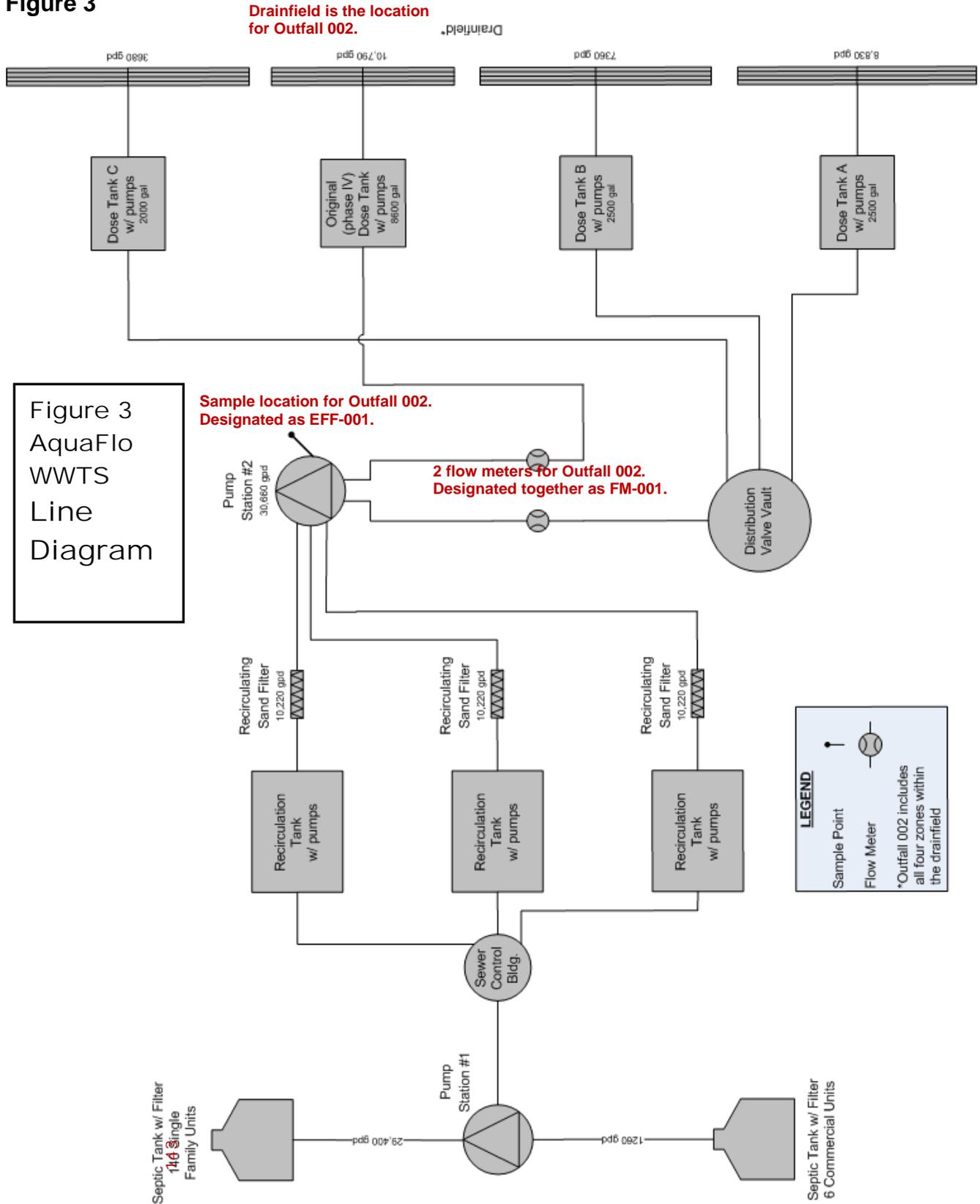


Figure 4 – AquaFlo WWTS, Line Diagram from 2015 Permit Application

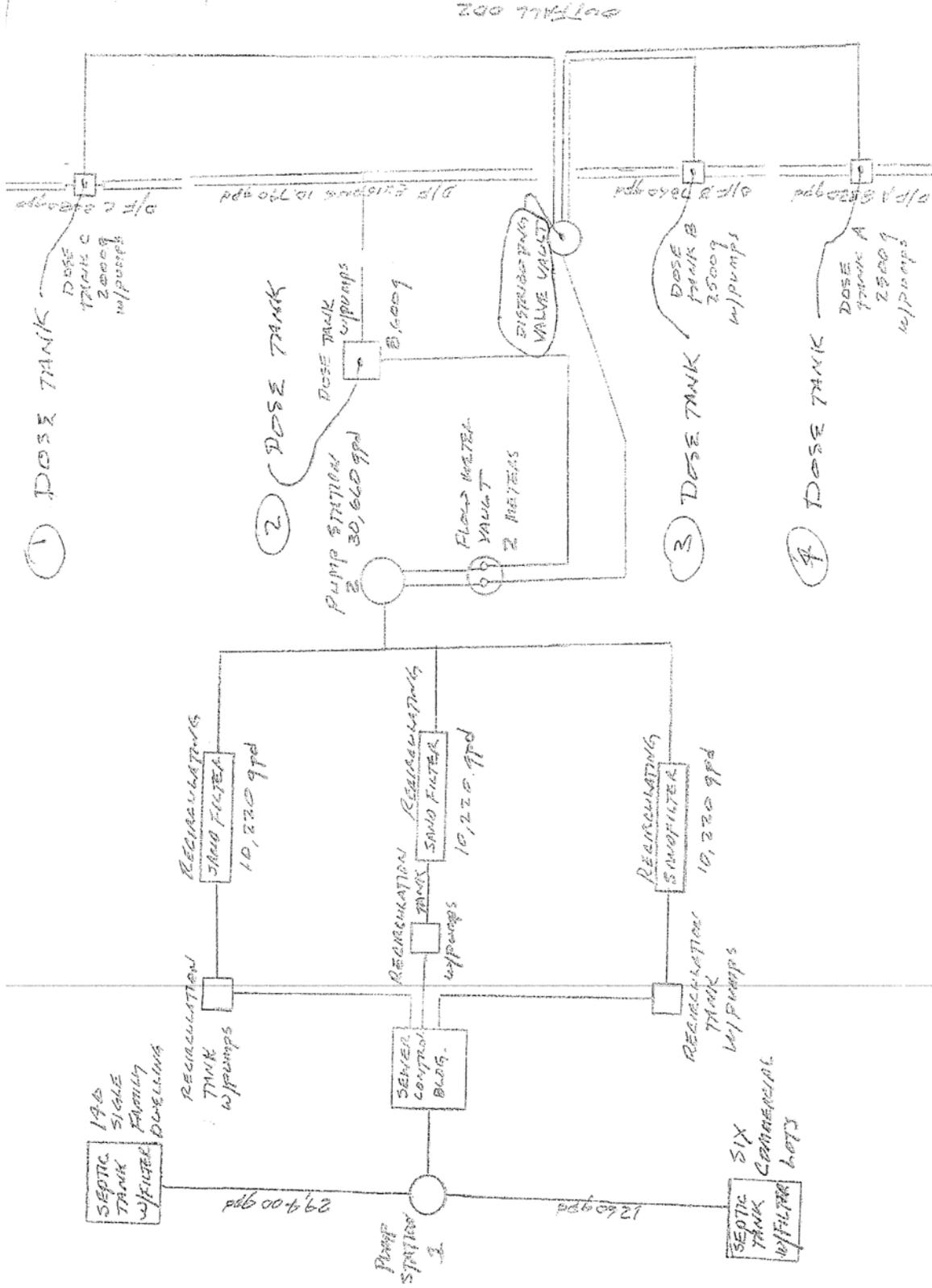
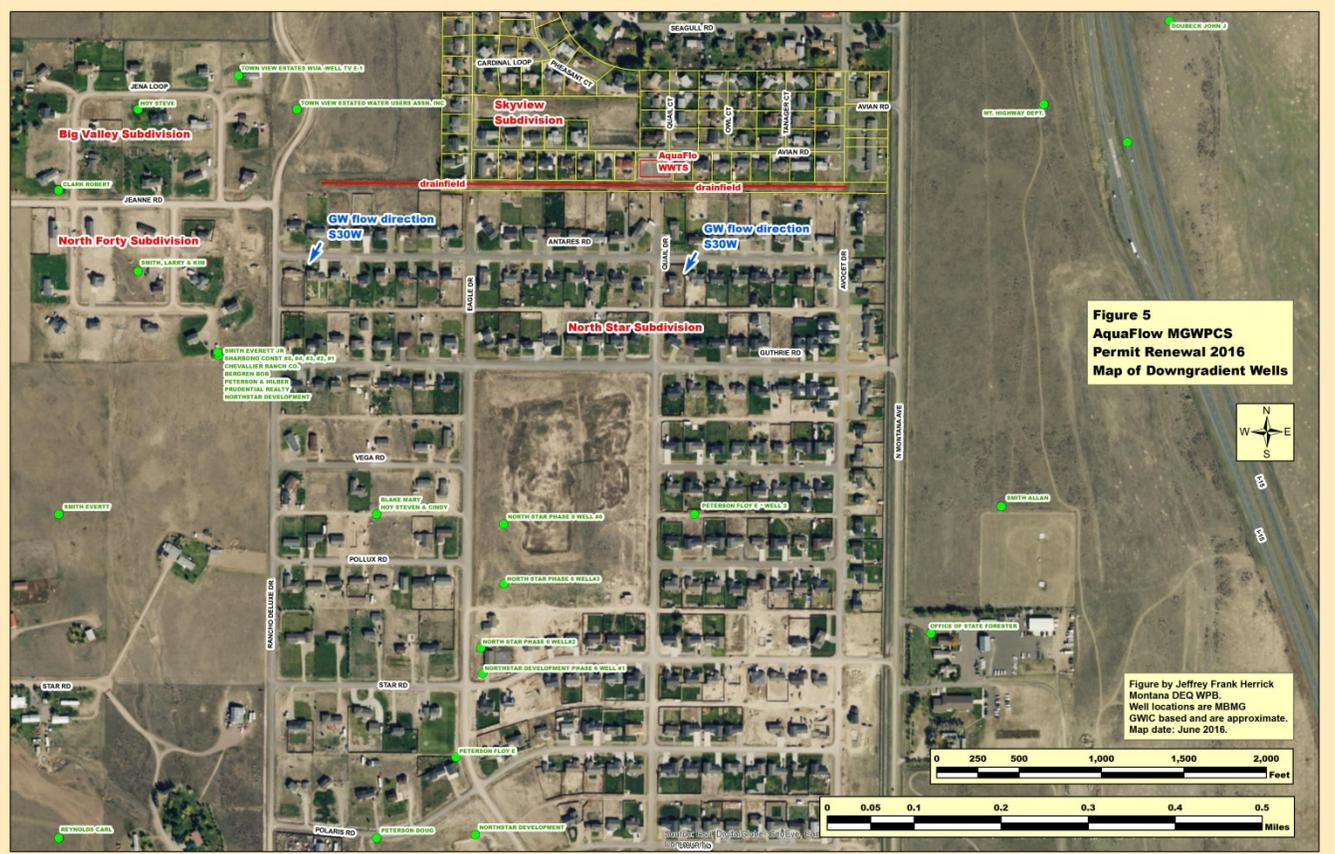


Figure 5

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APPENDIX I - EFFLUENT QUALITY

Table 5

| Effluent Quality – Outfall 002. AquaFlo - Skyview & NW Subdivisions | | | | | | | | |
|--|----------|-------------------------|------------------------|------------------------|---------------------------------------|--------------|----------------|-------------------|
| Parameter ⁽¹⁾ | Location | Units | Reported Minimum Value | Reported Average Value | Reported Maximum ⁽²⁾ Value | # of Samples | Source of Data | 2010 Permit Limit |
| Flow rate, Discharge | FM-001 | gal/day | 10,780 | 16,398 | 19,269 | 63 | DMR | - |
| | | 30 day avg. gal/day | 12,500 | 16,443 | 19,269 | 63 | DMR | - |
| Chloride (as Cl) | EFF-001 | mg/L | 130.0 | 198.3 | 296.0 | 63 | DMR | - |
