STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

650 Addison Avenue West, Suite 110 • Twin Falls, ID 83301 • (208) 736-2190
www.deq.idaho.gov

Brad Little, Governor
John H. Tippets, Director

MEMORANDUM

TO: Larry Waters, P.E., Wastewater Program Manager, State Office
Susan Switzer, Regional Administrator, Twin Falls Regional Office

FROM: Jerimiah Fenton, P.E., Water Quality Staff Engineer, State Office

DATE: August 28, 2020

SUBJECT: Municipal Reuse Permit No. M-076-05, City of Wendell, Staff Analysis Supporting Reuse Permit Issuance

Executive Summary

The City of Wendell (permittee) owns and operates a municipal wastewater treatment and reuse facility located south of Wendell, Idaho in Gooding County. The wastewater treatment plant (WWTP) is designed to treat an average daily flow of 0.356 million gallons per day (MGD) and a maximum daily flow of 0.659 MGD (JUB 2017c, Table 3-1, p. 9). The Idaho Department of Environmental Quality (DEQ) issued municipal reuse permit M-0076-04 on August 10, 2012 allowing Class D recycled water to be beneficially used to irrigate two existing management units and a new 240-acre field divided into three management units (DEQ 2012d).

In 2012, the permittee completed the construction of a 27.3 million gallon (MG) wastewater storage lagoon (LG-076-06) over the South Site management unit (MU-076-01), a sodium hypochlorite disinfection system, and recycled water irrigation systems for management units MU-076-03 and MU-076-04 (JUB 2012a). The permittee also decommissioned a retired lagoon (LG-076-03; Wendell 2012) and disconnected the West Site management unit (MU-076-02) from the recycled water irrigation system (JUB 2014). Recycled water is no longer applied to management units MU-076-01 or MU-076-02. DEQ recommends that these management units be removed from the permit.

Annual reports detailing the performance of the reuse facility were not submitted for the 2013 or 2014 reporting years. Additionally, the permittee failed to complete all required recycled water, ground water, and plant tissue monitoring from 2013 through 2016 (DEQ 2017a, DEQ 2018a). The permittee has improved compliance with monitoring and reporting requirements during recent years (2017-2019), but there have still been some deficiencies (DEQ 2018b).

Since the permittee began using the new disinfection system in 2013, the recycled water has not been in compliance with Class D recycled water disinfection requirements (JUB 2017a, 2018a,

2018b, 2020a). If the permittee cannot demonstrate the ability to consistently produce Class D recycled water, immediate corrective action should be taken to improve disinfection or Class E buffer zone distances should be implemented around the reuse site for the protection of surface water, ground water, drinking water supplies, and the public.

Permit M-0076-04 allowed both growing season and nongrowing season application (DEQ 2012d, Section 4.2, p. 8); however, nongrowing season application was intended to be an emergency operation plan until the new storage lagoon could be constructed (DEQ 2012a, Section 4, p. 4). Storage Lagoon 4 (LG-076-06) was constructed to eliminate the requirement for nongrowing season application. Additionally, Lagoons 3 (LG-076-04) and 5 (LG-076-05) have been relined and are now available to store wastewater. DEQ recommends that nongrowing season application is no longer allowed.

The existing ground water monitoring well network that consists of four domestic wells was not designed to monitor ground water impacts from the land application of recycled water to the management units currently used by the permittee. DEQ recommends that a new monitoring well network should be installed that is designed to monitor potential ground water impacts from the new management units (MU-076-03 and MU-076-04) and the lagoons.

DEQ recommends the issuance of reuse permit M-076-05 for a five-year term. The permit specifies constituent limits and establishes monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance.

1 Introduction

The purpose of this memorandum is to satisfy the requirements of the *Recycled Water Rules* (IDAPA 58.01.17.400) for issuing reuse permits. The principal facts and significant questions considered in preparing the draft permit and a summary of the basis for the draft permit conditions are provided.

The City of Wendell (permittee) owns and operates a municipal wastewater treatment and reuse facility that serves a population of approximately 3,000. Reuse permit M-0076-04 was issued to the permittee on August 10, 2012 and expired on August 10, 2017 (DEQ 2012d). The reuse permit allows Class D recycled water to be beneficially used to grow crops. The permittee has been allowed to operate the reuse system under the terms and conditions of reuse permit M-0076-04 until a new permit is issued by DEQ.

The following is a summary of the significant dates and events associated with the renewal of reuse permit M-0076-04:

- Reuse permit M-0076-04 was issued by DEQ on August 10, 2012 (DEQ 2012d).
- The pre-application conference was held on November 3, 2016 at the DEQ Twin Falls Regional Office.

- The reuse permit renewal application was submitted to DEQ on June 27, 2017 (JUB 2017c). The permit application included the reuse permit application forms and the Preliminary Technical Report (PTR).

- Reuse Permit M-0076-04 expired August 10, 2017 (DEQ 2012d).

- DEQ issued a Completeness Determination letter determining the permit application complete on August 11, 2017 (DEQ 2017c). The effective date of the permit application is August 11, 2017. The Completeness Determination requested additional information regarding the lease agreement with the contract farmer, backflow prevention, and the growing seasons during which recycled water was applied.

- The permittee submitted the additional information requested by the Completeness Determination letter to DEQ on August 22, 2017 (JUB 2017e).

- DEQ issued a Preliminary Decision to issue a draft reuse permit to the permittee on October 5, 2017 (DEQ 2017d).

2 Site Location and Ownership

Wendell is located in south central Idaho in Gooding County. The permittee's wastewater treatment plant (WWTP) is located approximately 2,620 feet southwest of the city limits and 2,895 feet south of Interstate I-84. The WWTP is bordered by the 3000 South county road to the north and the 3050 South county road to the south. The WWTP is located in Township 8S, Range 15E, Section 5 (JUB 2017c, Section 2.1, p. 2).

The reuse site (MU-076-03, MU-076-04, and MU-076-05) is located directly south of the WWTP. The WWTP and reuse site are separated by the 3050 South county road. The reuse site is bordered by the 3100 South county road to the south and the 1900 East county road to the east. The reuse site is also located in Township 8S, Range 15E, Section 5 (JUB 2017c, Section 2.1, p. 2). A regional location map of the wastewater treatment and reuse facility is shown in Figure A-1 and a vicinity map is shown in Figure A-2 in Appendix A of this Staff Analysis.

The land surrounding the WWTP and reuse site is primarily private agriculture. A private residence is located to the southeast of the reuse site at the intersection of 1900 East and 3100 South (JUB 2017c, Section 2.1, p. 2). There is also a private residence immediately west of the WWTP along 3050 South.

The WWTP and reuse site are solely owned and operated by the permittee. The reuse site is leased to a farmer who plants, fertilizes, grows, and irrigates the crops (JUB 2017c, Section 2.2, p. 2). A copy of the lease agreement was included in the response to the Completeness Determination (JUB 2017e). While the lease agreement does not specifically mention the permit, it does state that the tenant agrees to comply with the management plan and crop requirements established by DEQ land application guidelines.

3 Process Description

The WWTP treats municipal and commercial wastewater from the city and surrounding areas. There are currently no significant industrial wastewater producers; however, Valley Beef discharges industrial wastewater to the collection system (JUB 2017c, Section 5.1, p. 20). The WWTP is designed to treat an average daily flow of 0.356 MGD and a maximum daily flow of 0.659 MGD (JUB 2017c, Table 3-1, p. 9). A plan drawing of the WWTP and reuse site is shown in Figure A-3 and the wastewater treatment process flow diagram is shown in Figure A-4 in Appendix A.

Municipal wastewater flows by gravity into the headworks located northeast of Lagoon 1 (LG-076-01). The headworks consist of a comminutor that grinds up influent solids in the wastewater and a parshall flume that measures influent wastewater flow entering the lagoon system. Wastewater is then treated and stored in a series of five lagoons (JUB 2017c, Section 3.1.1, p 5).

Wastewater gravity flows from the headworks into Lagoon 1 (LG-076-01), an 8.05 million gallon (MG) partially aerated lagoon, and then to Lagoon 2 (LG-076-02), a 6.41 MG facultative lagoon (JUB 2017c, Section 3.1.2, p. 5). Following treatment in the partially aerated and facultative lagoons, wastewater is stored in three storage lagoons: Lagoon 3 (LG-076-04) has a volume of 14.45 MG, Lagoon 4 (LG-076-06) has a volume of 27.3 MG, and Lagoon 5 (LG-076-05) has a volume of 7.5 MG (JUB 2017c, Section 3.1.3, p. 5). The PTR states that the total wastewater storage capacity is 33.7 MG (JUB 2017c, Section 3.1.3, p. 5); however, the sum of the storage lagoon volumes is 49.25 MG. The former Lagoon 3 (LG-076-03) has been decommissioned and is not included in draft reuse permit M-076-05.

When operating the reuse system, wastewater flows by gravity from the storage lagoons to a sodium hypochlorite disinfection system. Wastewater is disinfected as it flows through a 30-inch diameter pipeline designed to provide 30 minutes of average contact time (JUB 2017c, Section 3.1.4, p. 5). Effluent gravity flows to the reuse pump station located at the northern edge of the reuse site. Class D recycled water is then land applied to management units MU-076-03 and MU-076-04 using the two pivot irrigation systems: the East Pivot and the West Pivot (JUB 2017c, Section 3.1.5, p. 8).

Supplemental irrigation water (SIW) for the reuse site is provided by 200 shares from the North Side Canal Company (NSCC) delivered by an unnamed ditch located northeast of the lagoons (JUB 2017e; JUB 2017c, Section 3.1.6, p. 8). SIW is stored in an unlined pond located at the northeast corner of the reuse site (JUB 2017c, Section 3.1.6, p. 8).

The SIW pumps for the West Pivot (Pump #1 and Pump #2), the recycled water pump for the West Pivot (Pump #3), and the recycled water pump for the East Pivot (Pump #4) are located at the Irrigation and Reuse Pump Station (IRPS) at the northern border of the West Pivot along the 3050 South county road. The SIW pumps (Pump #5 and Pump #6) for the East Pivot are located at the East Pivot Irrigation Pump Station (EPIPS) at the SIW pond (JUB 2015b, Section 4.6, p. 4-18).

The recycled water and SIW systems are plumbed separately. There are no interconnections between the SIW and recycled water systems; therefore, backflow prevention is not required (JUB 2017e). Only SIW from the NSCC is applied through the main pivot piping. Recycled water is applied to the reuse site using separate high-density polyethylene (HDPE) pipe that hangs beneath the main pivot piping. SIW and recycled water are delivered to the pivot points by separate buried mainlines (JUB 2015b, Section 4.6, p. 4-18).

The drop nozzles on the main pivot piping within the recycled water application areas are equipped with pressure activated shutoff valves that automatically close when the recycled water line is pressurized. The drop nozzles on the outer spans of the main pivot piping remain open so that the buffer area (MU-076-05) may be irrigated with SIW while management units MU-076-03 and MU-076-04 are being irrigated with recycled water. Tables 4-4 and 4-5 in the permittee's Wastewater Treatment Facilities Operator's Operation and Maintenance Manual, hereafter referred to as the Plan of Operation (PO), list the valve settings that are required for both the SIW only irrigation condition, and the SIW and recycled water irrigation condition for each pivot (JUB 2015b, Section 4.6, p. 4-18).

Figure A-7 in Appendix A shows a map of the permitted management unit boundaries. The 240-acre reuse site is divided into three management units:

- The East Pivot management unit (MU-076-03) rotates a full 360 degrees and has an area of 70.7 acres. This management unit does not include the full area irrigated by the East Pivot; it only includes the area irrigated by the recycled water irrigation system (JUB 2017c, Table 3-1, p. 9).

- The West Pivot management unit (MU-076-04) does not make a full rotation, as it would overlap with the East Pivot, and has an area of 37.7 acres. This management unit does not include the full West Pivot; it also only includes the area that is irrigated by the recycled water irrigation system (JUB 2017c, Table 3-1, p. 9).

- MU-076-05 is comprised of the remaining 131.6 acres of the reuse site that is not irrigated by the recycled water irrigation system (JUB 2017c, Table 3-1, p. 9). The current permit (M-0076-04) allowed recycled water to be applied to this management unit provided the permittee complied with the required buffer zone distances (DEQ 2012d, Section 4.1, p.8). The permittee currently uses SIW to irrigate 99.6 acres of MU-076-05 (JUB 2020a). The recycled water irrigation system is not currently designed to apply recycled water to any portion of MU-076-05. The current permit inaccurately states that MU-076-05 is irrigated by wheel lines.

The current management unit descriptions included in reuse permit M-0076-04 do not accurately represent how the reuse site is being managed. Recycled water is only applied to management units MU-076-03 and MU-076-04. Recycled water application to MU-076-05 should not be allowed in order to maintain the required buffer zone distances. If the permittee ever desires to expand the permitted area of management units MU-076-03 or MU-076-04, an updated buffer zone management plan and plans and specifications for the modification of the recycled water irrigation system shall be submitted to DEQ for review and approval.

4 Site Characteristics

4.1 Site Management History

The permittee initially applied for a reuse permit in 1989 and was issued permit LA-000076-01 later that year (DEQ 1989). The original WWTP consisted of a series of four lagoons: LG-076-01, LG-076-02, LG-076-03, and LG-076-04. There were two permitted management units referred to as the South Site (MU-076-01) and the West Site (MU-076-02).

Permit LA-000076-02 was issued in 2002 (DEQ 2002).This permit required ground water to be monitored in the following domestic wells: Diamond (GW-076-01), Stacey (GW-076-02), Clark (GW-076-03), and Grout (GW-076-04).

On May 8, 2006, DEQ issued a notice of violation (NOV) to the permittee for noncompliance with permit LA-000076-02 (DEQ 2006a). The NOV listed four permit violations: phosphorus loading limit exceedance, nongrowing season hydraulic loading limit exceedance, failure to maintain adequate buffer distances for the class of recycled water used, and failure to meet recycled water monitoring requirements for volatile dissolved solids (VDS), chemical oxygen demand (COD), and total coliform (DEQ 2006a, pp. 1-3). On July 28, 2006, the permittee entered into a consent order with DEQ that required a wastewater facilities plan to be submitted by August 31, 2006 and construction of wastewater facility improvements to be completed by August 31, 2008 (DEQ 2006b).

The wastewater facilities plan required by the consent order was submitted to DEQ on May 17, 2007 (JUB 2007). A number of options were presented in the facilities plan that could return the facility to compliance. Ultimately, the permittee elected to expand the reuse site and construct a new storage lagoon.

DEQ issued permit LA-000076-03 on June 29, 2007 (DEQ 2007a). Permit LA-000076-03 was meant to cover the interim period from the expiration of LA-0000076-02 until DEQ issued a new permit following the wastewater facility upgrades. The requirements of the consent order were incorporated into permit LA-000076-03 as a compliance activity (DEQ 2007a, Section E, p. 6). It was anticipated that the facility upgrades would be completed before the expiration of LA-000076-03.

The permittee purchased the 240-acre field located south of the WWTP to expand the reuse site in 2011 (JUB 2017c, Appendix B). Prior to being used for the land application of recycled water, the land had been used as an agriculture field to grow crops. The proposed wastewater treatment and reuse system upgrades included the construction of a new disinfection system, the construction of new recycled water irrigation systems, the closure of the West Site (MU-076-02), and the construction of a new storage lagoon (LG-076-06) on the South Site (MU-076-01) to allow the permittee to eliminate the need for nongrowing season application.

On August 10, 2012, DEQ issued the current permit, M-0076-04 (DEQ 2012d). The permit incorporated the wastewater treatment and reuse system improvements allowing the permittee to

land apply Class D recycled water to management units MU-076-03 and MU-076-04. Significant events that occurred during the current permit cycle include the following:

- Construction of the sodium hypochlorite disinfection system, reuse pump station, and recycled water irrigation systems was completed in fall 2012 (JUB 2012a).

- The West Site management unit (MU-076-02) was disconnected from the recycled water irrigation system in October 2012 (JUB 2014).