| <i>Escherichia Coliform</i> Bacteria | EFF-001 | CFU / 100ml 90 day avg. | 1 | 52,652 | 220,000 | 22 | DMR | - |
| | | CFU/100ml Daily Max | 1 | 69,985 | 390,000 | 22 | DMR | - |
| Nitrogen, Nitrate + Nitrite (as N) | EFF-001 | mg/L | 0.50 | 11.51 | 99.00 | 63 | DMR | - |
| Nitrogen, Total Ammonia (as N) | EFF-001 | mg/L | 0.62 | 18.88 | 58.00 | 63 | DMR | - |
| Nitrogen, Total Kjeldahl (as N) | EFF-001 | mg/L | 1.00 | 22.04 | 66.50 | 63 | DMR | - |
| Nitrogen, Total (as N) ⁽³⁾ | EFF-001 | mg/L | 13.40 | 32.48 | 74.20 | 63 | DMR | 26 |
| | | lbs/day | 1.85 | 4.26 | 9.58 | 29 | DMR | 5.1 |
| Phosphorus, Total (as P) | EFF-001 | mg/L | 0.46 | 4.61 | 12.80 | 63 | DMR | - |
| | | lbs/day | 0.062 | 0.617 | 1.387 | 63 | DMR | 2.7 |
| Total Suspended Solids (TSS) | EFF-001 | mg/L | 0.00 | 30.39 | 930.00 | 49 | DMR | - |

Footnotes:

Period of Record for Nitrogen, Total as lbs/day: 08/2012 through 03/2016.