- Lagoon 4 (LG-076-06), a 27.3 MG wastewater storage lagoon, was constructed over the South Site management unit (MU-076-01) in November 2012 (JUB 2012b).

- The former Lagoon 3 (LG-176-03) was decommissioned in December 2012 (Wendell 2012). The lagoon piping was removed and the lagoon has been slowly filled in with inert solids.

- The seepage test reports for Lagoons 1, 3, 4, and 5 were submitted on February 5, 2016 (JUB 2015a, 2016b). The reports indicated that Lagoon 1 (LG-076-01) and Lagoon 4 (LG-076-06) were in compliance with the maximum allowable seepage rates; however, Lagoons 3 (LG-076-04) and 5 (LG-076-05) were leaking at rates greater than the allowable limit.

- On April 28, 2017, the permittee submitted plans and specifications for the Lagoon 3 (LG-076-04) and 5 (LG-076-05) liner installation project (JUB 2017b). These plans were approved by DEQ on May 16, 2017. The installation of the Lagoon 3 and 5 HDPE liners was completed in October 2017. The lagoons were then seepage tested in May 2018 (JUB 2019d).

- In 2018, the east embankment of Lagoon 4 (LG-076-06) began to fail. Soil appeared to be eroding away from behind the liner. This was observed by DEQ during the September 28, 2018 site inspection (DEQ 2018c).

- The permittee submitted plans for the Lagoon 4 (LG-076-06) embankment repair on March 20, 2019 (JUB 2019a). Repair work on Lagoon 4 was completed in fall 2019. Lagoon 4 was seepage tested in June 2020 prior to being returned to service (JUB 2020b).

The permittee began applying recycled water to the new management units (MU-076-03 and MU-076-04) in 2013 (JUB 2014). A farmer leases the fields from the permittee. Silage corn and triticale have been grown on the reuse site since 2013 (JUB 2017c, Section 5.1.2, p. 21).

The permittee did not submit annual reuse reports for the 2013 or 2014 reporting years. While the permittee reported only minimal recycled water application during this time, all monitoring and reporting should have been completed as required by Sections 5 and 6 of permit M-0076-04 (DEQ 2012d). The permittee also failed to complete multiple recycled water, ground water, and crop tissue monitoring requirements during the current permit cycle (DEQ 2017a).

4.2 Climatic Characteristics

The climatic characteristics of the reuse site are described in detail in Section 4.2 of the PTR (JUB 2017c, Section 4.2, p. 10). The climate data was taken from the Gooding 2 S (103682) weather station located in Gooding, ID. The average annual precipitation is 11.8 inches per year, of which 6.9 inches occur during the nongrowing season (November 1 through March 31). The annual average maximum temperature is 62.5 °F and annual average minimum temperature is 35.3 °F. Additional meteorological data can be found at the Western Regional Climate Center website (WRCC 2020): *http://www.wrcc.dri.edu/summary/climsmid.html*.

According to DEQ's Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater (Guidance), the reuse site is located in Climate Zone II. The number of growing season frost free days for this climate zone ranges from approximately 120 to 140 days (DEQ 2007b, Table 4-1, p. 4-5).

Crop evapotranspiration data for the reuse site was taken from the ET_{Idaho} website located at: *http://data.kimberly.uidaho.edu/ETIdaho/* using the Jerome National Weather Service station located at latitude 42° 43' North, longitude 114° 32' West at an elevation of 3,770 feet (Allen 2017). Precipitation deficit (P_{def}) is defined as the amount of water the plant requires less than the amount in the root zone and less than the effective precipitation. The growing season P_{def} values for crops commonly grown on the reuse site are shown in Table 1.

Table 1. Crop growing season precipitation deficit (P_{def}), inches.

Crop	April	May	June	July	Aug.	Sep.	Oct.	GS Total
Spring Grain - Irrigated	1.8	5.0	9.0	7.7	0.7	-	-	**24.2**
Winter Grain - Irrigated	3.5	6.7	8.5	4.0	0.7	0.4	0.2	**24.1**
Silage Corn	0.0	0.4	3.4	8.9	8.3	3.8	0.4	**25.2**

Source: Allen 2017

4.3 Soils

Soil types present on the reuse site are described in detail in Section 4.3 of the PTR (JUB 2017c, Section 4.3, p. 11). According to the United States Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey, the predominant soil types on the reuse site include: Taunton-Ticeska Very Fine Sandy Loam, Chijer Very Fine Sandy Loam, Taunton-Chijer Very Fine Sandy Loam, and Wendell-Wako-Rekima Complex (NRCS 2019). These soils are deep, sandy loams with 0 to 4 percent slopes, suitable for agricultural production. The PTR also shows the Dehana-Rock outcrop complex with 4 to 40 percent slopes is present on the site (JUB 2017c, Table 4-3, p. 12). This soil type was not observed by DEQ in the NRCS soil survey report. Additionally, there are no known rock outcrops present on the site.

The NRCS soil survey map is shown in Figure A-6 in Appendix A. Table 2 lists the properties of the NRCS soil types present on the reuse site.

Table 2. Reuse site soil properties.

Soil Map Unit	Soil Types	Percent of Reuse Site (%)	Slope (%)	Permeability	AWC (Inches)	Drainage Class	Rooting Depth (inches)
194	Taunton-Ticeska very fine sandy loams	~41	1-4	Low	4.2-5.7	Well Drained	26-38
32	Chijer very fine sandy loam	~34	0-2	Low	7.3	Well Drained	55
189	Taunton-Chijer very fine sandy loams	~20	1-4	Low	4.7-7.3	Well Drained	31-55
214	Wendell-Wako-Rekima complex	~4	1-4	Low	1.4-4.1	Well Drained	18-32

Source: NRCS 2019
AWC = available water capacity

Section 5.3 of permit M-0076-04 required soil samples to be collected from each soil monitoring unit twice annually in April and October for the first two years of the permit and annually in April for the remainder of the permit (DEQ 2012d, Section 5.3, p. 14). The soil samples were required to be monitored for electrical conductivity (EC), nitrate-nitrogen, ammonia-nitrogen, pH, and plant available phosphorus. Additionally, sodium adsorption ratio (SAR), diethylenetriaminepentaacetic acid (DTPA) iron, and DTPA manganese were required to be monitored in April of the first and last year of the permit. The permittee did not collect soil samples from the new management units (MU-076-03, MU-076-04, and MU-076-05) in 2013 and did not collect soil samples in October for the first two years of the permit (JUB 2017c, Appendix C).

Soil monitoring data were provided in Appendix C of the PTR (JUB 2017c, Appendix C). This information was also updated in the 2017 through 2019 annual reports (JUB 2018a, 2018b, 2020a). Table 3 provides a summary of the average soil monitoring results from 2014 through 2019.

Table 3. Average soil constituent concentrations (2014-2019).

Parameter	MU-076-02			MU-076-03			MU-076-04			MU-076-05		
	0-12"	12-24"	24-36"	0-12"	12-24"	24-36"	0-12"	12-24"	24-36"	0-12"	12-24"	24-36"
Nitrate-N (ppm)	7.25	8.25	8.75	17.5	18.3	**30.7**	10.5	9.00	8.50	15.8	**37.0**	**39.2**
Ammonium-N (ppm)	3.93	3.27	3.63	4.03	4.93	3.98	4.92	5.17	3.43	5.40	3.48	3.02
Phosphorus (ppm)	21.0	12.1	9.50	**67.8**	**49.3**	27.3	**63.8**	**30.3**	27.5	**54.8**	27.0	22.0
pH (S.U.)	7.73	7.90	8.10	7.90	8.13	8.27	8.08	8.23	8.07	7.95	8.10	8.15
E.C. (mmhos/cm)	0.35	1.25	0.40	0.36	0.39	0.48	0.30	0.36	0.37	0.37	0.61	0.65
SAR (S.U.)	0.49	1.50	2.12	0.66	0.76	0.92	0.48	0.55	0.96	0.63	1.40	1.63
DTPA Iron (ppm)	**7.47**	**6.80**	4.23	**18.9**	**12.3**	**6.68**	**12.2**	**7.43**	**14.7**	**13.9**	**7.78**	5.13
DTPA Mn (ppm)	4.53	2.23	3.13	4.98	3.88	3.60	2.60	2.85	3.55	4.95	3.68	2.83

Source: JUB 2017c, 2018a, 2018b, 2020a

Nitrate-nitrogen soil concentrations greater than 20 parts per million (ppm) and phosphorus concentrations greater than 30 ppm are generally considered high (DEQ 2007b, Section 2.5.1, p. 2-57). Average nitrate-nitrogen concentrations are high on MU-076-03 and MU-076-05. Average phosphorus concentrations are high on all active management units (MU-076-03, MU-076-04, and MU-076-05). Iron and manganese concentrations greater than 6 ppm are generally

considered high (DEQ 2007b, Section 2.5.1, p. 2-57). Iron concentrations are high on all active management units and slightly elevated on MU-076-02.

Compliance activity CA-076-06 in Section 3 of permit M-0076-04 required the closure of the West Site (MU-076-02; DEQ 2012d, Section 3, p.6). The pipeline that delivered recycled water to MU-076-02 was disconnected in 2012 and recycled water has not been applied to MU-076-02 since that time. On October 14, 2014, the permittee submitted a West Site closure report that provided soil monitoring results (JUB 2014). The closure report indicated slightly elevated nitrogen concentrations throughout the soil profile; therefore, the closure of the West Site was not approved. DEQ requested that the permittee continue to collect soil samples from MU-076-02 until nitrogen concentrations decreased to acceptable levels (DEQ 2015a). The permittee continued to monitor the soil on MU-076-02 through 2016. An updated West Site closure report was submitted in 2016 and the permittee requested that this management unit be removed from the permit (JUB 2016c).

Figures 1 and 2 show the MU-076-02 soil nitrate-nitrogen and plant available phosphorus concentrations from 2012 through 2016, respectively. A soil sample was not collected from MU-076-02 in 2014. Soil nitrate-nitrogen concentrations have decreased throughout the soil profile since the permittee stopped applying recycled water to MU-076-02. The upper foot of soil continues to have slightly elevated phosphorus concentrations; however, the phosphorus concentrations in the second and third foot appear to have decreased.

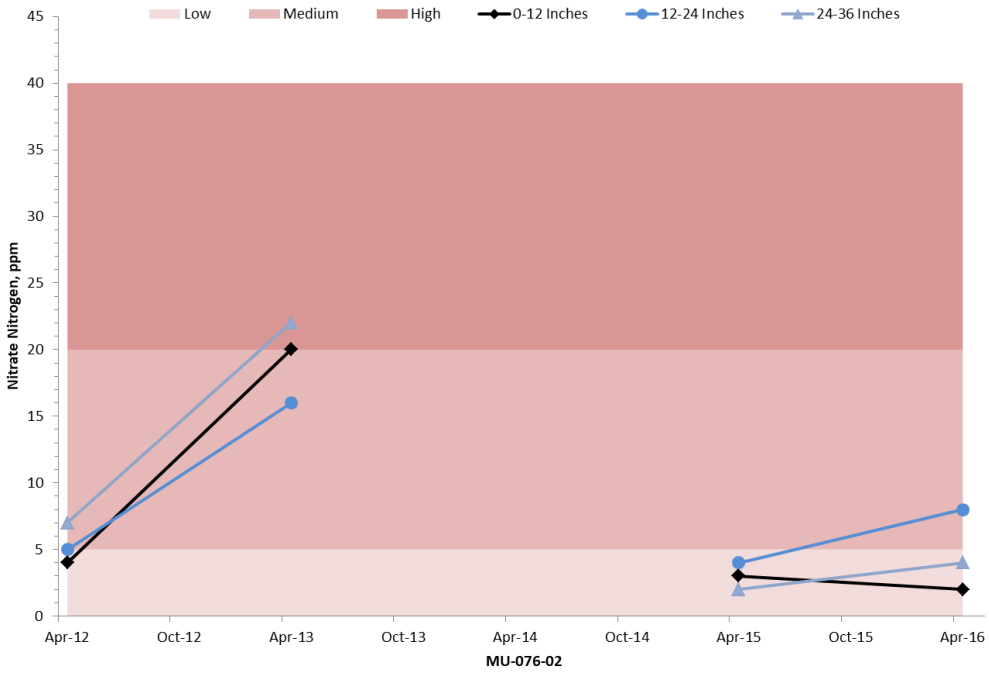

Figure 1. MU-076-02 soil nitrate-nitrogen concentrations.

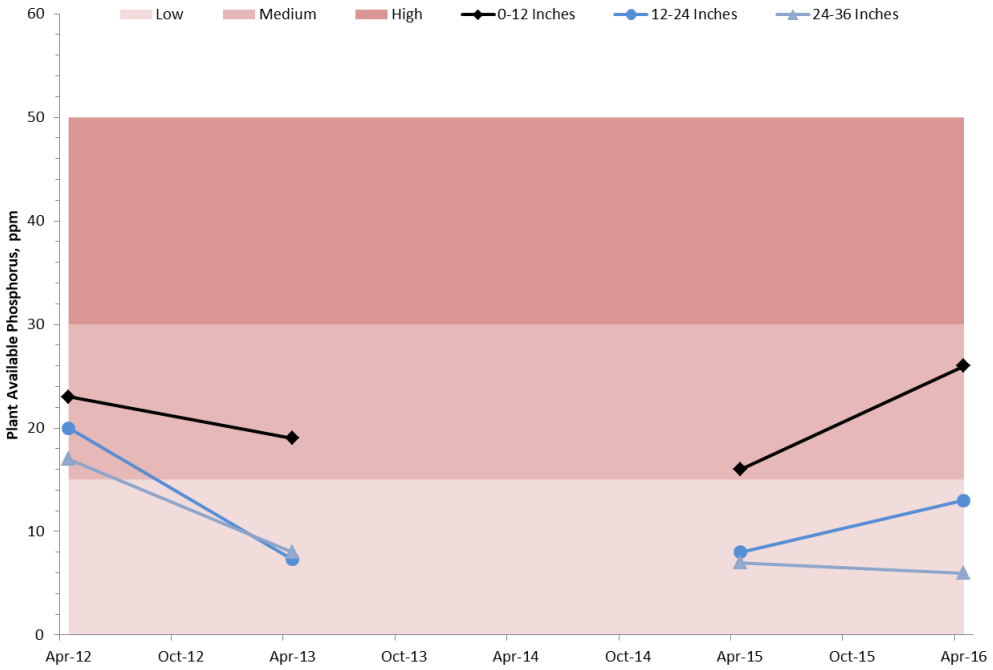

Figure 2. MU-076-02 soil phosphorus concentrations.

Soil nitrate-nitrogen and phosphorus concentrations on MU-076-02 appear to have decreased to acceptable levels since the permittee stopped applying recycled water. It does not appear to be necessary to continue monitoring MU-076-02. DEQ recommends that MU-076-02 be considered closed and removed from the permit. Draft reuse permit M-076-05 does not specify any monitoring or reporting requirements for MU-076-02.

Nitrate-nitrogen concentrations in the first, second, and third foot of soil on all active management units (MU-076-03, MU-076-04, and MU-076-05) are shown in Figures 3, 4, and 5, respectively. Nitrate-nitrogen concentrations on MU-076-03 were initially high throughout the soil profile but appear to have decreased since the permittee began operating it under the reuse permit. The cause of the initial elevated nitrate-nitrogen concentrations is likely over fertilization by the previous owner. There was a spike in nitrate-nitrogen soil concentrations on all management units in 2018. This is likely the result of the excessive amount of nitrogen fertilizer applied to the entire site in 2018 at a rate of over 900 pounds per acre (lb/acre; JUB 2018b). The permittee must ensure that nitrogen is applied to the site at agronomic rates. Excessive nitrate-nitrogen in the soil could potentially leach to ground water.