Period of Record for the rest of above samples: 10/2010 through 03/2016.

CFU = Colony Forming Unit

DMR = Self Reported Discharge Monitoring Reports

EFF-001: Effluent sample site for Outfall 002 is located in Pump Station #2 just prior to the Flow Meters and the Distribution Valve Vault.

FM-001 = This represents to total flow through 2 effluent flow meters (arranged in parallel), each in its own vault located after Pump Station #2. The flow values for the 2 meters are combined for the values reported on the DMRs.

s.u. = standard units

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) Total Nitrogen = Nitrate + Nitrite + Total Kjeldahl Nitrogen (as N)

APPENDIX II – MONITORING WELL SUMMARY

Table 6

| |
|--|
| Monitoring Well Summary AquaFlo - Skyview & NW Subdivisions |
| Monitoring Well: MW-2 MBMG GWIC #: unknown, <u>no log was available.</u> This is an old domestic well, currently unused. |
| <u>Location:</u> This well is located along the south side of Prairie Road, which is at the north terminus of the Northwest Subdivision. It appears to be located at 811 Prairie Road. See Figure 1. Latitude: 46.73357° Longitude: -112.02992° |
| <u>Representation:</u> Ambient quality of the shallow receiving ground water, up and side gradient to Outfall 002. Previously discussed as potentially representing ambient receiving water, it was not used for this permit cycle. |
| Monitoring Well: OBS1 OBS1 has in the past been variously identified as Observation Well No. 1, Obs Well, Observation Well, MW East Permit, MW East, and MW East 2014. MBMG GWIC #: unknown, <u>no log was available.</u> This is an old domestic well, currently unused. This is the well currently used to characterize ground water up-gradient from Outfall 002. |
| <u>Location:</u> This well is located along the north side of Pintail Court. This appears to be located between 988 and 966 Pintail Court. The well is approximately 1,850 feet up-gradient from Outfall 002. See Figure 1. Latitude: 46.73154° Longitude: -112.02705° |
| <u>Representation:</u> For this permit cycle, this well represents ambient water quality, of the shallow receiving ground water, upgradient of Outfall 002. This is the well that provided ambient water quality data for this permit cycle (sampled in 2014 and 2015). |

Note: The above wells' Lat. & Long. were updated for this permit cycle and mapped on Figure 1 in 2016 by J.F. Herrick DEQ WPB.

APPENDIX III - GROUND WATER QUALITY MONITORING RESULTS

Table 7

| Ground Water Monitoring Results - OBS1. AquaFlo - Skyview & NW Subdivisions | | | | | | | | |
|--|------------------------------------|--------------|-------------------------------|-------------------------------|---|----------------------------|---------------------|-----------------------|
| Monitored Source⁽¹⁾ | Parameter | Units | Reported Minimum Value | Reported Average Value | Reported Maximum Value⁽²⁾ | Lab Reporting Limit | # of Samples | Source of Data |
| OBS1 = Ambient Ground Water, >1,500 feet upgradient from Outfall 002 | Sulfate, Total | mg/L | 55 | 126 | 172 | 1 | 3 | Lab |
| | Chloride (as Cl) | mg/L | 93 | 171 | 269 | 1 | 3 | Lab |
| | Total Dissolved Solids (TDS) | mg/L | 421 | 547 | 691 | 10, 20 | 3 | Lab |
| | <i>Escherichia coli</i> Bacteria | CFU /100ml | <1 | <1 | <2 | 1 | 3 | Lab |
| | Nitrogen, Nitrate + Nitrite (as N) | mg/L | 2.80 | 3.26 | 3.77 | 0.02, 0.1 | 3 | Lab |
| | Nitrogen, Total Kjeldahl (as N) | mg/L | ND | 2.7 | 3.4 | 0.5, 1 | 3 | Lab |
| | Organic Carbon | mg/L | 0.6 | 1.0 | 1.4 | 0.5 | 3 | Lab |
| | pH | s.u. | 7.3 | 7.7 | 8.2 | 0.1 | 3 | Lab |
| | Specific Conductivity (@ 25°C) | µS/cm | 758 | 992 | 1250 | 1 | 3 | Lab |
| | Static Water Level (SWL) | ft-bgs | 62.3 | 64.9 | 68.9 | 0.1 | 13 | Aqua-Flo |

Footnotes:

Period of Record for analytic data: 08/25/2014 through 01/15/2015.

Period of Record for water level measurements: 01/06/2014 through 01/15/2015.

bgs = below ground surface

CFU = Colony Forming Units

Total Nitrogen Concentration is defined as **Nitrate + Nitrite + Total Kjeldahl Nitrogen (as N).**

Total Nitrogen was not reported for the 2014 & 2015 water sampling of OBS1; but it is 3.26 mg/L + 2.7 mg/L = 5.96 mg/L.

s.u. = standard units

1) Refer to Section II of the Fact Sheet for the existing or proposed location of the monitoring wells.

2) Maximum value recorded of all monthly or quarterly reported values.

APPENDIX IV – MIXING ZONE RATIONALE

In the 2015 renewal application for MGWPCS permit MTX000121, the applicant requested to maintain the existing standard mixing zone. No changes to the size or shape of the mixing zone were proposed or considered in this statement of basis for the permit.

The Montana Water Quality Act (75-5-103, Montana Code Annotated (MCA)) states that a mixing zone is an area of the receiving water, established in a permit, where the water quality standards may be exceeded. Mixing zones are subject to the conditions imposed by DEQ and consistent with the rules adopted by the Board of Environmental Review (Board). A person applying to DEQ for a mixing zone must indicate the type of mixing zone requested and supply information of sufficient detail for DEQ to make a determination regarding the authorization of the mixing zone (ARM 17.30.515(2)).

DEQ determines whether a mixing zone is appropriate pursuant to the requirements and procedures of ARM 17.30.501 et seq. DEQ must conduct a water quality assessment in accordance with ARM 17.30.506(2)(a-i), to determine if a mixing zone is applicable and the type of mixing zone authorized.

A mixing zone may be denied if it will threaten or impair existing uses (see Section IV.A.) in accordance with ARM 17.30.505(2). In making this determination, DEQ will consider whether the currently available data accurately predicts ground water or pollutant movement or whether there is sufficient unpredictability that might result in adverse impacts due to a particular concentration of a parameter within the mixing zone (ARM 17.30.506; ARM 17.30.518).

For purposes of authorization determination, DEQ will reference the following rules for water quality assessment of the mixing zone. A mixing zone may be granted for individual parameters in a discharge (ARM 17.30.505). As part of the water quality assessment described above, the concentration of pollutants at the downgradient boundary of the mixing zone must be estimated in accordance with ARM 17.30.517 to determine if the discharge qualifies for a (500 foot) ground water mixing zone. After an assessment of the application information (ARM 17.30.505), the permittee requesting a mixing zone should indicate the type of mixing zone requested and supply information of sufficient detail in order for DEQ to make a determination regarding the authorization of the mixing zone (ARM 17.30.515(2)). The applicant requested a standard mixing zone in the 2015 renewal application for MGWPCS permit MTX000121. No changes to the size or shape of the mixing zone were proposed or considered. DEQ will authorize a mixing zone for the parameters listed within the table below as the potential impact to beneficial uses may be minimal (Section IV).

The downgradient boundary mixing zone width is the width of the source (the maximum outfall width perpendicular to the direction of ground water) plus the distance determined by the tangent of 5° (equal to 0.0875) times twice the length of the mixing zone (ARM 17.30.517(1)(d)(iii)(B)). The permittee has requested a standard mixing zone length of 500 feet for Outfall 002 (ARM 17.30.517). The width of the drainfield structure perpendicular to

ground water flow direction is 1,795 feet. Using the adjustment discussed above, the mixing zone width at the downgradient boundary of Outfall 002 is equal to 1,882.5 feet (Refer to Table 8 below). ARM 17.30.517(1)(d)(iii)(A) states that the depth of a standard ground water mixing zone extends from the top of the water table beneath the source down to 15 feet below the water table. Although the soils are fine-grained, no specific limiting layers were documented within these depths at the location of the facility's mixing zone. Therefore, DEQ has used 15 feet as the depth of the mixing zone for Outfall 002.

The cross-sectional area (A) of the mixing zone is the area of the ground water flux boundary at the terminus of the mixing zone. This area is calculated by multiplying the depth of the mixing zone (15 feet) by the width of the mixing zone at the downgradient boundary (1,882.5 feet). This results in a cross-sectional area at the downgradient boundary of mixing zone of 28,327.5 ft². The permittee submitted information indicating that the ground water gradient (I) is 0.023 ft/ft, the ground water flow direction is S30°W, and the hydraulic conductivity (K) is 15 ft/day. Most of the above values are drawn from the previous DEQ statement of basis (2009), the most recent permit (2010), and the most recent permit application (2015). As summarized in Table 7 above:

- The average ambient Nitrate + Nitrite (as N) concentration was 3.26 mg/L.
- The average ambient Total N = Nitrate + Nitrite + Total Kjeldahl (as N) concentration is 5.96 mg/L.

These values represent the receiving water. The applicable mixing zone variables for Outfall 002 are summarized below in Table 8 below.

The cross sectional area (A) is the area of the ground water flux boundary at the terminus of the mixing zone (ARM 17.30.517). The down gradient boundary mixing zone width is the width of the source (drainfield width perpendicular to ground water flow direction), plus the distance determined by the tangent of 5° (0.0875) times the length of the mixing zone times two (2) (ARM 17.30.517). The calculated widths and respective cross section areas (A) are listed in Table 8.

Based on the dimensions of the standard mixing zones, and the hydrogeologic characteristics (Section II), the volume of ground water (Q_{GW}) available to mix with the effluent is calculated using Darcy's Equation (ARM 17.30.517):

$$Q_{GW} = KIA$$

Where:

- Q_{GW}** = ground water flow volume (ft³/day)
- K** = hydraulic conductivity (ft/day)
- I** = hydraulic gradient (ft/ft)
- A** = cross-sectional area (ft²) of flow at the downgradient boundary of the mixing zone.

The table below displays the respective mixing zone parameters used in the above equation. The table also lists the resulting volume of ground water available to mix at Outfall 002. Based on the description of the mixing zone above, and analysis presented in

Section IV, above, DEQ has determined pursuant to ARM 17.30.505 that a standard mixing zone is applicable and will be authorized for the parameters listed in the table below for Outfall 002.

Table 8

| Mixing Zone Information - Outfall 002 AquaFlo - Skyview & NW Subdivisions | | |
|--|---------------------------|-----------------------|
| Parameter | Units | Value |
| Mixing Zone Type | - | Standard |
| Authorized Parameters | - | Total Nitrogen |
| Ambient Ground Water Concentrations, Nitrate + Nitrite | mg/L | 3.26 |
| Ambient Ground Water Concentrations, Nitrate + Nitrite + Total Kjeldahl Nitrogen | mg/L | 5.96 |
| Ground Water Flow Direction | bearing | S30°W |
| Length of Mixing Zone | feet | 500 |
| Thickness of Mixing Zone | feet | 15 |
| Outfall Width, Perpendicular to Ground Water Flow Direction | feet | 1795 |
| Width of Mixing Zone at Down Gradient Boundary | feet | 1882.5 |
| Cross Sectional Area of Mixing Zone (A) | ft² | 28237.5 |
| Hydraulic Conductivity (K) | feet/day | 15 |
| Hydraulic Gradient (I) | ft/ft | 0.023 |
| Volume of Ground Water Available for Mixing (Q _{gw}) | ft³/day | 9,742 |

APPENDIX V - RATIONALE FOR PROPOSED DISCHARGE LIMITATIONS AND CONDITIONS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. Section IV presents the basis for discharge limitations in accordance with the requirements at ARM 17.30.1006, ARM 17.30.1031 and ARM 17.30.715.

A. Water Use Classification & Applicable Water Quality Standards

The receiving water is Class I ground water and high quality waters of the state (75-5-103, MCA). The quality of Class I ground water must be maintained so that these waters are suitable for the following beneficial uses with little or no treatment (ARM 17.30.1006):

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

Persons may not cause a violation of the following specific water quality standards in Class I ground water, pursuant to ARM 17.30.1006, except within a DEQ approved mixing zone as provided in ARM 17.30.1005:

- The human health standards for ground water listed in Circular DEQ-7;
- For concentrations of parameters for which human health standards are not listed in DEQ-7, no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses listed for Class I water. DEQ may use any pertinent credible information to determine these levels; and,
- No increase of a parameter that causes a violation of the nondegradation provisions of 75-5-303, MCA.

The nondegradation rules (ARM 17.30.701, et seq.) implement Montana's nondegradation policy, which applies to any activity of man resulting in a new or increased source which may cause degradation (ARM 17.30.705). In accordance with ARM 17.30.706, DEQ is required to determine whether a new or increased source may cause degradation or whether it is nonsignificant according to ARM 17.30.715.

DEQ performed a significance determination for the proposed activity as part of permit development (DEQ 2003, 2009). The determination established that the proposed discharge is a new or increased source (ARM 17.30.702) because it is an activity resulting in a change of existing water quality occurring on or after April 29, 1993. Discharges in compliance with the nondegradation-nonsignificance criteria established within this permit, constitute nonsignificant degradation.