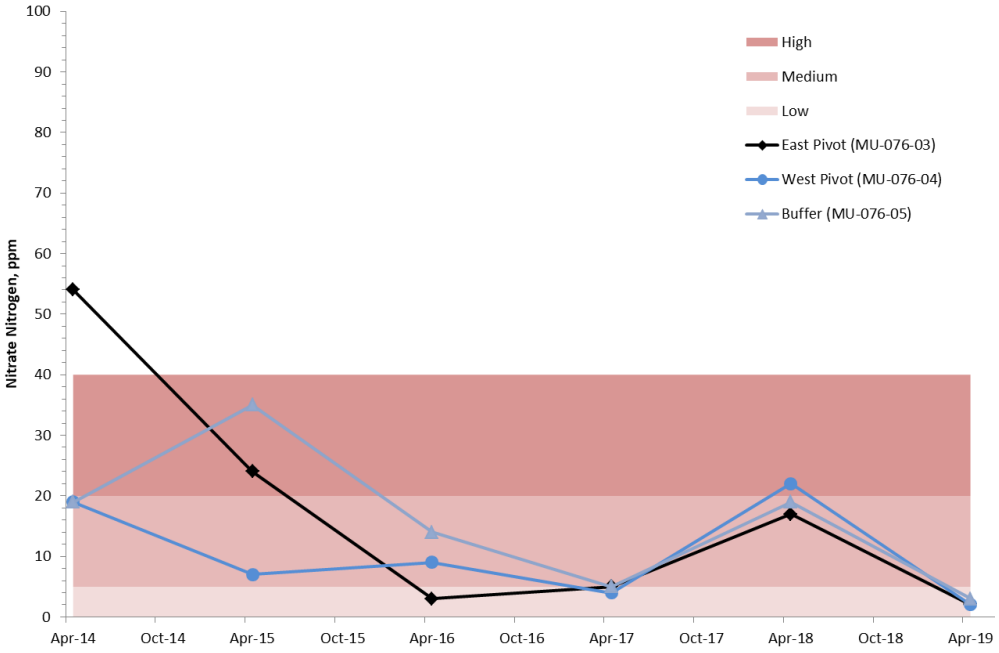

Figure 3. Reuse site soil nitrate-nitrogen concentrations, 0-12 inches.

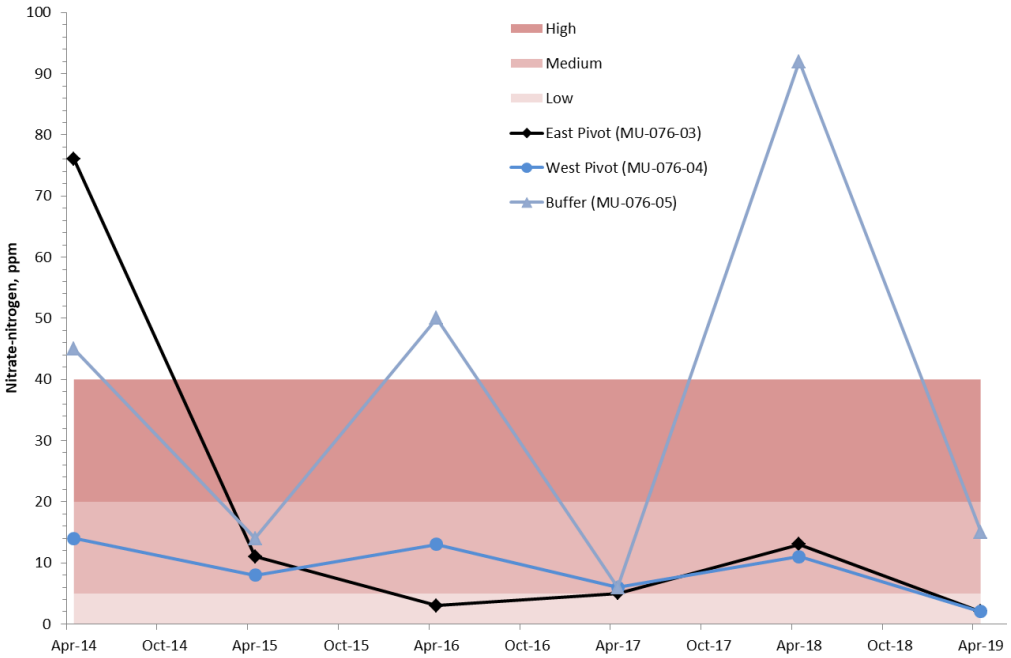

Figure 4. Reuse site soil nitrate-nitrogen concentrations, 12-24 inches.

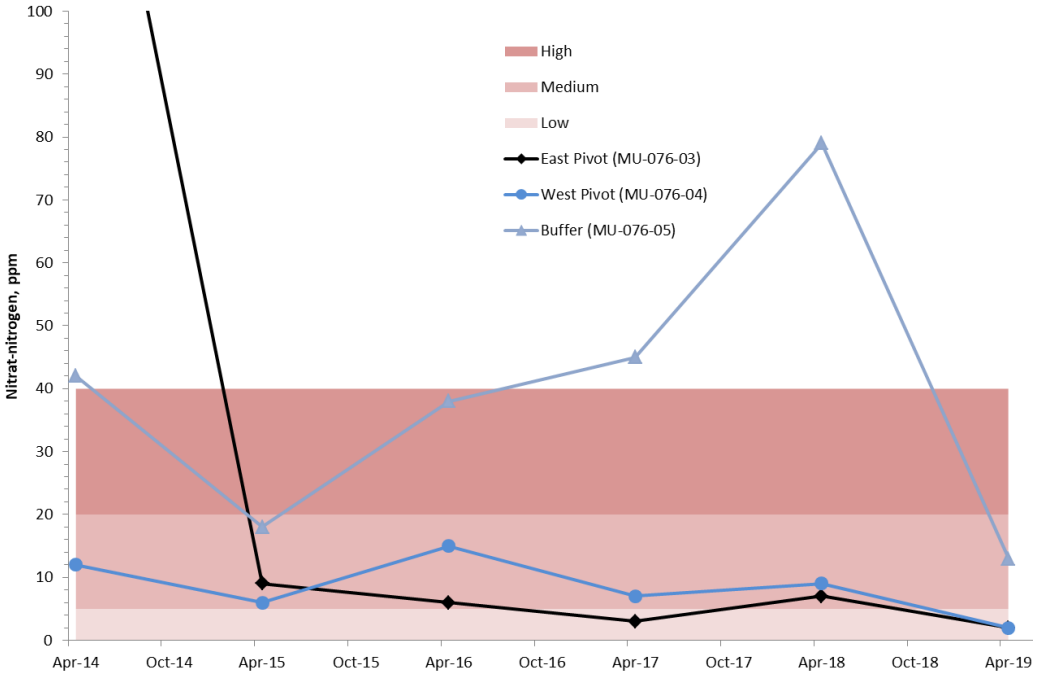

Figure 5. Reuse site soil nitrate-nitrogen concentrations, 24-36 inches.

Plant available phosphorus concentrations in the first, second, and third foot of soil on active management units (MU-076-03, MU-076-04, and MU-076-05) are shown in Figures 6, 7, and 8, respectively. Phosphorus concentrations were initially excessive on all three management units. Again, this was likely the result of over fertilization by the previous owner. Phosphorus concentrations appeared to be decreasing; however, phosphorus concentrations increased in 2018 and 2019. Similar to the soil nitrate-nitrogen concentration spike, the phosphorus increase is likely the result of excessive phosphorus fertilizer application rates in 2018 at over 500 lb/acre.

Phosphorus applied to the soil surface can be stored in the soil profile by precipitation and adsorption to soil particles. Eventually, with significant phosphorus loading, phosphorus can migrate to lower soil levels and even below the root zone. Once it goes beyond the root zone, the phosphorus is unavailable for crop uptake. There is the risk that phosphorus may breakthrough to ground water, which in turn can transport phosphorus from the site to other areas (DEQ 2007b, Section 4.2.2.7, p. 4-31). Runoff or leaching from reuse site soils could potentially contaminate nearby surface waters such as the canal bordering MU-076-05 to the west.

The permittee must ensure that phosphorus is applied to the site at agronomic rates. The permittee should use soil nutrient concentrations to determine the crop nutrient requirements each growing season. Fertilizer applications should be coordinated between the permittee and the contract farmer to ensure loading rates are not excessive. Section 4.6.3 discusses reuse site constituent loading rates.

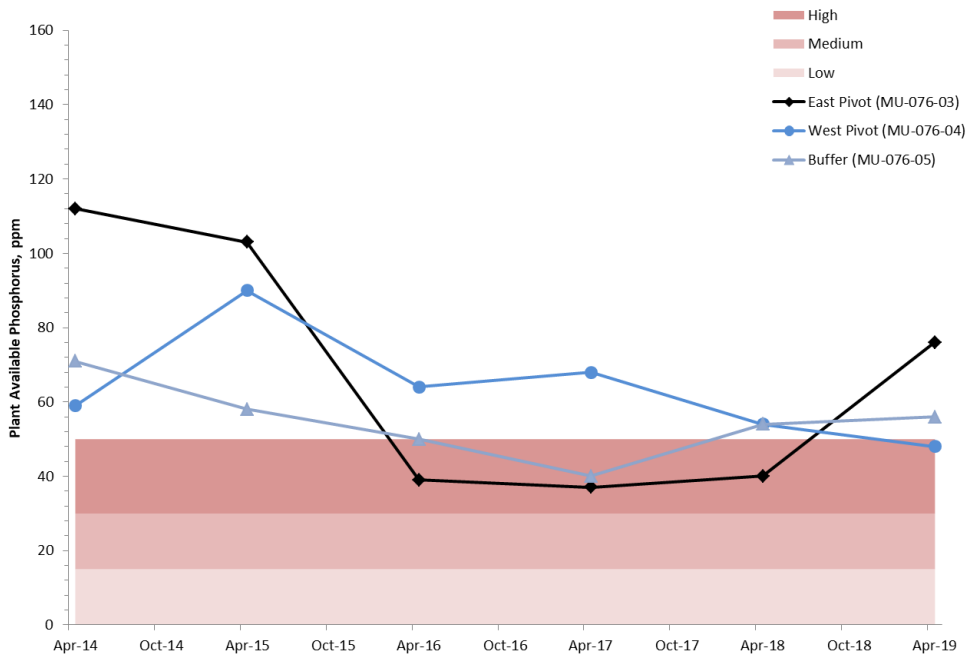

Figure 6. Reuse site soil phosphorus concentrations, 0-12 inches.

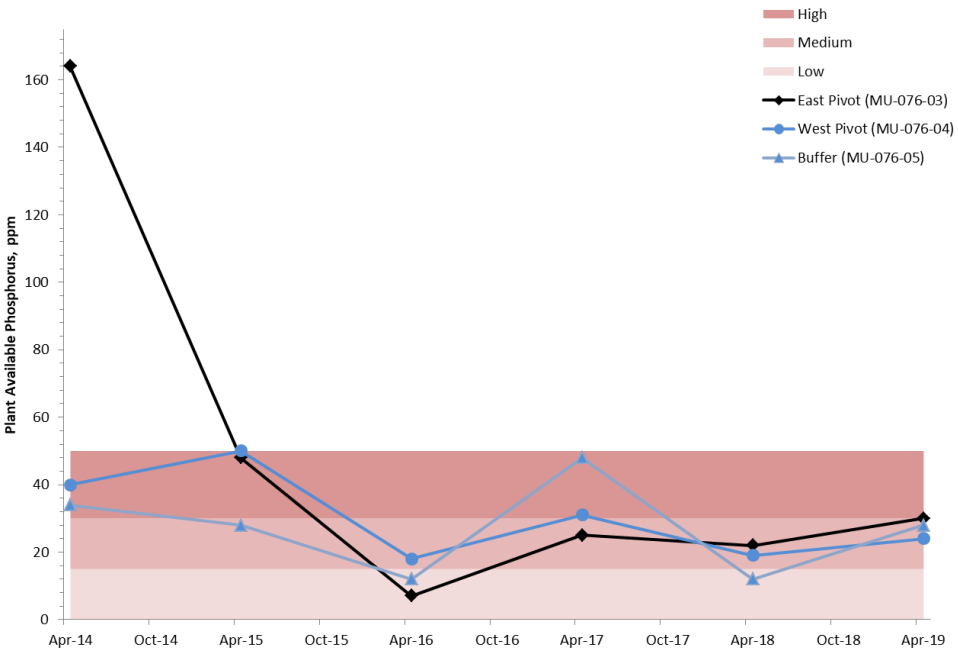

Figure 7. Reuse site soil phosphorus concentrations, 12-24 inches.

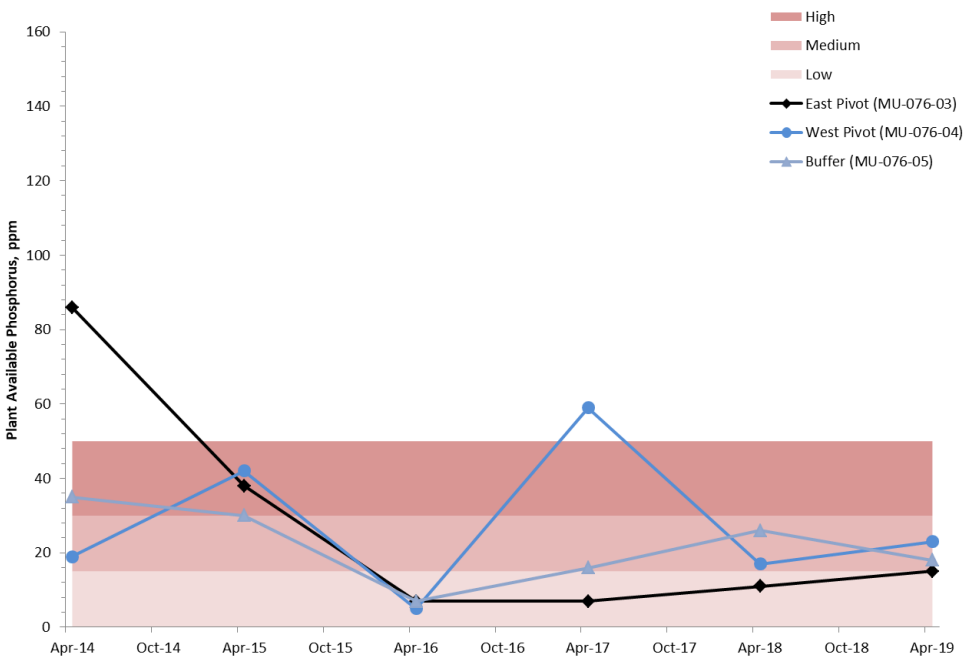

Figure 8. Reuse site soil phosphorus concentrations, 24-36 inches.

4.4 Surface Water

The Snake River is located approximately 6.5 miles southwest of the southern boundary of the reuse site (JUB 2017c, Section 4.4, p. 14). The WWTP and reuse site are located outside of the 100-year floodplain (JUB 2017c, Section 4.6, p. 16).

There are two irrigation canal laterals near the reuse site. A canal lateral borders the West Pivot to the west for approximately 500 feet. SIW is applied right at this canal; however, a buffer distance of greater than 200 feet is maintained to the recycled water application area. The other canal lateral is located approximately 1,400 feet east of the East Pivot (JUB 2017c, Section 4.4, p. 14).

An unnamed ditch that flows northeast of the WWTP provides SIW to the reuse site. SIW is stored in an unlined pond located at the northeast corner of the reuse site (JUB 2017c, Section 3.1.6, p. 8). The permittee owns 200 shares of water from the NSCC (JUB 2017e).

4.5 Ground Water/Hydrogeology

The Eastern Snake Plain Aquifer (ESPA) is located approximately 125 to 150 feet below the reuse site. Ground water in this aquifer is located within non-uniform fractures and thin sedimentary inter-beds in basalt flows. The aquifer is generally considered to be unconfined (JUB 2017c, Section 4.5, p. 14). Ground water flow direction across the reuse site is generally northeast to southwest toward the Snake River (JUB 2017c, Recycled Water Reuse Permit Application, p. 3).

The reuse site ground water monitoring well network currently consists of four domestic wells. The wells are privately owned and require authorization from the well owners to be sampled. A map of the domestic well locations is shown in Figure A-5 in Appendix A. Reuse permit M-0076-04 incorrectly states that three of the wells were constructed as monitoring wells (DEQ 2012d, Section 5.2.1, p. 13). All four wells in the monitoring well network are domestic wells.

The ground water monitoring well network has not been updated since the permittee began applying recycled water to management units MU-076-03 and MU-076-04. Compliance activity CA-076-02 in permit M-0076-04 required the permittee to submit plans and specifications for an updated ground water monitoring network that includes at least one upgradient well and two downgradient wells (DEQ 2012d, Section 3, p. 6). The downgradient wells were required to capture potential ground water impacts from the entire facility, including the lagoons and the retired and active application sites. This compliance activity has not been completed by the permittee.

Assuming the ground water flow direction is northeast to southwest as described in the reuse permit application forms, GW-076-01 is located side-gradient of MU-076-02, which is not included in draft reuse permit M-076-05, and also appears to be side-gradient of the lagoons (Figure A-5). GW-076-02 is located side-gradient of MU-076-02 and may be downgradient of the lagoons. GW-076-03 is located downgradient of the lagoons and upgradient of MU-076-04. GW-076-04 is located at the southeast corner of the reuse site, side-gradient of MU-076-03. GW-076-04 may be able to provide a rough estimate of upgradient ground water quality. The current monitoring well network is not adequate to monitor ground water impacts from the lagoons or reuse site. There are no wells located downgradient of the management units currently irrigated with recycled water (MU-076-03 and MU-076-04). Draft reuse permit M-076-05 requires the permittee to submit a ground water monitoring plan that includes plans and specifications for a new ground water monitoring well network.

Section 5.2 of permit M-0076-04 required the permittee to collect ground water samples quarterly (April, July, October, and December) for the first two years of the permit and twice annually (April and October) for the remainder of the permit (DEQ 2012d, Section 5.2, p. 13). The ground water samples were required to be monitored for nitrate-nitrogen, total dissolved solids (TDS), sodium, chloride, total phosphorus, total and dissolved iron, and total and dissolved manganese. It appears the permittee only collected samples twice annually during the current permit cycle; samples were never collected in July or December. In addition, only April ground water samples were collected in 2014 and 2015 (JUB 2017c, Table 4-5, p. 15).

A summary of ground water monitoring results during the current permit cycle was provided in Table 4-5 of the PTR (JUB 2017c, Table 4-5, p. 15). This data was also updated in the 2017 through 2019 annual reports (JUB 2018a, 2018b, 2020a). A statistical summary of the ground water quality data is shown in Table 4.

Table 4. Ground water quality (2014-2019), mg/L.

Parameter	GW-076-01			GW-076-02			GW-076-03			GW-076-04		
	Mean	Med	Max	Mean	Med	Max	Mean	Med	Max	Mean	Med	Max
Nitrate	1.54	1.54	2.38	2.36	2.37	3.16	2.85	2.63	3.97	1.93	2.49	2.49
TDS	308	280	**580**	279	270	380	361	290	**1080**	248	280	280
Sodium	18.7	19.0	22.9	20.7	19.9	27.0	21.1	21.8	24.0	19.8	32.3	32.3
Chloride	15.5	15.1	18.6	17.7	18.0	19.9	20.2	19.9	25.9	17.8	19.0	19.0
Total P	0.05	0.05	0.06	0.06	0.05	0.10	0.05	0.05	0.05	0.05	0.05	0.05
Total Iron	0.07	0.06	0.21	0.18	0.10	**0.69**	0.10	0.10	0.21	0.07	0.10	0.10
Total Mn	0.01	0.01	**0.06**	0.01	0.01	0.02	0.01	0.01	0.04	0.01	0.05	0.05
Diss. Iron	0.05	0.04	0.10	0.05	0.05	0.10	0.05	0.04	0.10	0.05	0.10	0.10
Diss. Mn	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.02

Source: JUB 2017c, 2018a, 2018b, 2020a
Med = Median, Max = Maximum, P = phosphorus, Mn = Manganese

Average ground water nitrate-nitrogen concentrations are below the *Ground Water Quality Rule* (*GWQR*; IDAPA 58.01.11.200) primary standard for nitrate-nitrogen of 10 mg/L in all four domestic wells. The TDS secondary standard of 500 mg/L was exceeded in GW-076-01 and GW-076-03 in May 2014; however, average TDS concentrations are below the standard. Chloride concentrations are substantially below the secondary standard of 250 mg/L in all wells. The total iron secondary standard of 0.3 mg/L was exceeded in GW-076-02 and the total manganese secondary standard of 0.05 mg/L was exceeded in GW-076-01. However, dissolved iron and manganese concentrations are below the secondary standards in all wells.

While the ground water monitoring results do not appear to indicate any significant impacts to ground water resulting from reuse activities, the current monitoring well network is not adequate. An updated ground water monitoring well network would provide more useful data for determining potential impacts to ground water resulting from the operation of the lagoons and reuse site.

4.6 Recycled Water Characterization and Loading Rates

4.6.1 Recycled Water Characterization

Influent wastewater is predominantly composed of domestic wastewater with small contributions from commercial developments. There are currently no significant industrial wastewater contributions to the influent wastewater; however, Valley Beef discharges industrial wastewater to the wastewater collection system. The permittee reports that influent wastewater flows are generally consistent throughout the year, with low seasonal variability (JUB 2017c, Section 5.1, p. 20).

Section 5.1.1 of reuse permit M-0076-04 required a monthly recycled water quality grab sample to be collected during periods of use and analyzed for total Kjeldahl nitrogen (TKN), nitrate+nitrite-nitrogen, TDS, VDS, pH, COD, and total phosphorus (DEQ 2012d, Section 5.1.1, p. 12). Annual reports were not submitted for the 2013 or 2014 reporting years as required by Section 6 of permit M-0076-04 (DEQ 2012d, Section 6.1, p. 16). Additionally, the permittee failed to collect recycled water samples during the 2015 reporting year (DEQ 2017a). The permittee incorrectly collected two recycled water samples when operating the reuse system in 2016 and 2017 (JUB 2017a, 2018a). Sample taps are located on both of the pumps that convey

recycled water to the East and West Pivots. A sample was collected from both the Pump #4 recycled water sample tap for MU-076-03 and from the Pump #3 sample tap for MU-076-04.

All available recycled water quality results for samples collected from 2012 through 2019 are shown in Table 5. In 2012 all recycled water was applied to the West Site (MU-076-02). The permittee began applying recycled water to management units MU-076-03 and MU-076-04 in 2013.

Table 5. Recycled water quality, mg/L.

Date	COD	Total-N	Total-P	TDS	NVDS
5/8/2012	721	8.30	4.63	560	380
5/14/2012	91	5.83	2.06	590	440
7/27/2012	143	4.35	3.21	550	350
8/7/2012	193	15.1	3.83	790	590
9/14/2012	195	10.7	3.23	730	510
5/6/2013	100	6.63	1.32	470	360
6/3/2013	462	23.7	8.68	720	480
7/15/2016	20	1.42	0.17	280	220
7/15/2016	20	1.25	0.07	250	230
4/4/2017	125	30.6	9.81	330	210
4/4/2017	130	38.4	9.43	150	40
7/17/2017	115	26.6	5.35	420	230
7/17/2017	112	6.53	1.94	540	350
8/2/2017	444	25.0	9.25	570	380
8/2/2017	446	26.4	9.15	600	470
7/13/2018	223	17.3	10.8	750	490
8/3/2018	120	9.18	5.22	600	480
10/22/2018	256	22.0	8.01	790	580
4/3/2019	158	39.4	8.93	520	400
Mean	**214**	**16.8**	**5.53**	**537**	**378**
Median	**143**	**15.1**	**5.22**	**560**	**380**
Std Dev	**180**	**12.1**	**3.59**	**185**	**142**
Maximum	**721**	**39.4**	**10.8**	**790**	**590**
Minimum	**20**	**1.3**	**0.1**	**150**	**40**

Sources: JUB 2017c, 2018a, 2018b, 2020a
NVDS = Non-volatile dissolved solids (TDS-VDS)

The reuse system is designed to produce Class D recycled water. The *Recycled Water Rules* (IDAPA 58.01.17.601.04) state the following disinfection criteria for Class D recycled water:

- The median number of total coliform organisms does not exceed 230 per 100 milliliters (mL), as determined from the bacteriological results of the last three days for which analyses have been completed.

- No sample shall exceed 2,300 organisms per 100 mL in any confirmed sample.

Section 5.1.1 of reuse permit M-0076-04 required the recycled water to be sampled and analyzed weekly for total coliform during periods of use (DEQ 2012d, Section 5.1.1, p.12). The PTR states that the median total coliform level during the current permit cycle was 1 organism per 100 mL (JUB 2017c, Table 5-2, p. 20). However, this median likely includes the total coliform results prior to the completion of the WWTP upgrades. The permittee began using the new

sodium hypochlorite disinfection system in 2013. The results of the recycled water total coliform monitoring from 2013 through 2019 are shown in Table 6. The permittee failed to analyze recycled water samples for total coliform in 2014 and 2015 (JUB 2017c, Appendix E). As discussed previously, recycled water samples were collected from two recycled water sampling points in 2016 and 2017 (JUB 2017a, 2018a). When two samples were collected, DEQ used the results with the greater total coliform level to determine compliance with the total coliform limit.

Table 6. Recycled water total coliform results.

Date	Total Coliform Organisms/100 mL	Three-Day Median Organisms/100 mL
5/6/2013	1	-
6/3/2013	>2,420	-
7/15/2016	39	39
7/25/2016	980	510
4/4/2017	250	615
4/10/2017	980	980
6/28/2017	>2,420	980
7/6/2017	>2,420	>2,420
7/21/2017	>2,420	>2,420
7/26/2017	980	>2,420
7/6/2018	>2,420	>2,420
7/13/2018	>2,420	>2,420
8/3/2018	2,300	>2,420
8/7/2018	9,210,000	>2,420
10/23/2018	23	2,300
10/29/2018	11,500	11,500
4/3/2019	4,000	4,000
4/10/2019	<2	4,000
4/17/2019	17,200	4,000
4/23/2019	9,600	9,600
Median	**>2,420**	**>2,420**
Maximum	**9,210,000**	**11,500**
Minimum	**1**	**39**

Sources: JUB 2017c, 2018a, 2018b, 2020a

As shown in Table 6, the permittee has not been in compliance with the three-sample median total coliform limit (230 per 100 mL) since the permittee began using the new disinfection system. Additionally, the single sample total coliform limit (2,300 per 100 mL) was exceeded numerous times. The permittee's new disinfection system does not appear to be adequately disinfecting the recycled water to Class D standards. DEQ recommends that draft reuse permit M-076-05 includes a compliance activity that requires the permittee to submit a disinfection improvement plan that specifies standard operating procedures that will improve compliance with Class D recycled water disinfection requirements. If the disinfection system cannot consistently produce Class D recycled water, the permittee shall take immediate corrective action to improve disinfection or implement Class E buffer zone distances around the reuse site.

4.6.2 Hydraulic Loading Rates

The total hydraulic loading rate to management units is equal to the sum of the recycled water and SIW loading rates. Reuse permit M-0076-04 limited growing season hydraulic loading to substantially at the irrigation water requirement (IWR) of the crop grown (DEQ 2012d, Section

4.2, p. 8). The IWR is based on the P_{def} of a specific crop for specific conditions (climatic and soil conditions) and the method of applying water. IWR is defined by Equation 1, where P_{def} is the precipitation deficit and E_i is the irrigation efficiency of the irrigation system.

$$IWR = \frac{P_{def}}{E_i}$$

Equation 1. Calculation of irrigation water requirement.

DEQ recommends that draft reuse permit M-076-05 continues to limit hydraulic loading to substantially at the IWR. The hydraulic loading limit for slow rate land application sites is established at the IWR for the following reasons (DEQ 2007b, Section 4.1.1.2.1, p. 4-6):

- Irrigating considerably below the IWR could lead to poor plant growth, causing inadequate nutrient uptake in the plants, potentially leading to infiltration of more recycled water nutrients past the root zone, which could then infiltrate deeper into the soil and potentially pollute the ground water and surface water; and,

- Conversely, applying water to management units at rates considerably greater than the IWR could lead to the water that is in excess of the quantity necessary for crop growth to infiltrate past the root zone, carrying with it excess nutrients deeper into the soil, which could potentially pollute ground water and surface water.

As discussed in Section 4.2, estimates of the P_{def} for specific crops and locations can be found on the ET_{Idaho} website (Allen 2017). The PTR states that the irrigation efficiency of the pivots is 85 percent (%; JUB 2017c, Section 5.2.3, p. 22). Table 7 lists the estimated growing season IWR values for the silage corn and triticale grown on the reuse site based on the 85% pivot irrigation efficiency.

Table 7. Crop growing season irrigation water requirement, inches.

Crop	April	May	June	July	Aug	Sep	Oct	Total
Spring Grain - Irrigated	2.1	5.9	10.6	9.0	0.9	0.0	0.0	**28.5**
Winter Grain - Irrigated	4.1	7.9	10.0	4.7	0.9	0.5	0.3	**28.4**
Silage Corn	0.0	0.5	4.0	10.4	9.8	4.4	0.5	**29.6**

Source: Allen 2017

The reported recycled water and SIW volumes applied to each active management unit during the current permit cycle (2015-2019) are shown in Table 8. The permittee failed to report the volumes of recycled water applied during the 2013 and 2014 growing seasons (DEQ 2017a). An average of 29 MG of recycled water per year was applied to the reuse site during the current permit cycle.

Table 8. Hydraulic loading rates, MG.

Year	MU-076-03			MU-076-04			MU-076-05			Total		
	RW	SIW	Total	RW	SIW	Total	RW	SIW	Total	RW	SIW	Total
2015	10.1	84.1	94.1	0.9	40.9	41.8	0.0	48.6	48.6	11.0	173.5	184.4
2016	32.4	73.8	106.2	9.2	44.1	53.3	0.0	46.4	46.4	41.6	164.3	205.9
2017	27.5	28.5	56.0	11.4	17.1	28.5	0.0	73.1	73.1	38.9	118.7	157.5
2018	27.3	38.6	65.8	7.7	26.5	34.2	0.0	97.4	97.4	34.9	162.5	197.4
2019	14.8	63.1	77.8	5.1	34.4	39.4	0.0	101.8	101.8	19.9	199.2	219.1
Average	**22.4**	**57.6**	**80.0**	**6.8**	**32.6**	**39.4**	**0.0**	**73.4**	**73.4**	**29.2**	**163.6**	**192.9**

Sources: JUB 2017c, 2018a, 2108b, 2020a
RW = Recycled Water, SIW = Supplemental Irrigation Water

Table 9 compares the total growing season hydraulic loading rate (recycled water plus SIW) in inches to the IWR of the crop grown on each management unit. The permittee occasionally grows a winter or spring triticale crop that is harvested in May before planting a silage corn crop that is harvested in September/October.

Table 9. Hydraulic loading rates (HLR) compared to irrigation water requirement (IWR), inches.

Year	MU-076-03		MU-076-04		MU-076-05	
	IWR	HLR	IWR	HLR	IWR	HLR
2015[a]	29.6	**49.0**	29.6	**40.8**	29.6	18.0
2016[b]	41.2	**55.3**	29.1	**52.0**	37.0	17.2
2017[a]	29.6	29.1	29.6	27.8	29.6	27.0
2018[a]	29.4	34.3	29.4	33.4	29.4	**36.0**
2019[c]	41.0	40.5	29.4	**38.5**	41.0	37.6

a. Silage corn was irrigated all growing season.
b. Triticale was irrigated April through May on the East Pivot. Silage corn was irrigated May through October on all management units.
c. Silage corn was irrigated April through September. Triticale was irrigated in October.