The applicable ground water standards pursuant to ARM 17.30.1006 and the nondegradation-nonsignificance criteria at ARM 17.30.715 for the identified parameters are

summarized in the table below and will be used as the basis for developing effluent limitations in the permit.

Table 9

| Applicable Ground Water Quality Standards. AquaFlo - Skyview & NW Subdivisions | | | | | |
|---|--------------|--|--|---|---|
| Parameter⁽¹⁾ | Units | 17.30.1006(1)(b)(i) Human Health Standards - Ground Water | 17.30.1006(1)(b)(ii) Beneficial Uses - Ground Water | Pollutant Category⁽²⁾ | 17.30.715 Nondegradation - Nonsignificance Criteria⁽³⁾⁽⁴⁾ |
| Nitrogen, Nitrate + Nitrite (as N) | mg/L | 10.0 | - | T | 7.5 |
| Nitrogen, Total (TN) | mg/L | - | 10.0 | - | 7.5 |
| Phosphorus, Total Inorganic | - | - | - | H | Surface water breakthrough time greater than 50 years ⁽⁴⁾ |

Footnotes:

CFU = Colony Forming Unit

Dissolved: Metal parameters will be analyzed using the dissolved portion (0.45 micron filter), ARM 17.30.1006. These standards establish the maximum allowable changes in ground water quality and are the basis for limiting discharges to ground water, ARM 17.30.1005(1); Circular DEQ-7 (2012), Footnote 16; and ARM 17.30.715(1)(d).

- 1) Includes known parameters of concern only.
- 2) Circular DEQ-7 (2012): Carcinogen (C), Harmful (H), and Toxic (T) parameter. Toxic pollutant with a Bioconcentrator (B) factor.
- 3) Discharges in compliance with the nondegradation significance criteria constitute nonsignificant degradation.
- 4) 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 is met.

B. Pollutants and Parameters of Interest (POI)

DEQ has identified pollutants and parameters of interest (POI's) for the proposed discharge based on the following:

- Reported effluent characteristics (Section II.B. & E., Appendix I),
- Water quality standards (Appendix VI),
- Water use classification of the receiving ground water (Section II.I. and VIII., & Appendix V), and,
- United States Environmental Protection Agency (USEPA) reference documents (Appendix VIII).

Each individual POI is further discussed below.

C. Development of Effluent Limits

ARM 17.30.1006 and 17.30.715 set forth the basis for developing effluent limitations that will protect water quality. The ground water quality standards establish the maximum allowable changes to ground water quality; are the basis for limiting discharges to ground water; and may only be exceeded within a mixing zone authorized by DEQ.

1) Water Quality Based Effluent Limitations

a. Total Nitrogen

Application materials and analytic data indicate that nitrogen will be present in the proposed wastewater stream (Appendix I Table 5). To protect beneficial uses [ARM 17.30.1006(1)(b)(ii)], there shall be no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses. Therefore, no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. DEQ will establish the effluent limitations for nitrogen based on the projection that the entire nitrogen load in the wastewater stream may ultimately be converted to nitrate (USEPA 2002a).

The allowable discharge concentrations is derived from a mass-balance equation (ARM 17.30.517) which is a simple steady-state model, used to determine the POI concentration after accounting for other sources of pollution in the receiving water and any dilution as provided by a mixing zone. The equation factors in cumulative impacts of existing upgradient discharges and will limit the discharger to the assimilative capacity currently available in the receiving aquifer. The mass-balance equation (Equation 1) derived for ground water is as follows:

Equation 1:

$$Q_{gw} * C_{gw} + Q_{eff} * C_{eff} = Q_{comb} * C_{proj}$$

Where:

| | | |
|------------|---|--|
| Q_{gw} | = | ground water volume available for mixing |
| C_{gw} | = | ambient receiving ground water concentration |
| Q_{eff} | = | maximum design capacity of wastewater system |
| C_{eff} | = | effluent pollutant concentration |
| Q_{comb} | = | combined ground water and effluent ($Q_{comb} = Q_{gw} + Q_{eff}$) |
| C_{proj} | = | projected pollutant concentration (after available mixing) |

The following are some of the known values for this WWTS.

- $Q_{gw} = 9,742 \text{ ft}^3/\text{day}$
- $C_{gw} = 5.96 \text{ mg/L Total N}$
- $Q_{ef} = 4,098.646 \text{ ft}^3/\text{day}$
- $C_{ef} = 33.55 \text{ mg/L Total N}$
- $Q_{comb} = (Q_{gw} + Q_{ef}) = (9,742 \text{ ft}^3/\text{day} + 4,098.646 \text{ ft}^3/\text{day}) = 13,840.646 \text{ ft}^3/\text{day}$
- $C_{proj} = 7.5 \text{ mg/L Nitrate}$

The mass-balance equation has been arranged to calculate effluent limits so that the discharge does not cause or contribute to an exceedance of the most restrictive water quality standard. This equation can be applied to any effluent and receiving water where the applicable dilution ratio is known. This equation will only be used for nitrogen which has been authorized within the mixing zone.

Equation 2:

$$C_{\text{limt}} = C_{\text{std}} + D(C_{\text{std}} - C_{\text{gw}})$$

Where:

C_{limt} = effluent limitation concentration

C_{std} = water quality standard concentration

C_{gw} = ambient receiving ground water concentration

D = dilution ratio ($Q_{\text{gw}}/Q_{\text{eff}}$)

Using Equation 2 above to find the maximum allowable concentration (the limit), C_{limt} :

$$C_{\text{limt}} = C_{\text{std}} + D(C_{\text{std}} - C_{\text{gw}})$$

C_{limt} = calculated

$C_{\text{std}} = 7.5 \text{ mg/L}$

$D = (Q_{\text{gw}} / Q_{\text{eff}}) = (9,742 \text{ ft}^3/\text{day} / 4,098.646 \text{ ft}^3/\text{day}) = 2.37688$

$$C_{\text{limt}} = C_{\text{std}} + D(C_{\text{std}} - C_{\text{gw}}) = 7.5 \text{ mg/L} + 2.37688(7.5 \text{ mg/L} - 5.96 \text{ mg/L})$$

$C_{\text{limt}} = 11.16 \text{ mg/L}$ (effluent limitation concentration)

i. Outfall 002

The area surrounding and north of the Skyview Water & Sewer WWTS has been characterized as having localized elevated nitrate concentrations measured in numerous domestic water wells. The source of this nitrate is believed to be from agriculture and from the abundant individual onsite septic systems servicing most of the surrounding neighborhoods. The well representing the receiving water for this WWTS is OBS1. Water sampling from OBS1 (for 2014-2015) had average concentrations of total nitrogen (as N) of 5.96 mg/L.

A mass-balance approach is used to calculate the effluent quality of the discharge that meets the most restrictive water quality standard at the end of the mixing zone. Numeric effluent limitations are expressed as loads since this type of limitation inherently regulates both volume and strength of the effluent as prescribed by 75-5-402(3), MCA. Load limits ensure compliance with the ground water standards at the end of the mixing zone. Based on the proposed design capacity, the respective load effluent limitation is expressed as follows.

Equation 3:

$$L_{\text{limt}} = \text{CON} * C_{\text{eff}} * \text{DC}_{\text{eff}}$$

Where:

L_{limt} = effluent limitation (load)

C_{eff} = allowable effluent concentration at end of drainfield (standard)

DC_{eff} = design capacity of wastewater treatment system (gpd)

CON = conversion factor [$8.34 * 10^{-6}$]

As based on the above equation:

$$L_{\text{limt}} \text{ lbs/day} = [(8.34 * 10^{-6}) * 11.16 \text{ mg/L} * 30,660 \text{ gpd}]$$

$$L_{\text{limt}} \text{ lbs/day} = \mathbf{2.85376 \text{ lbs/day (effluent limitation, load)}}$$

The maximum allowable concentration of total nitrate (as N) that can be discharged to ground water is 11.16 mg/L, which when expressed as a load limit is 2.85 lbs/day. This value is used as the final effluent limit as depicted on Table 3 in Section IV of this document.

b. Phosphorus

Phosphorus is removed from solution in ground water mainly through soil sorption processes, which vary based on soil composition. The 50 year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the average load of phosphorus from the wastewater source between the discharge point and the closest downgradient surface water. The total phosphorus (as P) limitations are imposed to ensure that the quality of the effluent meets the nondegradation limit prior to discharge into any surface water (ARM 17.30.715(1)(e)). The effluent limits do not include a concentration limit for total phosphorus because of the method used to determine compliance with the 50-year breakthrough criteria.

DEQ determined in the 2009 Fact Sheet for the 2010 Permit that phosphorous discharged to ground water would not reach the first surface water (Silver Creek) in a significant amount of time. At the current discharge rate, the phosphorous breakthrough is expected to occur in 484 years. A phosphorous breakthrough that would occur in 50 years would be considered significant. As discussed in Section IV and in Tables 2 and 3 (in the beginning of this document), the total phosphorous numerical effluent limit will stay the same as the last permit cycle. The phosphorous numerical effluent limit was 2.7 lbs/day, which translates to 985 lbs/year. The same limit value, 985 lbs/year, will be maintained for the upcoming permit cycle.

E. Final Effluent Limitations

Based on the information and analyses presented in Sections III and IV and pursuant to 75-5-402, MCA and ARM 17.30.1031, DEQ proposes to reestablish numerical effluent limitations for Outfall 002 as listed in Section III Table 2, Interim Effluent Limits. These Interim Effluent Limits for Outfall 002 would be unchanged from the last permit cycle. DEQ has developed revised Final Effluent Limits which are listed in Section III Table 3. These Final Effluent Limits are the most stringent applicable limitations for each individual parameter as developed above. Effluent limits based on water quality standards are expressed as loads whenever possible since this type of limitation inherently regulates both the volume and the strength of the effluent as prescribed at 75-5-402(3), MCA. Load limits also ensure compliance with the ground water standards at the end of the mixing zone. The Final Effluent Limits are listed in Section IV.

The Interim Effluent Limits (Table 2) are taken directly from the 2010 MGWPCS Permit. These Limits are currently in effect and will remain in effect until 01 January 2020.

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APPENDIX VI – PHOSPHORUS BREAKTHROUGH ANALYSIS

DEQ determined in the 2009 Statement of Basis (Fact Sheet) that phosphorous discharged to ground water would not reach the first surface water (Silver Creek) in a significant amount of time. The phosphorous breakthrough is expected to occur in 484 years. A phosphorous breakthrough that would occur in 50 years would be considered significant. As discussed in Section IV Tables 2 and 3, the total phosphorous numerical effluent limit will stay the same as the last permit cycle. The phosphorous numerical effluent limit, 985 lbs/year, will be maintained for the upcoming permit cycle.

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APPENDIX VII – RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

ARM 17.30.1031 requires that all issued MGWPCS permits contain monitoring requirements that assure compliance with the developed numeric effluent limitations and the water quality standards. Ongoing Effluent and ground water monitoring will be required as conditions of this permit.

A. Effluent Monitoring - Compliance

Interim and Final numeric effluent limitations are developed for this permit with specific magnitudes and durations based on site-specific conditions that ensure the discharge will not cause or contribute to an exceedance of an applicable water quality standard (see Sections III and IV). Accordingly, the permittee will be required to monitor and report monitoring results at a specified frequency in order to demonstrate compliance with the applicable effluent limitations. Effluent monitoring and reporting requirements are summarized in the table below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

B. Effluent Monitoring - Sampling Location

Samples shall be representative of the nature of the monitored discharge (Permit Part II.A.). As discussed in Section II.D, the effluent sample location has been established within Pump Station #2. This sample location is specifically identified as EFF-001. Pump Station #2 is located after and receives effluent from the 3 sand filters and before the effluent is sent to the 2 flow meters (Figures 3 & 4).

C. Discharge Monitoring

Measurements shall be representative of the volume of the monitored discharge (Permit Part II.A.). The applicant will be required to maintain and report flow measurements using a flow-measuring device capable of measurements that are within 10 percent of the actual flow (Permit Part II.B.). The flow measuring device (FM-001) consists of 2 separate flow meters, each located on an effluent line that exits Pump Station #2 (Figures 3 & 4). The flow measurements are combined for reporting purposes. Flow monitoring and reporting requirements are summarized in the table below.

Table 10

| Effluent Monitoring and Reporting Requirements – Outfall 002. AquaFlo - Skyview & NW Subdivisions | | | | | | |
|--|-------------------------|-------------------------|----------------------------------|---------------------------------|---|--------------------------|
| Parameter/Method | Monitor Location | Units | Sample Type⁽¹⁾ | Minimum Sample Frequency | Reporting Requirements⁽¹⁾⁽²⁾ | Report Frequency |
| Flow Rate, Effluent ⁽³⁾ | FM-001 | gal/day | Contin-uous | Contin-uous | Daily Maximum Quarterly Average | Quarterly |
| <i>Escherichia coli</i> Bacteria | EFF-001 | CFU/100mL | Grab | 1/Quarter | Daily Maximum Quarterly Average ⁽⁴⁾ | Quarterly |
| Nitrogen, Nitrite + Nitrate (as N) | EFF-001 | mg/L | Grab | 1/Month | Daily Maximum Quarterly Average | Quarterly |
| Nitrogen, Total Ammonia (as N) | EFF-001 | mg/L | Grab | 1/Month | Daily Maximum Quarterly Average | Quarterly |
| Nitrogen, Total Kjeldahl (TKN) (as N) | EFF-001 | mg/L | Grab | 1/Month | Daily Maximum Quarterly Average | Quarterly |
| Nitrogen, Total (as N) ⁽⁵⁾ | EFF-001 | mg/L | Calculate | 1/Month | Daily Maximum Quarterly Average | Quarterly |
| | | lbs/day ⁽⁶⁾ | Calculate | 1/Month | Daily Maximum ⁽⁷⁾ Quarterly Average ⁽⁸⁾ | Quarterly |
| Phosphorus, Total (as P) | EFF-001 | mg/L | Grab | 1/Month | Quarterly Average | Quarterly |
| | | lbs/day ⁽⁶⁾ | Calculate | 1/Month | Quarterly Average ⁽⁸⁾ | Quarterly |
| | | lbs/year ⁽⁹⁾ | Calculate | 1/Year | Annual Maximum ⁽¹⁰⁾ | Annually ⁽¹⁰⁾ |