As shown in Table 9, the hydraulic loading rates applied to MU-076-03 and MU-076-04 substantially exceeded the IWR of the crop multiple times during the current permit cycle, while the hydraulic loading rate to MU-076-05 was often below the IWR of the crop. Since management unit MU-076-05 is generally operated as a buffer zone area, DEQ recommends that draft reuse permit M-076-05 only allows SIW to be applied to the MU-076-05. Therefore, a hydraulic loading rate limit is not specified for this management unit in draft permit M-076-05.

Section 5.3 of the PTR provides the projected 2021 water balance for the wastewater treatment and reuse systems based on inflow, evaporation, precipitation, seepage loss from the lagoons, storage capacity, and crop IWR (JUB 2017c, Section 5.3, pp. 22-24). DEQ does not concur with the use of lagoon seepage loss in the water balance evaluation. While the *Wastewater Rules* (IDAPA 58.01.16.493) do provide allowable seepage rates for wastewater lagoons, lagoons should not be designed to seep. Overestimating seepage in the water balance evaluation could impact storage availability. The water balance provided in the PTR assumed a weighted average seepage rate of 0.054 inches per day for all five lagoons. The resulting total estimated seepage is approximately 1.2 MG per year. The use of lagoon seepage in the water balance evaluation results in a significant assumption.

The measured 2016 effluent volume and an effluent volume growth rate of 2.5% per year were used to estimate future flows (JUB 2017c, Section 5.3, p. 23). For the year 2021, the permittee

estimated a growing season influent volume of 37.6 MG and an effluent volume of 69.0 MG (JUB 2017c, Table 5-9, p. 24). Assuming the nongrowing season influent volume is equal to the annual effluent volume minus the growing season influent volume, an estimated volume of 31.4 MG would be stored during the nongrowing season (November through March). Assuming the storage lagoons are empty at the end of the growing season, the projected nongrowing season influent volume would be significantly less than the 49.25 MG of available lagoon storage capacity. Using the 2.5% growth rate and a permit length of five years, the estimated nongrowing season influent volume would be approximately 34.7 MG in 2025 at the end of the permit term. This is still significantly less than the total lagoon storage capacity.

Section 3.1.3 of the PTR states that wastewater is stored in the lagoons during the nongrowing season since the permittee is not permitted to discharge wastewater from November 1 through March 31 (JUB 2017c, Section 3.1.3, p. 5). Nongrowing season application was actually allowed by permit M-0076-04 as an emergency measure (DEQ 2012d, Section 4.2, p. 8). However, with the construction of storage Lagoon 4 (LG-076-06), the addition of management units MU-076-03 and MU-076-04, and the relining of Lagoons 3 (LG-076-04) and 5 (LG-076-05), nongrowing season application no longer appears to be necessary. DEQ recommends nongrowing season application is not allowed by draft reuse permit M-076-05. The permittee should continue to monitor the water balance of the wastewater treatment and reuse systems to ensure there is sufficient nongrowing season storage capacity.

4.6.3 Constituent Loading Rates

Permit M-0076-04 limited growing season COD loading rates to 50 pounds per acre per day (lb/acre/day) averaged over 214 days. The permit also incorrectly limited nongrowing COD loading rates to 0 lb/acre/day (DEQ 2012d, Section 4.3, p. 9). The nongrowing season COD loading limit was not consistent with the nongrowing season hydraulic loading limits specified in Section 4.2 of permit M-0076-04 (DEQ 2012d, Section 4.2, p. 8). However, the permittee has not conducted any nongrowing season application during the current permit cycle.

Table 10 lists the annual average COD growing season loading rates to each management unit contributed by both recycled water and SIW. COD loading rates were only reported in the 2016 through 2019 annual reports (JUB 2017a, 2018a, 2108b, 2020a). The COD loading rates to MU-076-05 are only contributed by SIW.

Table 10. Annual growing season COD loading rates, lb/acre/day.

Year	MU-076-03	MU-076-04	MU-076-05
2016	0.6	0.5	0.1
2017	2.2	1.7	0.2
2018	3.3	1.8	0.2
2019	1.5	1.1	0.2

Sources: JUB 2017a, 2018a, 2108b, 2020a

Growing season COD loading rates were substantially less than the limit during the current permit cycle. DEQ recommends that draft reuse permit M-076-05 continues to specify a growing season COD loading limit of 50 lb/acre/day. Nongrowing season application is not allowed by the draft permit.

Permit M-0076-04 limited nitrogen and phosphorus loading from all sources to 150 percent of typical crop uptake (DEQ 2012d, Section 4.3, p. 9). Typical crop uptake is defined as the median crop uptake from the three most recent years the crop has been grown. For crops having less than three years of crop uptake data, regional crop yield data and typical nutrient content values, or other values approved by DEQ may be used.

The methods used by the permittee to estimate crop uptake varied throughout the permit cycle. Typical crop nutrient content values provided by the NRCS were used to estimate crop nutrient uptake in 2015 and 2016 (JUB 2016a, 2017a). The permittee did not begin analyzing plant tissue samples as required by Section 5.4 of permit M-0076-04 until 2017 (DEQ 2012d, Section 5.4, p. 15; JUB 2018a). In 2017, only one crop tissue sample was analyzed for all three management units (JUB 2018a). In 2018 and 2019, a plant tissue sample was collected and analyzed from each of the three management units for each harvested crop as required by the permit (JUB 2018b, 2020a).

Tables 11 and 12 compare the nitrogen and phosphorus loading rates to the calculated loading limits. Silage corn was grown on all management units (MU-076-03, MU-076-04, and MU-076-05) every year during the current permit cycle (2015-2019). A silage corn crop and a triticale crop were grown and harvested on the East Pivot (MU-076-03 and MU-076-05) in 2016. A silage corn crop and a triticale crop were grown and harvested on all management units in 2019.

The 2015 loading limits were assumed to be 150% of the estimated 2015 corn uptake. The 2016 loading limits were assumed to be 150% of the median of the estimated 2015 and 2016 corn uptake plus 150% of the 2016 triticale crop uptake for MU-076-03 and MU-076-05; the loading limit for MU-076-04 was assumed to be 150% of the median 2015 and 2016 corn uptake. The 2017 loading limits were assumed to be 150% of the median corn uptake from 2015 through 2017. The 2018 loading limits were assumed to be 150% of the estimated corn uptake for the three previously grown corn crops (2015-2017). The 2019 loading limits were assumed to be 150% of the median uptake for the three previously grown corn crops (2016-2018) plus 150% of the median uptake of the 2016 and 2019 triticale crops.

Table 11. Annual nitrogen (N) loading rates, lb/acre.

Year	MU-076-03			MU-076-04			MU-076-05		
	N Loading	N Uptake	N Limit	N Loading	N Uptake	N Limit	N Loading	N Uptake	N Limit
2015[a]	56	237	355	56	237	355	56	237	355
2016[b]	86	323	482	54	323	357	102	323	482
2017[a]	102	245	359	47	245	359	6	245	359
2018[a]	**970**	362	359	**943**	338	359	**919**	374	359
2019[c]	435	1316	529	334	1130	450	190	708	525

Source: JUB 2016a, 2017a, 2018a, 2108b, 2020a

a. A silage corn crop was grown and harvested from all management units.
b. A triticale crop was harvested from the East pivot in the spring, followed by silage corn that was harvested from all management units in the fall.
c. A triticale crop was harvested from all management units in the spring, followed by silage corn that was harvested from all management units in the fall.

Table 12. Annual phosphorus (P) loading rates, lb/acre.

Year	MU-076-03			MU-076-04			MU-076-05		
	P Loading	P Uptake	P Limit	P Loading	P Uptake	P Limit	P Loading	P Uptake	P Limit
2015[a]	0	61	91	0	61	91	0	61	91
2016[b]	1	45	86	1	45	72	0	45	86
2017[a]	22	36	54	12	36	54	0	36	54
2018[a]	**610**	88	54	**596**	86	54	**580**	98	54
2019[c]	84	111	81	78	123	81	1	95	80

Source: JUB 2016a, 2017a, 2018a, 2108b, 2020a

a. A silage corn crop was grown and harvested from all management units.
b. A triticale crop was harvested from the East pivot in the spring, followed by silage corn that was harvested from all management units in the fall.
c. A triticale crop was harvested from all management units in the spring, followed by silage corn that was harvested from all management units in the fall.

As shown in Tables 11 and 12, the nitrogen and phosphorus loading rates have been in compliance with permit limits every year during the current permit cycle except 2018. In 2018, the permittee applied an excessive amount of nitrogen and phosphorus fertilizer that was far greater than crop needs. This was a noncompliance event. The loading limits apply to all sources of nitrogen and phosphorus, including fertilizer. The permittee must ensure that the farmer leasing the site adheres to the conditions of the reuse permit. The application of excessive amounts of fertilizer will restrict the permittee's ability to apply recycled water in the future.

Soil nitrate-nitrogen concentrations are currently at acceptable levels (DEQ 2007b, Section 2.5.1, p. 2-57); however, the 2018 fertilizer application did cause a temporary increase in soil nitrate concentrations. Excessive nitrogen loading could potentially cause nitrogen to leach to ground water and increase ground water nitrate levels. Nitrogen must be applied at agronomic rates to prevent leaching to ground water. DEQ does not currently recommend a reduction in the nitrogen loading limit. Section 4.3 of draft reuse permit M-076-05 specifies a nitrogen loading limit of 150% of typical crop uptake. However, if the permittee continues to apply excessive amounts of fertilizer, the nitrogen loading limit may be reevaluated.

As stated in the DEQ Guidance (DEQ 2007b, Section 4.2.2.4.2, p. 4-26):

> *Alfalfa presents a unique problem when making required nitrogen calculations since it is able to fix atmospheric nitrogen in addition to its ability to take up plant available nitrogen (nitrate, ammonia) from the soil.*

Alfalfa is not currently grown on the reuse site. If the permittee ever desires to grow alfalfa, DEQ recommends that loading limits on fields with alfalfa account for nitrogen fixation. Equation 2 should be used when calculating a nitrogen loading limit for management units with an alfalfa crop (DEQ 2007b, Section 4.2.2.4.2, p. 4-26):

$$N_{required} = \frac{(1 - N_{fixation}) \times N_{crop}}{e_f}$$

Equation 2. Nitrogen loading rates accounting for nitrogen fixation.

Where $N_{fixation}$ is the proportion of N_{crop} which is fixed from the atmosphere and e_f is the uptake efficiency factor. This equation would provide a more realistic estimate of nitrogen uptake since

a portion of nitrogen content in alfalfa is derived from the atmosphere (DEQ 2007b, Section 4.2.2.4.2, p. 4-26).

Phosphorus loading to reuse sites is generally not a concern in cases where phosphorus levels in the soil are within normal ranges. However, as discussed in Section 4.3, phosphorus concentrations in the upper foot of soil are currently high on all management units. The permittee applied an excessive amount of phosphorus fertilizer in 2018 causing a spike in soil phosphorus concentrations. Phosphorus is not lost to the atmosphere through volatilization or denitrification like nitrogen. DEQ recommends that the phosphorus limit in draft reuse permit M-076-05 is reduced to 125% of the typical crop uptake. However, if the permittee continues to apply excessive amounts of fertilizer, the phosphorus loading limit should be reduced to 100% of typical crop uptake to help reuse soil phosphorus concentrations.

Permit M-0076-04 did not specify a non-volatile dissolved solids (NVDS) loading rate limit. NVDS loading rates are discussed in Section 5.8 of this Staff Analysis.

5 Site Management

5.1 Buffer Zones

Buffer zones for the protection of surface water, ground water, drinking water supplies, and the public are required by the *Recycled Water Rules* (IDAPA 58.01.17.604). The DEQ Guidance provides recommended buffer zone distances for various reuse scenarios (DEQ 2007b, Table 6-4, p. 6-18). These recommended buffer zone distances were updated by DEQ on October 28, 2015 to incorporate current state rules (DEQ 2015c). For this permit, the following scenario was used in determining buffer zone distances: municipal Class D recycled water, rural area location, and sprinkler application. Table 13 compares the existing reuse site buffer zone distances to the current permit requirements and guidance recommendations.

Table 13. Buffer zones, feet.

Object	M-0076-04 Buffer Zone Requirements[a]	Guidance Buffer Zone Requirements[b]	Actual Reuse Area
Private Residences	500	500	500
Areas Accessible to the Public	300	300	300
Natural Surface Water Bodies	100	100	6.5 miles
Man-Made Water Conveyances	50	50	>200
Public Water Supply Wells	1,000	1,000	>3,500
Private Water Supply Wells	500	500	500
Drinking Water Reservoir	-	500[c]	>1 mile
Fencing	Required	Low Secureity (Three-wire pasture)	Four-strand barbed wire fence

a. Current Buffer Zone Requirements in Reuse Permit M-0076-04.
b. The Guidance provides recommended buffer zone distances for various reuse scenarios (DEQ 2015c). For this permit, the following scenario was used for determining buffer zone distances: Class D, rural location, sprinkler application.
c. The buffer zone for drinking water reservoirs is a DEQ rule requirement (IDAPA 58.01.08.544.02.c).

All existing buffer zone distances satisfy the DEQ guidance buffer zone distance requirements for Class D recycled water. However, as discussed in Section 4.6.1, the permittee has not been in compliance with Class D recycled water total coliform limits during the current permit cycle. If the permittee is unable to demonstrate the ability to consistently produce Class D recycled water, immediate corrective action should be taken to improve disinfection or Class E buffer zone distances shall be implemented around the reuse site. This would increase the required buffer distances to private residences and areas accessible to the public to 1,000 feet.

The *Recycled Water Rules* (IDAPA 58.01.17.603.03) require signs to be posted around the perimeter of the reuse site that state "Warning: Recycled Water – Do Not Enter," or equivalent in both English and Spanish. The required bilingual signs are currently posted around the perimeter of the reuse site and at all entrances (JUB 2017c, Section 2.2, p. 2).

The guidance buffer zone distance requirements for Class D recycled water are specified in Section 4.4 of draft reuse permit M-076-05. Section 3 of the draft permit also includes a compliance activity that requires the permittee to submit a disinfection improvement plan.

5.2 Runoff

Best Management Practices (BMPs) for preventing runoff or discharge from the WWTP and reuse site are listed in Section 12 of the PO, which was submitted to DEQ on July 2, 2015 (JUB 2015b, Section 12, p. 12-1). Section 12.3 of the PO specifies various BMPs that should be implemented to prevent runoff from the reuse site, including, irrigating the reuse site at agronomic rates and not applying recycled water during freezing conditions. The PO also states that the runoff retention pond located at the southwest corner of the reuse site should be maintained to collect any potential runoff (JUB 2015b, Section 12.3, p. 12-1).

DEQ recommends that the Runoff Management Plan should be updated with detailed information explaining how all control structures and other BMPs are used to prevent runoff from the permitted reuse site. Section 9.1.2 of draft reuse permit M-076-05 states that all recycled water applied to the reuse site must be restricted to the premises. Any discharges to surface water that require a permit under the Clean Water Act must be authorized by the United States Environmental Protection Agency (EPA). The permittee should follow all BMPs listed in the Runoff Management Plan to ensure recycled water does not leave the site.

5.3 Seepage Rate Testing

The *Wastewater Rules* (IDAPA 58.01.16.493.02) require municipal wastewater lagoons to be seepage tested every ten years or if there is a change in condition to the lagoon liner that may affect its permeability. The former Lagoon 3 (LG-076-03) has been decommissioned and will no longer be used to store wastewater. Lagoons 3 (LG-076-04) and 5 (LG-076-05) were re-lined with 60 mil HDPE liners in 2017 and seepage tested in the spring of 2018. The HDPE liner in storage Lagoon 4 (LG-076-06) sustained some damage to the east berm in 2018. Lagoon 4 was repaired in the fall of 2019 and seepage tested in the spring of 2020 prior to being returned to service (JUB 2019c, 2020b).