Footnotes:

CFU = Colony Forming Units

EFF-001: Effluent Sampling Location for Outfall 002 is EFF-001 taken from the wastewater treatment Pump Station #2.

FM-001: Flow Monitoring Location FM-001: Located in the Flow Meter Vault that is downstream from Pump Station #2 and prior to 4 dose tanks for the drainfield. Note that there are 2 discharge lines, each with a flow meter.

If no discharge occurs during the reporting period, "no discharge" shall be recorded on the effluent Discharge Monitoring Report (DMR) report forms.

Grab sample will 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) Requires recording device or totalizing meter, must record daily effluent volume.

4) The geometric mean must be reported if multiple samples are taken during a reporting period.

5) Total Nitrogen (as N) 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 reporting period.

8) Quarterly Average Load calculation: lbs/day = the average of all calculated individual daily average loads (lbs/day) recorded during the reporting 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). Annual maximum load shall be reported (DMR) on an annual basis (due January 28 each year of the permit cycle).

D. Ground Water Quality Monitoring

As a special condition (ARM 17.30.1031), ground water monitoring will be established in this permit to provide for long term ambient and downgradient monitoring of the aquifer. Ground water monitoring will be required at monitoring well OBS1 (Figure 1). Ground water monitoring data will be used for mixing zone determination, aquifer characterization, and for future permit renewal (Part III.A., Duty to Reapply). Ground water monitoring and reporting requirements are summarized in the table below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter. The existing ground water monitoring well OBS1 has already been established by the permittee. OBS1 shall be maintained and monitored during the term of the upcoming permit cycle. Sampling and reporting requirements shall commence upon the effective date of the permit. Information collection, water sampling, and data reporting requirements for OBS1 are discussed in Section VI. The commencement date for monitoring well sampling and reporting is listed in Section VII. Ground water monitoring and reporting requirements are detailed in the table below.

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Table 11

| Ground Water Monitoring and Reporting Requirements AquaFlo - Skyview & NW Subdivision | | | | | | | |
|--|---------------------------------|--------------|-------------------------------|-----------------------------------|---|----------------------------|--|
| Parameter / Method | Monitor Location (1) | Units | Sample Type (2)(3) | Minimum Sampling Frequency | Reporting Requirements (2)(3)(4)(5)(6) | Reporting Frequency | Rationale |
| Chloride (as Cl) | OBS1 | mg/L | Grab | 1/6-months | Daily Maximum Semi-Annual Average | 1/6-months | Aquifer Characterization and to provide information needed to develop the next permit renewal. |
| Nitrogen, Nitrate + Nitrite (as N) | OBS1 | mg/L | Grab | 1/6-months | Daily Maximum Semi-Annual Average | 1/6-months | |
| Nitrogen, Total Kjeldahl (TKN) (as N) | OBS1 | mg/L | Grab | 1/6-months | Daily Maximum Semi-Annual Average | 1/6-months | |
| Nitrogen, Total Ammonia | OBS1 | mg/L | Grab | 1/6-months | Daily Maximum Semi-Annual Average | 1/6-months | |
| Nitrogen, Total (as N) This is Nitrate + Nitrite + Total Kjeldahl Nitrogen (as N) | OBS1 | mg/L | Calculate | 1/6-months | Daily Maximum Semi-Annual Average | 1/6-months | |
| Specific Conductivity @ 25°C | OBS1 | µS/cm | Grab or Instantaneous | 1/6-months | Daily Maximum Semi-Annual Average | 1/6-months | |
| Static Water Level (SWL) ⁽⁷⁾ | OBS1 | ft-bmp | Instantaneous | 1/6-months | Daily Average Semi-Annual Average | 1/6-months | |

Footnotes:

ft-bmp = feet below measuring point

s.u. = standard units

At no time shall the permittee mark or state "no discharge" on any monitoring well DMR form.

If any monitoring well(s) are abandoned, destroyed or decommissioned, or are no longer able to be sampled due to fluctuations in the ground water table; the permittee shall install or designate a new well to replace the abandoned, destroyed, decommissioned, or non-viable well(s).

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

Submittal of discharge monitoring report forms (DMRs) will be required, regardless of the operational status of the facility or of each individual monitoring well.

- 1) Refer to Section 2.H., Figure 1, and Appendix II of this Fact Sheet for the location of the monitoring well OBS1.
- 2) If more than 1 monitoring well exist, then each monitor well to be individually sampled and analyzed for each respective parameter listed above.
- 3) See definitions in Part V of the permit.
- 4) Submittal of DMRs will be required, regardless of the installation status of each monitoring well. If the monitoring well(s) is not installed or established for an individual monitoring period, the following shall be stated upon each applicable DMR: "monitoring well has not been installed".
- 5) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report (DMR).
- 6) The geometric mean must be reported if more than one sample is taken during a reporting period.
- 7) Measuring point (point of reference) for SWL measurements shall be from top of casing and measured to within 1/100th of one foot.

APPENDIX VIII - REFERENCES CITED

40 CFR § 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants. 2011.

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 7 – Nondegradation of Water Quality.
- Subchapter 10 – Montana Ground Water Pollution Control System.
- Subchapter 13 – Montana Pollutant Discharge Elimination System.

Montana Department of Environmental Quality, Water Quality Circulars:

- Circular DEQ-2 – Design Standards for Wastewater Facilities.
- Circular DEQ-4 – Montana Standards for On-Site Subsurface Sewage Treatment Systems.
- Circular DEQ-7 – Montana Numeric Water Quality Standards, Required Reporting Values, and Trigger Values. Oct. 2012.

Montana Code Annotated, Title 75, Chapter 5, *Montana Water Quality Act*, 2011.

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Montana Department of Environmental Quality (DEQ), Oct. 2007, Completeness Letter, MTX000121.

Montana Department of Environmental Quality (DEQ), Sept. 2006. Compliance Inspection, Facility MTX000121.