Table 14 contains a summary of seepage rate testing requirements for the lagoons associated with this reuse permit. The allowable seepage rate for lagoons constructed before April 15, 2007 is 0.25 inches per day, while the allowable seepage rate for lagoons constructed after April 15, 2007 is 0.125 inches per day (IDAPA 58.01.16.493.03b).

Table 14. Seepage rate testing.

Lagoon	Facility designation	Test Date Completion	Date of DEQ approval of test report	Seepage rate, inches/day	Allowable rate, inches/day	Year next seepage rate test is due
LG-076-01	Lagoon #1	3/26/2014	Pending	0.079	0.25	2024
LG-076-02	Lagoon #2	8/18/2010	5/5/2011	0.217	0.25	2020
LG-076-03	-	Decommissioned			-	N/A
LG-076-04	Lagoon #3	5/3/2018	1/24/2020	0.033	0.125	2028
LG-076-05	Lagoon #5	5/16/2018	1/24/2020	0.002	0.125	2028
LG-076-06	Lagoon #4	6/5/2020	7/23/2020	<0.001	0.125	2030

Sources: JUB 2016b, 2019c, 2019d, 2020b

The seepage rate test period should be planned to avoid freezing temperatures. Freezing temperatures will nullify test data and therefore nullify the test itself. Test procedures for completing seepage tests are recommended to be submitted at least 45 days prior to the planned seepage test. Information on seepage testing procedures is located at: *http://www.deq.idaho.gov/water-quality/wastewater/lagoon-seepage-testing.aspx.*

5.4 Sludge and Waste Solids

A brief discussion of waste solids management is included in Section 4.7 of the PO (JUB 2015b, Section 4.7, p. 4-22). The PO states that operators will measure and record sludge accumulation in Lagoons 1 (LG-076-01) and 2 (LG-076-02) on an annual basis. If sludge accumulation adversely impacts the treatment efficiency of the lagoons, sludge will be removed and disposed of in accordance with all applicable federal, state, and local regulations. A sludge disposal plan that meets the requirements outlined in the *Wastewater Rules* (IDAPA 58.01.16.650) must be approved by DEQ prior to removing sludge from the lagoons.

The permittee submitted a Biosolids Management Plan to DEQ on July 5, 2017 for the removal and disposal of solids from Lagoons 3 (LG-076-04) and 5 (LG-076-05) prior to installing the new HDPE lagoon liners (JUB 2017d). DEQ approved the plan on July 15, 2017 (DEQ 2017b). Approximately 1,852 cubic yards of solids were removed from the lagoon bottoms and temporarily stored in a depression located northwest of the West Pivot. The solids were land applied evenly over management units MU-076-03 and MU-076-04 in October 2019 (JUB 2020a, Section 2, p. 2-1).

Just as with supplemental fertilizer, waste solids constituent loading rate contributions must be accounted for when calculating the total constituent loading rates to each management unit. Nutrient content values from the Biosolids Management Plan were used to estimate the waste solids constituent loading rates to management units MU-076-03 and MU-076-04. The

application of solids resulted in nitrogen and phosphorus loading rates of approximately 100 lb/acre and 68 lb/acre, respectively (JUB 2020a, Table 2-5 and Table 2-6, p. 2-6).

5.5 Nuisance Odors

An Odor Management Plan is included in Section 11 of the PO. The plan identifies potential sources of odor, such as overloading the treatment lagoons or reuse site, and procedures to minimize odor issues (JUB 2015b, Section 11, p. 11-1).

The plan also describes the protocol used to address odor complaints. The general corrective procedures for addressing upset conditions include the following (JUB 2015b, Section 11.4, p. 11-2):

- ***Identify and evaluate the situation***. *After a nuisance odor has been detected or reported, the first step is to identify the source of the odor (e.g., upset condition, mechanical failure, or other condition(s) resulting in the odor problem). In identifying the source, the operator should also assess the magnitude of the problem.*

- ***Determine and take the appropriate corrective actions***. *Having an understanding of the source and magnitude of the problem will aid the operator in making decisions regarding what corrective measures should be taken. The operator should consider all options available, including but not limited to: adding chemical or deodorants; adjusting lagoon levels; increasing aeration; stopping industrial waste from entering the collection system; stopping land application or moving land application to a different site, or a combination of these options. Once the corrective actions have been identified, they should be implemented as soon as possible.*

- ***Make notifications as soon as possible.*** *Communication is essential! For any nuisance odors, the operator should immediately notify the appropriate City management (Mayor and Council) and the IDEQ of the odors, complaints received and/or corrective actions, as necessary. Effective communication in these instances can often mitigate complaints or problems between the City, regulatory agencies and neighbors. The actions taken and implemented should be documented on the Odor Complaint Form shown in Appendix H.*

Appendix H of the PO contains an odor complaint form to document odor complaints and the actions implemented to address the odors (JUB 2015b, Appendix G). Copies of all odor compliant logs should be submitted with the annual reports.

DEQ is not aware of any odor complaints against the WWTP or reuse site during the current permit cycle. The permittee appears to be adequately managing odors.

5.6 Cropping Plan

A cropping plan was not included in the PO; however, crop information was provided in Section 5 of the PTR (JUB 2017c, Section 5.2, pp. 21-22). During the current permit cycle, silage corn

was grown and harvested every year. Triticale is also sometimes grown and harvested in the spring before the silage corn crop is planted. Triticale is reportedly grown in the spring because of its ability to scavenge excess nitrogen, grow in the very wet spring soils, and dry out the soils for other crops (JUB 2017c, Section 5.2.1, p. 21).

Table 15 provides a summary of the reported reuse site crop yields from 2015 through 2019. In 2016, a triticale crop was only grown on the East Pivot from April to May. A Triticale crop was planted over the entire site in October 2018 and harvested in May 2019.

Table 15. Reuse site crop yields.

Year	Management Unit	Triticale Dry Yield (ton/acre)	Silage Corn Dry Yield (ton/acre)
2015	MU-076-03 MU-076-04 MU-076-05	-	10.92
2016	MU-076-03 MU-076-04 MU-076-05	- 1.38	10.52
2017	MU-076-03 MU-076-04 MU-076-05	-	9.79
2018	MU-076-03 MU-076-04 MU-076-05	-	11.91
2019	MU-076-03 MU-076-04 MU-076-05	3.17	8.84 13.58 11.60

Sources: JUB 2016a, 2017a, 2017c, 2018a, 2018b, 2020a

Permit M-0076-04 required crop yield to be reported for each management unit. As shown in Table 15, the permittee often reported one yield for the entire reuse site. However, in 2019, a corn yield was reported for each management unit. The permittee has previously stated that it is difficult to differentiate the crop yield for each management unit when one crop is grown over the entire site. It is unclear to DEQ why yields previously weren't reported for each management unit, but yields for each management unit were reported in 2019. DEQ recommends that the permittee be allowed to report one average yield for the entire reuse site provided that the same crop is grown on all management units, a plant tissue sample is collected from each management unit, and the crops are managed similarly (e.g., growing time, hydraulic loading rates, constituent loading rates, and fertilizer application rates).

Draft reuse permit M-076-05 requires an updated PO to be submitted with a cropping plan. The cropping plan should provide a detailed explanation about how the permittee is managing the silage corn and triticale crops. The permittee's QAPP should also explain how crop yield is calculated and how plant tissue samples are collected and analyzed.

5.7 Grazing

Grazing is currently not allowed on the reuse site (DEQ 2012d, Section 4.2, p. 8). Prior to grazing, the permittee shall submit a grazing management plan and receive written approval from DEQ.

5.8 Salts

The current PO does not address salt loading management. Permit M-0076-04 required the permittee to monitor recycled water and SIW for NVDS (DEQ 2012d, Section 5.1.1, p. 12), soil for EC and SAR (DEQ 2012d, Section 5.3.2, p. 14), and ground water for TDS (DEQ 2012d, Section 5.2.2, p. 13).

Salts in wastewater/recycled water may be measured in a variety of ways including analyzing for NVDS or total dissolved inorganic solids (TDIS). The inorganic fraction of TDS is called NVDS. The assumption for this is that the volatile fraction represents the organic constituents, and the difference between TDS and VDS represents the inorganic or salt fraction (NVDS). But this is only a general assumption, since decomposition, volatilization, and oxidation of some mineral salts does occur. TDIS measurement involves the summing of individual ions, such as chloride, sulfate, carbonate/bicarbonate, potassium, calcium, sodium, magnesium and other inorganic constituents (DEQ 2007b, Section 3.4.5, p. 3-6).

Table 16 shows the estimated annual NVDS loading rates resulting from both recycled water and SIW irrigation during the current permit cycle. The NVDS loading rates are compared to crop ash uptake. The ash content of plant tissue is used to estimate inorganic salt uptake (DEQ 2007b, Section 7.6.3.3, p. 7-64). The permittee did not estimate crop ash uptake in 2016.

Table 16. Annual NVDS loading rates, lb/acre.

Year	MU-076-03		MU-076-04		MU-076-05	
	NVDS Loading	Ash Uptake	NVDS Loading	Ash Uptake	NVDS Loading	Ash Uptake
2016[a]	4,041	-	4,016	-	1,418	-
2017	1,314	3,525	1,279	3,525	1,005	3,525
2018	2,336	1,367	1,741	1,324	1,256	1,386
2019	1,843	2,271	1,622	1,972	1,314	1,766

Sources: JUB 2017a, 2018a, 2018b, 2020a

NVDS loading rates have been variable. This is likely because the permittee appears to use a single SIW sample analysis each year to estimate the SIW NVDS loading rate contributions. DEQ recommends that average SIW quality is used to estimate SIW loading rate contributions.

The accumulation of salts in reuse site soils may potentially impact plant growth and result in leaching to ground water. The monitoring of EC in soil and TDS in ground water may be used to determine salt impacts to a reuse site. The *GWQR* secondary constituent standard for TDS is 500 mg/L (IDAPA 58.01.11.200.b).

Soil with EC levels greater than 4 millimhos per centimeter (mmhos/cm) and SAR values greater than 15 are generally considered to be impacted by salts (DEQ 2007b, Section 2.1.2.2.2, p. 2-21; DEQ 2007b, Section 4.2.2.5.3, p. 4-29). As shown in Table 3, soil EC and SAR levels are substantially below these levels. Reuse site soils do not appear to be impacted by salt loading rates.

As shown in Table 4, average ground water TDS concentrations in the domestic wells are substantially less than the *GWQR* secondary standard of 500 mg/L. However, TDS concentrations in MW-3 (GW-076-03) appear to be greater than the other wells, with a maximum TDS concentration of 1,080 mg/L in 2014. This well is located downgradient of the wastewater lagoons.

While both the NVDS loading rates and crop ash uptake have been variable, the NVDS loading rates generally do not appear to be excessive. The reuse site does not appear to be impacted by salts. A salt loading management plan does not appear to be necessary at this time. An NVDS loading limit is not specified in draft reuse permit M-076-05.

5.9 Emergency Operating plan

An emergency operation plan was included in Section 10 of the PO (JUB 2015b, Section 10). The WWTP was designed so that any lagoons can be bypassed for repairs or emergency operation if necessary. DEQ should be notified prior to bypassing one of the treatment lagoons as this may affect wastewater treatment and storage capabilities.

6 Monitoring

The proposed monitoring requirements for draft reuse permit M-076-05 are described in detail in the following subsections. All monitoring shall be conducted in accordance with the permittee's QAPP. See Section 7 for requirements regarding the QAPP.

6.1 Recycled Water Monitoring

The goal of wastewater/recycled water monitoring is to provide a timely and cost-effective assessment of the adequacy of wastewater treatment process operations and operation and management procedures. Flow monitoring is critical for constituent loading calculations for permit compliance purposes (DEQ 2007b, Section 7.5.1, p. 7-50).

The *Recycled Water Rules* (IDAPA 58.01.16.601.03.a.ii.1) state that Class D recycled water shall be sampled and analyzed monthly for total coliform. However, the current permit (M-0076-04) required the permittee to collect and analyze recycled water samples *weekly* for total coliform (DEQ 2012d, Section 5.1.1, p. 12). As discussed in Section 4.6.1 of this Staff Analysis, the permittee has not complied with Class D recycled water total coliform limits during the current permit cycle. DEQ recommends that weekly monitoring of total coliform is continued to be required by reuse permit M-076-05.

In addition to the weekly total coliform monitoring, Section 5.1.1 of permit M-0076-04 required a monthly recycled water sample to be collected and analyzed for TKN, nitrate+nitrite-nitrogen, TDS, VDS, pH, COD, and total phosphorus (DEQ 2012d, Section 5.1.1, p. 12). Monitoring the separate species of nitrogen forms is generally unnecessary. Total nitrogen analysis, along with flow, is sufficient to calculate nitrogen loading to the reuse site. Total nitrogen is the sum of organic nitrogen, ammonia, nitrite, and nitrate. DEQ recommends that the recycled water should be monitored for total nitrogen instead of monitoring for TKN (the sum of organic nitrogen and ammonia) and nitrite+nitrate-nitrogen separately.

In wastewaters, TDS can include significant amounts of dissolved organic material, while in ground water TDS generally consists of inorganic salts. When modeling impacts of TDS loading to ground water, it is critical to make some other measure of the inorganic constituents in wastewater to accurately assess the inorganic fraction of TDS, such as NVDS (TDS less the volatile dissolved solids; DEQ 2007b, Section 7.2.4.1.2, p. 7-18). Draft reuse permit M-076-05 requires the recycled water to be monitored for NVDS. While TDS and VDS are no longer listed in the recycled water monitoring requirements, the analysis of TDS and VDS are still required to calculate NVDS.

DEQ recommends the recycled water constituent monitoring requirements shown in Table 17 be included in Section 5.1.1 of draft reuse permit M-076-05.

Table 17. Draft reuse permit M-076-05 recycled water constituent monitoring requirements.

Monitoring Point Serial Number and Location	Sample Description	Sample Type and Frequency	Constituents (mg/L unless otherwise specified)
WW-076-01 Following Disinfection at Pump #3 or Pump #4	Recycled water to MU-076-03 and MU-076-04	Grab/weekly (during periods of use)	Total coliform (organisms/100 mL)
		Grab/monthly (during periods of use)	pH (Standard Units) Total nitrogen, as N Total phosphorus, as P NVDS COD

The volumes of recycled water and SIW applied are required to calculate monthly hydraulic and constituent loading rates. Four Siemens electromagnetic flow meters are used to measure the volume of recycled water and SIW applied to each management unit (DEQ 2012d, Section 5.1.2, p. 12). Three of the flow meters are located at the IRPS located north of the West Pivot along the 3050 South county road. The flow meter installed at Pump #4 (FM-076-01) measures the volume of recycled water applied to MU-076-03. The flow meter installed at Pump #3 (FM-076-02) measures the volume of recycled water applied to MU-076-04. The flow meter installed downstream of Pumps #1 and #2 (FM-076-03) measures the volume of SIW applied to the West Pivot (MU-076-04 and MU-076-05). The fourth flow meter (FM-076-04) is installed at the EIPS located northeast of the East Pivot. This flow meter measures the SIW flow from Pumps #5 and #6 applied to the East Pivot (MU-076-03 and MU-076-05).

There is not a direct measurement of the SIW applied to each management unit. When operating the SIW irrigation system, the SIW flow meters measure the total flow to each pivot. The measured volume of SIW is averaged over the entire pivot area (buffer and recycled water irrigation management units) by acreage (Ahrens). When operating the recycled water irrigation system, SIW is only applied to MU-076-05. Therefore, when the recycled water system is operating, the volume of SIW applied to MU-076-05 can be directly measured using FM-076-03 and FM-076-04. DEQ recommends that a hydraulic loading rate measurement plan is included in the updated PO that provides a detailed description of how SIW hydraulic loading rates are measured and calculated for each management unit.

The current permit (M-0076-04) included an additional flow monitoring point (FM-076-05) for the measurement of recycled water applied to MU-076-02 and MU-076-05. However, MU-076-02 is not included in the draft permit and MU-076-05 is the buffer area that does not receive recycled water. DEQ recommends that FM-076-05 is not included in draft reuse permit M-076-05.

DEQ recommends the flow monitoring requirements shown in Table 18 be included in Section 5.1.2 of draft reuse permit M-076-05.

Table 18. Draft reuse permit M-076-05 recycled water and SIW flow monitoring requirements.

Management Unit or Flow Measurement Serial Number and Location	Sample Description	Sample Type and Frequency	Parameters, each MU or FM
FM-076-01 Flow meter at Pump #4	Recycled water flow to MU-076-03	Daily meter reading Monthly compilation of data	Volume (MG/month) Application depth (inches/month)
FM-076-02 Flow meter at Pump #3	Recycled water flow to MU-076-04	Daily meter reading Monthly compilation of data	Volume (MG/month) Application depth (inches/month)
FM-076-03 Flow meter at Pumps #1 and #2	SIW flow to West Pivot: MU-076-04 and MU-076-05	Daily meter reading Monthly compilation of data	Volume (MG/month)
FM-076-04 Flow meter at Pumps #5 and #6	SIW flow to East Pivot: MU-076-03 and MU-076-05	Daily meter reading Monthly compilation of data	Volume (MG/month)
MU-076-03 MU-076-04 MU-076-05 Flow meters at Pumps #1 and #2, and Pumps #5 and #6	SIW water flow to all management units	Daily meter reading Monthly compilation of data	Volume (MG/month) Application depth (inches/month)

6.2 Soil Monitoring

Soil monitoring objectives are discussed in Section 7.4.1 of the DEQ Guidance. Although reuse permits do not specify limits for soil parameters, the data provides information necessary to manage reuse operations (DEQ 2007b, Section 7.4.1, p. 7-39).

Reuse site soil monitoring has a dual purpose. First, the soils data is used for nutrient management. Typically, analysis for macronutrients such as nitrogen and phosphorus are specified in the permit. Although not normally included in permits, other nutrients such as potassium and micro-nutrients such as zinc, boron, calcium, magnesium, sulfate, copper, chloride, and molybdenum are typically monitored prior to planting crops to determine if any deficiencies or excesses are present that impact crop health (DEQ 2007b, Section 7.4.1, p. 7-39).

The second purpose of soil monitoring is to assess soil quality. This involves characterizing the chemical and physical properties of reuse site soils and determining if any detrimental trends are occurring over time which will reduce the crop performance. Soil quality monitoring can also signal the accumulation of constituents which may constitute a risk to ground water, given leaching conditions. The reuse permit may contain soil quality parameters depending on the quality and quantity of recycled water being applied (DEQ 2007b, Section 7.4.1, p. 7-39).

Section 5.3 of permit M-0076-04 required soil samples to be collected annually from each soil monitoring unit and analyzed for EC, nitrate-nitrogen, ammonia-nitrogen, pH, and plant available phosphorus (DEQ 2012d, Section 5.3, p. 14). During the first and last permit year, the analysis of SAR, DTPA-Iron, and DTPA-Manganese was also required. Nitrogen and phosphorus soil concentrations have varied from low to high on all management units depending on the amount of fertilizer applied. Iron concentrations were also high on all management units.

DEQ recommends that the permittee monitor the soil for exchangeable sodium percentage (ESP) during the first and fourth permit year instead of SAR. ESP serves as an index of the potential sodium influence in the soil. Soils with ESP values above 15 are classified as sodic or alkali, have sodium as the dominant cation, and may possibly experience infiltration problems due to deflocculation of soil colloids (DEQ 2007b, Section 2.1.2.2.1, p. 2-21). SAR is a more specialized soil test (thus more expensive) than that for ESP. ESP utilizes an analysis for CEC and a more common extraction of cations.

Soil monitoring unit SU-076-05 corresponds to the buffer area (MU-076-05). Recycled water is not applied to the buffer area in order to maintain the required buffer distances discussed in Section 5.1. The buffer area is managed similar to the other management units (MU-076-03 and MU-076-04) with respect to crop type, hydraulic loading rates, and fertilizer application rates. Soil constituent levels on SU-076-05 are similar to those found on SU-076-03 and SU-076-04. DEQ recommends reducing the required soil monitoring frequency for SU-076-05 from annually to only the first and fourth year of the permit. This still allows DEQ to evaluate whether any issues with the buffer area soils develop during the next permit cycle due to runoff or fertilizer application.

Lagoon #4 (LG-076-06) was constructed over soil monitoring unit SU-076-01 (MU-076-01) and SU-076-02 (MU-076-02) is no longer connected to the recycled water irrigation system. Soil monitoring units SU-076-01 and SU-076-02 are not included in draft reuse permit M-076-05.

DEQ recommends the soil monitoring requirements listed in Table 19 be included in Section 5.3 of draft reuse permit M-076-05.

Table 19. Draft reuse permit M-076-05 soil monitoring requirements.

Management Unit	Soil Monitoring Point Serial Number	Sample Type	Sample Frequency	Constituents (Units in mg/kg Soil Unless Otherwise Specified)
MU-076-03 MU-076-04	SU-076-03 SU-076-04	Composite samples[a]	Annually, March/April	pH (Standard Units) Nitrate, as N Ammonium, as N Plant available phosphorus EC (µmhos/cm in saturated paste extract)
			March/April of the first and fourth year of the permit	DTPA Iron DTPA Manganese ESP
MU-076-05	SU-076-05	Composite samples[a]	March/April of the first and fourth year of the permit	pH (Standard Units) Nitrate, as N Ammonium, as N Plant available phosphorus EC (µmhos/cm in saturated paste extract) DTPA Iron DTPA Manganese ESP

a. The number of sample locations specified in the PO or QAPP for each SU shall be sampled. At each location, samples shall be obtained from three depths: 0–12 inches; 12–24 inches; and 24–36 inches or refusal. The samples obtained from each depth shall be composited by depth to yield three composite samples for each soil monitoring unit; one composite sample for each depth.

6.3 Ground Water Monitoring

Section 7.2 of the DEQ Guidance describes the elements of a ground water monitoring plan for a reuse site (DEQ 2007b, Section 7.2, p. 7-12). Ground water monitoring may be used to evaluate a facility's impact on ground water quality and also serves to assess compliance with the reuse permit and the *GWQR* (IDAPA 58.01.11).

As discussed in Section 4.5, the existing ground water monitoring network of domestic wells is inadequate to monitor potential impacts to ground water resulting from recycled water application to MU-076-03 and MU-076-04. The *Wastewater Rules* (IDAPA 58.01.16.493.09.c.v) also require an approved system of wells or lysimeters around the perimeter of lagoons to monitor ground water. Section 3 of draft reuse permit M-076-05 includes a compliance activity that requires the permittee to submit a ground water monitoring plan that includes plans and specifications for a new ground water monitoring well network.

Section 5.2 of permit M-0076-04 required all monitoring wells to be sampled quarterly for the first two years of the permit and twice annually for the remainder of the permit for the following constituents: nitrate-nitrogen, TDS, sodium, chloride, total phosphorus, total and dissolved iron, total and dissolved manganese (DEQ 2012d, Section 5.2, p. 13). The quarterly sampling

requirement was intended to characterize the ground water in the new monitoring wells that were never installed. Three of the domestic wells are still in the vicinity of the new management units (GW-076-02, GW-076-03, and GW-076-04). DEQ recommends that draft reuse permit M-076-05 requires the three domestic wells to be sampled twice annually until the new monitoring well network is installed. The new monitoring wells should then be sampled quarterly for the remainder of the permit to adequately characterize the ground water.

Nitrate-nitrogen is a primary ground water constituent, meaning there can be health related concerns at ground water levels above ground water standards (IDAPA 58.01.11.200.01a). The primary ground water standard for nitrate-nitrogen is 10 mg/L. Nitrate-nitrogen contamination at reuse sites usually results from nitrogen overloading (DEQ 2007b, Section 7.2.4.1.1, p. 7-18). DEQ recommends that ground water is required to be monitored for nitrate-nitrogen.

TDS is a secondary ground water constituent, meaning there can be aesthetic related concerns at ground water levels above ground water standards (IDAPA 58.01.11.200.01b). The ground water standard for TDS is 500 mg/L. TDS is a general term that has different interpretations depending on the media it is measured. In ground water, TDS generally consists of inorganic salts (DEQ 2007b, Section 7.2.4.1.2, p. 7-18). DEQ recommends that ground water is required to be monitored for TDS.

Iron and manganese are secondary ground water constituents. The ground water standards for iron and manganese are 0.3 mg/L and 0.05 mg/L, respectively (IDAPA 58.01.11.200.01.b). Iron and manganese are often found in ground water downgradient of highly loaded wastewater land treatment facilities. Associated high COD loadings and depressed redox conditions generated in the soil can reduce the valence state of iron and manganese naturally present in soils to soluble forms (DEQ 2007b, Section 7.2.4.1.5, p. 7-20). These reduced species are mobile and can leach to ground water. Analyses of dissolved metals are generally more useful in evaluating the impacts of the land application of recycled water on ground water quality, since it considers only the fraction which are not from the well casing or collected sediment within the well (DEQ 2007b, Section 7.2.4.1.4, p. 7-19).

Organic loading rates to the management units are low and are not likely to cause reducing conditions; however, soil iron concentrations are relatively high. Soil iron and manganese will be monitored in the first and fourth year of the permit to ensure concentrations are not increasing or migrating down the soil profile. DEQ also recommends that ground water samples are required to be monitored for dissolved iron and manganese in the first and fourth year of the permit to ensure iron and manganese are not leaching to ground water.

When recycled water containing high concentrations of sodium is land-applied, many clay minerals may swell which hinders or prevents infiltration and reduces water movement through the soil (DEQ 2007b, Section 4.2.2.5.3, p. 4-28). Sodium is not listed as a ground water constituent in the *GWQR* (IDAPA 58.1.11.200). The permittee currently land applies low strength, municipal recycled water that is not expected to have a high salt content. Ground water TDS and EC concentrations will be monitored to evaluate salt impacts to ground water. Additionally, soil ESP will be monitored to evaluate sodium impacts to soils. The monitoring of

ground water sodium concentrations is currently unnecessary. DEQ recommends the requirement to monitor sodium in ground water is removed from the permit.

Chloride is a secondary ground water constituent with a ground water standard of 250 mg/L (IDAPA 58.01.11.200.01.b). Chloride is commonly found in municipal and industrial wastewaters. It can move substantially un-attenuated through the soil to ground water (DEQ 2007b, Section 7.4.3, p. 7-40). The low strength, municipal recycled water applied to the reuse site is not expected to contain excessive concentrations of chloride. As shown in Table 4, ground water chloride concentrations are low. Additionally, ground water TDS and EC concentrations will be monitored to evaluate salt impacts to ground water. DEQ recommends that the requirement to monitor ground water for chloride is removed from the permit.

Phosphorus has no numeric ground water standard (IDAPA 58.01.11.200). Phosphorus is a relatively immobile constituent. Elevated phosphorus in downgradient ground water can indicate excessive lagoon seepage or breakthrough from soils that have been loaded to capacity (DEQ 2007b, Section 7.2.4.1.3, p. 7-19). DEQ recommends that ground water is required to be monitored for phosphorus.

Fields parameters, such as pH, temperature, and EC, can be easily and accurately measured in the field with portable electronic instrumentation. These field measurements serve to verify when effective well purging has occurred and when ground water has stabilized to assure that the ground water sampled is representative of water in the aquifer. Measurements of field parameters should stabilize to within 5% variation per casing volume removed during well purging before ground water samples are collected (DEQ 2007b, Section 7.2.4.3, p. 7-23). In addition to assisting in the collection of representative ground water samples, significant changes in field parameters may indicate impacts resulting from the land application of recycled water or lagoon seepage.

DEQ recommends the ground water monitoring requirements listed in Table 20 be included in Section 5.2 of draft reuse permit M-076-05. After the new monitoring well network is installed, a permit modification must be issued to add the new monitoring wells to the permit and update the ground water monitoring requirements as necessary.

Table 20. Draft reuse permit M-076-05 ground water monitoring requirements.

Monitoring Point Serial Number	Sampling Point Description	Sample Type and Frequency	Constituents (Units in mg/L Unless Otherwise Specified)
GW-076-02 GW-076-03 GW-076-04	Domestic wells[a]	Unfiltered grab/Twice annually in April and October	pH (Standard Units) Temperature (ºC) EC (µmhos/cm) Nitrate-nitrogen, as N Total phosphorus, as P TDS
		Unfiltered grab/Twice annually in April and October of the first and fourth year of the permit	Dissolved iron Dissolved manganese

a. The domestic wells shall be monitored until the installation of the new ground water monitoring network is completed.

6.4 Supplemental Irrigation Water Monitoring

Section 5.1.1 of permit M-0076-04 required the permittee to collect a SIW sample annually and monitor for TKN, nitrate+nitrite-nitrogen, TDS, and total phosphorus (DEQ 2012d, Section 5.1.1, p. 12). The SIW monitoring results appear to have been highly variable during the current permit cycle. DEQ recommends that SIW samples are collected at the beginning and end of the irrigation season during the first and second year of the permit. The permittee should use the average SIW constituent concentrations when calculating SIW constituent loading rate contributions for the remainder of the permit.

As discussed in Section 6.1, total nitrogen analysis, along with flow, is sufficient to calculate nitrogen loading to the reuse site. DEQ recommends that the SIW should be monitored for total nitrogen instead of monitoring for TKN and nitrite+nitrate-nitrogen separately.

DEQ recommends the SIW monitoring requirements listed in Table 21 be included in Section 5.1.1 of draft reuse permit M-076-05. Recommended SIW flow monitoring requirements are listed in Table 18.

Table 21. Draft reuse permit M-076-05 SIW constituent monitoring requirements.

Monitoring Point Serial Number and Location	Sample Description	Sample Type and Frequency	Constituents (Units in mg/L Unless Otherwise Specified)
SW-076-01 NSCC water	SIW to all management units	Grab sample/Twice annually in the first and second year of the permit	- Total nitrogen, as N - Total phosphorus, as P - NVDS

6.5 Crop Yield and Tissue Monitoring

Section 5.4.1 of draft reuse permit M-076-05 requires the permittee to monitor the following crop harvest parameters for the harvested portion of each crop for each management unit: crop type, harvest date, sample collection date, harvested acreage, as-harvested (‘wet’) yield, as-harvested (field) moisture content, and dry yield. The field moisture shall be monitored at the time the harvested crop is weighed.

The purpose of plant tissue monitoring as it pertains to permitted recycled water reuse facilities is to determine crop uptake of nutrients and other constituents, and their removal from the treatment acreage. Section 5.4.2 of draft reuse permit M-076-05 requires the permittee to analyze the harvested portion of each crop for each management unit for the following parameters: laboratory moisture content, total combustible nitrogen, phosphorus, and ash. With the exception of laboratory moisture content, all analytical results should be reported on a dry-basis.

As discussed in Section 5.6, the permittee has previously stated that it is difficult to differentiate crop yield for each management unit when one crop is grown over the entire site. DEQ recommends that the permittee be allowed to report one average yield for the entire reuse site provided that the same crop is grown on all management units, a crop plant tissue sample is collected from each management unit, and the crops are managed similarly on each management

unit. Each crop should have similar planting and harvesting dates, hydraulic loading rates, constituent loading rates, and fertilizer application rates on all management units.

6.6 Meteorological Monitoring

There are currently no nuisance odors or loading concerns that would warrant meteorological monitoring. In addition, there are currently adequate meteorological data available from weather stations located near the reuse site. The draft permit does not require meteorological monitoring.

6.7 Calculation Methodologies

DEQ recommends that draft reuse permit M-076-05 requires the calculations listed in Table 22. The PO should specify the methods of calculation used to determine permit compliance.

Table 22. Draft reuse permit M-076-05 calculation requirements.

Monitoring Point Serial Number	Parameter (Calculate for each MU)	Units
MU-076-03 MU-076-04 MU-076-05	Recycled water and SIW hydraulic loading rates (separate and combined)	MG/month Inches/month
	IWR for each crop grown	Inches/month Inches/growing season
	Nitrogen and phosphorus loading rates from recycled water, SIW, fertilizer, and waste solids (separate and combined)	lb/acre-year
	NVDS loading rates from recycled water and SIW (separate and combined)	lb/acre-year
	COD loading rates from recycled water	lb/acre-day
	Crop harvest and yield Report each harvest and the annual totals for each MU	Crop types harvested Total harvested area (acres) Total 'wet' yield (lb/yr, lb/acre-yr) Total 'dry' yield (lb/yr, lb/acre-yr)
	Crop uptake of nitrogen, phosphorus, and ash	lb/acre-year

The draft permit requires daily monitoring of the volume of recycled water and SIW applied to each management unit. The monthly hydraulic loading rate to each management unit should be calculated by summing the daily irrigation volumes corresponding to each month and dividing by the associated acreage. The annual report should compare the monthly hydraulic loadings to the IWR of the crop for each month. The IWR should be calculated for each management unit using the ET_{Idaho} P_{def} data from the Jerome National Weather Service station corresponding to the type of crop grown and the efficiency of the irrigation system as described in Section 4.6.2.

The draft permit requires the permittee to calculate and report the following constituent loading rates for each management unit: annual total nitrogen and phosphorus loading rates from all sources, annual NVDS loading rates from recycled water and SIW, and average daily growing season COD loading rates from recycled water. Recycled water constituent loading rates to each management unit should be calculated based on the monthly concentrations, monthly volumes of water applied to each management unit, and the irrigated acreage of each management unit.

Constituent loadings from any fertilizer or waste solids applied to the site should also be reported. The PO should be updated to explain how constituent loading rates are calculated and include sample calculations.

The draft permit limits total nitrogen to 150% of the typical crop uptake and phosphorus loading to 125% of typical crop uptake. Typical crop uptake is defined as the median constituent crop uptake from the three most recent years the crop has been grown. For crops having fewer than three years of onsite crop uptake data, other crop yield data or nutrient content values may only be used if DEQ provides written approval before use. When three years of crop uptake data are available for a management unit, the typical crop uptake is to be calculated at the end of each growing season so the permittee knows the nitrogen and phosphorus loading limits prior to the start of the next growing season.

Crop nutrient uptake rates should be calculated based on the results of the plant tissue analysis, crop yield, and the harvested acreage for each management unit. For alfalfa, the nitrogen uptake should be adjusted for nitrogen fixation as discussed in Section 4.6.3. The PO should explain how crop uptake is calculated and include sample calculations.

The draft permit requires the recycled water to meet Class D disinfection requirements. The median number of total coliform organisms shall not exceed 230 per 100 mL, as determined from the bacteriological results of the last three samples for which analyses have been completed. No sample shall exceed 2,300 per 100 mL in any confirmed sample. The median number of total coliform organisms determined by the bacteriological results of the last three samples for which analyses have been completed is calculated by taking the current sample and prior two sample results and arranging them in order from least to greatest. The second sample result is the median of the last three samples.

7 Quality Assurance Project Plan

The QAPP outlines the procedures used by the permittee to ensure the data collected and analyzed meets the requirements of the permit.

To support its mission, DEQ is dedicated to using and providing objective, correct, reliable, and understandable information. Decisions made by DEQ are subject to public review and may at times, be subject to rigorous scrutiny. Therefore, DEQ’s goal is to ensure that all decisions are based on data of known and acceptable quality.

The QAPP is a permit requirement and must be submitted to DEQ as a standalone document for review and acceptance. The QAPP is used to assist the permittee in planning for the collection, analysis, and reporting of all monitoring data in support of the reuse permit and explaining data anomalies when they occur.

DEQ does not approve QAPPs, but reviews them to determine if the minimum EPA guideline requirements are met and that the reuse permit requirements are satisfied. DEQ does not approve

QAPPs because the responsibility for validating of the sampling data lies with the permittee's quality assurance officer and not with DEQ.

The format of the QAPP should adhere to the recommendations and references in the Assurance and Data Processing sections of the DEQ Guidance (DEQ 2007b, Section 7) and EPA QAPP guidance documents: *https://www.epa.gov/sites/production/files/2015-06/documents/g5-final.pdf*.

A QAPP for all permit required monitoring and reporting was submitted to DEQ on September 11, 2015 (JUB 2015c). DEQ has not issued a full review of the submitted QAPP; however, annual report reviews have noted that some of the analytical methods specified in the QAPP do not match the methods used by the contract laboratories (DEQ 2017a). The permittee should update the QAPP to specify the approved methods used by labs. Draft reuse permit M-076-05 requires the permittee to update and implement a QAPP that incorporates the monitoring and reporting requirements of the reuse permit.

8 Site Operation and Maintenance

An operator in responsible charge of a public wastewater system must hold a valid license equal to or greater than the classification of the system (IDAPA 58.01.16.203). A substitute responsible charge operator shall be designated to replace the responsible charge operator when the responsible charge is not available. For the permittee's wastewater collection, wastewater treatment, and reuse systems, the responsible charge and substitute responsible charge must possess the following Idaho wastewater operator licenses: Class I Wastewater Collection Operator (DEQ 2018d), Class I Wastewater Treatment Operator (DEQ 2018e), and Land Application Wastewater Treatment Operator.

The PTR states that the responsible charge operator for the permittee's wastewater collection, treatment, and reuse systems is Mr. Bob Bailey. Mr. Bailey currently possesses all required licenses to operate the facilities (Idaho 2009). A substitute responsible charge operator is not specified by the PTR. The permittee must ensure that there is a designated substitute responsible charge operator available. Updated operator licensure record forms should be submitted to DEQ to designate the responsible charge and substitute responsible charge operators.

The WWTP and reuse site are solely owned and operated by the permittee. The management units are currently leased by a farmer, who is in charge of planting, fertilizing, irrigating, growing, and harvesting the crop. A copy of the lease agreement was submitted with the response to the Completeness Determination (JUB 2017e). While the lease agreement does not specifically mention the permit, it does state that the tenant agrees to comply with the management plan and crop requirements established by DEQ land application guidelines. The agreement also states that the tenant will work cohesively with city employees in the application of effluent to meet DEQ requirements and regulations.

Third parties may only operate a reuse system if they are under the direct oversight of a properly licensed operator. The permittee's licensed operator must coordinate with the contract farmer to ensure the reuse system is properly operated in accordance with the reuse permit.

9 Compliance Activities

9.1 Status of Compliance Activities in Current Permit

Table 23 lists the compliance activities required by Section 3 of permit M-0076-04 (DEQ 2012d, Section 3, p. 5-7) and their current statuses.

As discussed in Section 4.3, DEQ has not yet approved the closure of the West Site (MU-076-02) required by compliance activity CA-076-06 due to previously elevated nitrate-nitrogen and phosphorus soil concentrations. Nitrate-nitrogen and phosphorus concentrations appear to have decreased to acceptable levels. No further monitoring of MU-076-02 is required. DEQ recommends that MU-076-02 be removed from the reuse permit.

As discussed in Section 4.5, the permittee did not complete compliance activity CA-076-02 that required the installation of a new ground water monitoring well network. The permittee has requested to continue monitoring the domestic wells (JUB 2017c, Table 6-5, p. 32). However, the domestic wells no not appear to be located or constructed to capture potential impacts to ground water resulting from the land application of recycled water to management units MU-076-03 and MU-076-04. DEQ recommends that draft reuse permit M-076-05 requires the permittee to submit an updated ground water monitoring plan within six months of permit issuance.

Table 23. Reuse permit M-0076-04 compliance activities and statuses.

Compliance Activity (CA)	Description	Due Date	Status
CA-076-01	Plan of Operation (PO) with Quality Assurance Project Plan (QAPP)	February 10, 2013	PO: Submitted: 7/2/2015 (JUB 2015b) Approved: 7/24/2015 (DEQ 2015b) QAPP: Submitted: 9/11/2015 (JUB 2015c) Review: Pending
CA-076-02	Ground Water Monitoring Network	November 10, 2012	***The permittee has not completed this compliance activity.***
CA-076-03	Waste Solids Management Plan (WSMP)	August 10, 2013	General Facility WSMP: Submitted: 7/2/2015 (JUB 2015b, Section 4.7) Approved: 7/24/2015 (DEQ 2015b) Lagoons 3 and 5 WSMP: Submitted: 6/28/2017 (JUB 2017d) Approved: 7/13/2017 (DEQ 2017b)
CA-076-04	Runoff Management Plan	Prior to applying wastewater, complete construction within 3 months of plan approval	Runoff Structure Design Plans: Submitted: 2/23/2012 (JUB 2012a) Approved: 3/13/2012 (DEQ 2012b) Construction completed in 2012. Runoff Management Plan: Submitted 7/2/2015 (JUB 2015b, Section 12) Approved: 7/24/2015 (DEQ 2015b)
CA-076-05	Lagoon #3 Closure	February 10, 2013	Decommissioned: 12/7/2012 (Wendell 2012) Plan Submitted: 12/18/2012 (Wendell 2012) Plan Approval: 2/14/2013 (DEQ 2013) The filling of the decommissioned lagoon with inert material is ongoing.
CA-076-06	West Site Closure	October 10, 2012 or before transfer of ownership	Reuse disconnected: 12/2012 (JUB 2014) Closure Plan Submitted: 10/14/2014 (JUB 2014) Review: 1/22/2015 (DEQ 2015a) Update Submitted: 7/27/2016 (JUB 2016c) Approval: Pending permit renewal.
CA-076-07	Storage Lagoon Design and Seepage Test Planning	November 10, 2012	Lagoon 4 Design Plans: Submitted: 5/29/2012 (JUB 2012b) Approved: 6/5/2012 (DEQ 2012a) Lagoon Seepage Test Procedure: Submitted: 4/21/2013 Approved: 4/25/2013 Lagoon 4 Seepage Test Report: Submitted: 2/5/2016 (JUB 2015a) Approved: Pending (Lagoon was tested again in 2020 following liner repair)
CA-076-08	Permit Renewal Application	February 10, 2017	Submitted: 6/27/2017 (JUB 2017c) Determined Complete: 8/11/2017 (DEQ 2017c)

9.2 Compliance Activities Required in New Permit

The following Compliance Activities are specified in Section 3 of draft reuse permit M-076-05:

1. Submit an updated PO that incorporates the requirements and conditions of the new reuse permit within 12 months of permit issuance. The PO should include all applicable items listed in the DEQ PO checklist.

2. Submit an updated QAPP for all permit required monitoring and reporting, including verification that the plan has been implemented by the permittee, within 12 months of permit issuance.

3. Complete lagoon seepage tests as specified in Table 14. Submit lagoon seepage rate test proposed schedule one year prior to the planned seepage test. Submit a procedure for performing the required seepage test at least 45 days prior to the planned seepage test. Submit the seepage test report within 90 days after completion of the seepage test.

4. Submit a Ground Water Monitoring Plan to DEQ for review and approval within six months of permit issuance. The plan shall include plans and specifications for a new ground water monitoring well network that will provide sufficient ground water quality data to characterize the impacts of reuse activities. The ground water monitoring well network shall be designed to monitor up and downgradient ground water conditions of the management units and the lagoons. The ground water monitoring well network shall be installed within two years after DEQ approval of the plan.

5. Submit a Disinfection Improvement Plan within 12 months of permit issuance. The plan shall summarize the historical operation and performance of the sodium hypochlorite disinfection system, identify any existing system deficiencies, and propose standard operating procedures to ensure compliance with the Class D recycled water disinfection requirements. If the permittee fails to meet the required disinfection limits at any time during the permit, immediate corrective action shall be taken to disinfect as required by the permit. If material modifications are required to improve disinfection, the permittee shall submit plans and specifications to DEQ for review and approval.

6. Schedule a pre-application conference one year prior to permit expiration.

7. Submit a permit renewal application 180 days prior to expiration of the existing permit.

10 Recommendations

DEQ recommends reuse permit M-076-05 be issued for five years. The permit specifies hydraulic and constituent loading limits and establishes monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance. A permit modification will be necessary following the installation of the new ground water monitoring well network.

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Appendix A. Site Maps

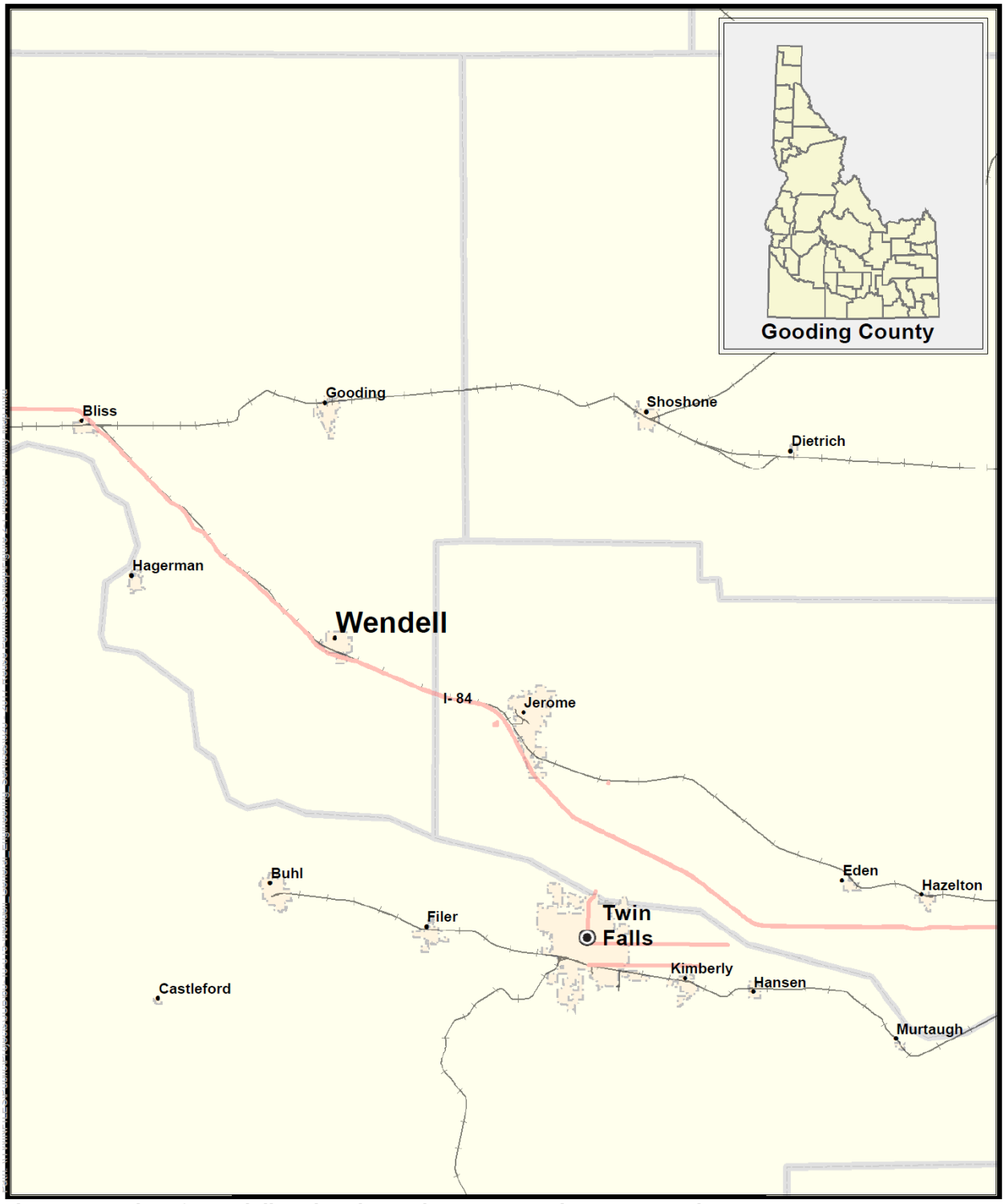

Figure A-1. City of Wendell regional map (JUB 2017c, Figure 2-2, p. 3).