Montana Department of Environmental Quality (DEQ), June 2005. Statement of Basis for the Skyview and Northwest Subdivision. MTX000121.

Montana Department of Environmental Quality (DEQ), Oct. 2004. Statement of Basis for the Skyview and Northwest Subdivision. MTX000121.

Montana Department of Environmental Quality (DEQ), June 2002. Statement of Basis for the Skyview and Northwest Subdivision. MTX000121.

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Prepared By: Jeffrey Frank Herrick DEQ WPB, August 2016.

WELL LOGS FOR AREA WELLS

The following logs are for wells that are located south of the septic drainfield of the AquaFlo/Skyview/Northwest septic drainfield. Wells are arranged from the west to the east. Refer to DEQ's Map of Downgradient Wells 2016 (Figure 5).

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: SMITH, LARRY & KIM
GWIC Id: 223771
DNRC Water Right: P30016756

Section 1: Well Owner(s)

1) SMITH, LARRY AND KIM (WELL)
693 JEANNE RD
HELENA MT 59602 [11/08/2005]
2) SMITH, KIM AND LARRY (MAIL)
7510 APPLGATE DR.
HELENA MT 59602 [11/08/2005]

Section 2: Location

| Township | Range | Section | Quarter Sections | |
|-------------------------|------------|-----------|------------------|------|
| 11N | 03W | 7 | SE¼ SE¼ NW¼ | |
| County | | Geocode | | |
| LEWIS AND CLARK | | | | |
| Latitude | Longitude | Geomethod | Datum | |
| 46.727411 | 112.033301 | TRS-SEC | NAD83 | |
| Ground Surface Altitude | | Method | Datum | Date |

| Addition | Block | Lot |
|--------------------------|-------|--------|
| BIG VALLEY (JEANNE SUB) | | 11B2A3 |

Section 3: Proposed Use of Water
DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY AIR
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, November 08, 2005

Section 6: Well Construction Details

Borehole dimensions

| From | To | Diameter |
|------|-----|----------|
| 0 | 18 | 9 |
| 18 | 120 | 6 |

Casing

| From | To | Diameter | Wall Thickness | Pressure Rating | Joint | Type |
|------|------|----------|----------------|-----------------|--------|-------|
| -1.5 | 18.5 | 6 | 0.250 | | WELDED | STEEL |
| 9 | 120 | 4 | | 220.00 | WELDED | PVC |

Completion (Perf/Screen)

| From | To | Diameter | # of Openings | Size of Openings | Description |
|------|-----|----------|---------------|------------------|-----------------------|
| 100 | 120 | 4 | .030 | | SCREEN-CONTINUOUS-PVC |

Annular Space (Seal/Grout/Packer)

| From | To | Description | Cont. Fed? |
|------|----|-------------|------------|
| | | | |

Section 7: Well Test Data

Total Depth: 120
Static Water Level: 56
Water Temperature:

Air Test *

30 gpm with drill stem set at 120 feet for 1 hours.
Time of recovery 0.5 hours.
Recovery water level 56 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

DRILLER GREG LAMPHIER

Section 9: Well Log

Geologic Source

Unassigned

| From | To | Description |
|------|-----|---|
| 0 | 18 | REDDISH BROWN SILTY CLAY WITH 3/4 INCH GRAVEL |
| 18 | 41 | REDDISH BROWN SILTY CLAY |
| 41 | 49 | REDDISH BROWN SANDY SILTY CLAY |
| 49 | 57 | REDDISH BROWN SILTY CLAY |
| 57 | 59 | REDDISH BROWN SILTY SAND WATER |
| 59 | 81 | BROWNISH SILTY CLAY |
| 81 | 83 | REDDISH BROWN SAND SHALE |
| 83 | 90 | REDDISH BROWN SILTY CLAY SHALE |
| 90 | 92 | REDDISH BROWN SAND SHALE |
| 92 | 96 | REDDISH BROWN SANDY GRAVEL SHALE |
| 96 | 109 | REDDISH BROWN SHALE SHALE 15GPM |
| 109 | 120 | REDDISH BROWN 30 GPM |

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: TREASURE STATE DRILLING
License No: WWC-522
Date
Completed: 11/8/2005

MONTANA WELL LOG REPORT

NOTICE >> This well deepens GWIC Id 243817. << NOTICE

Site Name: NORTHSTAR DEVELOPMENT
GWIC Id: 254079

Section 7: Well Test Data

Total Depth: 540
Static Water Level: 51.09
Water Temperature:

Section 1: Well Owner(s)

1) NORTHSTAR DEVELOPMENT (MAIL)
P.O. BOX 5104
HELENA MT 59604 [01/12/2010]

Pump Test *

Depth pump set for test 360 feet.
82 gpm pump rate with 265 feet of drawdown after 24 hours of pumping.
Time of recovery 171 hours.
Recovery water level 59.98 feet.
Pumping water level feet.

Section 2: Location

| Township | Range | Section | Quarter Sections |
|-------------------------|-----------|-----------|------------------|
| 11N | 03W | 7 | SW¼ NW¼ |
| County | | Geocode | |
| LEWIS AND CLARK | | | |
| Latitude | Longitude | Geomethod | Datum |
| 46.72646 | 112.03198 | NAV-GPS | WGS84 |
| Ground Surface Altitude | Method | Datum | Date |

| Addition | Block | Lot |
|----------|-------|-----|
| | | |

* 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 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 8: Remarks

Section 4: Type of Work

Drilling Method: ROTARY
Status: DEEPENED

Section 9: Well Log

Geologic Source

Unassigned

Section 5: Well Completion Date

Date well completed: Tuesday, November 17, 2009

| From | To | Description |
|------|-----|---------------------|
| 0 | 2 | TOPSOIL |
| 2 | 35 | CLAY |
| 35 | 65 | PEA GRAVEL |
| 65 | 200 | SILTY CLAY AND SAND |
| 200 | 300 | FINE GRAVEL |
| 300 | 540 | FRACTURED SHALE |

Section 6: Well Construction Details

Borehole dimensions

| From To | Diameter |
|---------|----------|
| 300 540 | 8 |

Casing

| From | To | Diameter | Wall Thickness | Pressure Rating | Joint | Type |
|------|-----|----------|----------------|-----------------|----------|-------|
| 2 | 260 | 8 | 0.25 | | WELDED | STEEL |
| 240 | 540 | 6 | | 220.0 | THREADED | PVC |

Completion (Perf/Screen)

| From To | Diameter | # of Openings | Size of Openings | Description |
|---------|----------|---------------|------------------|-----------------------|
| 240 | 280 | 6 | 80 | SCREEN-CONTINUOUS-PVC |
| 300 | 540 | 6 | 80 | SCREEN-CONTINUOUS-PVC |

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.

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Name: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date 11/17/2009
Completed:

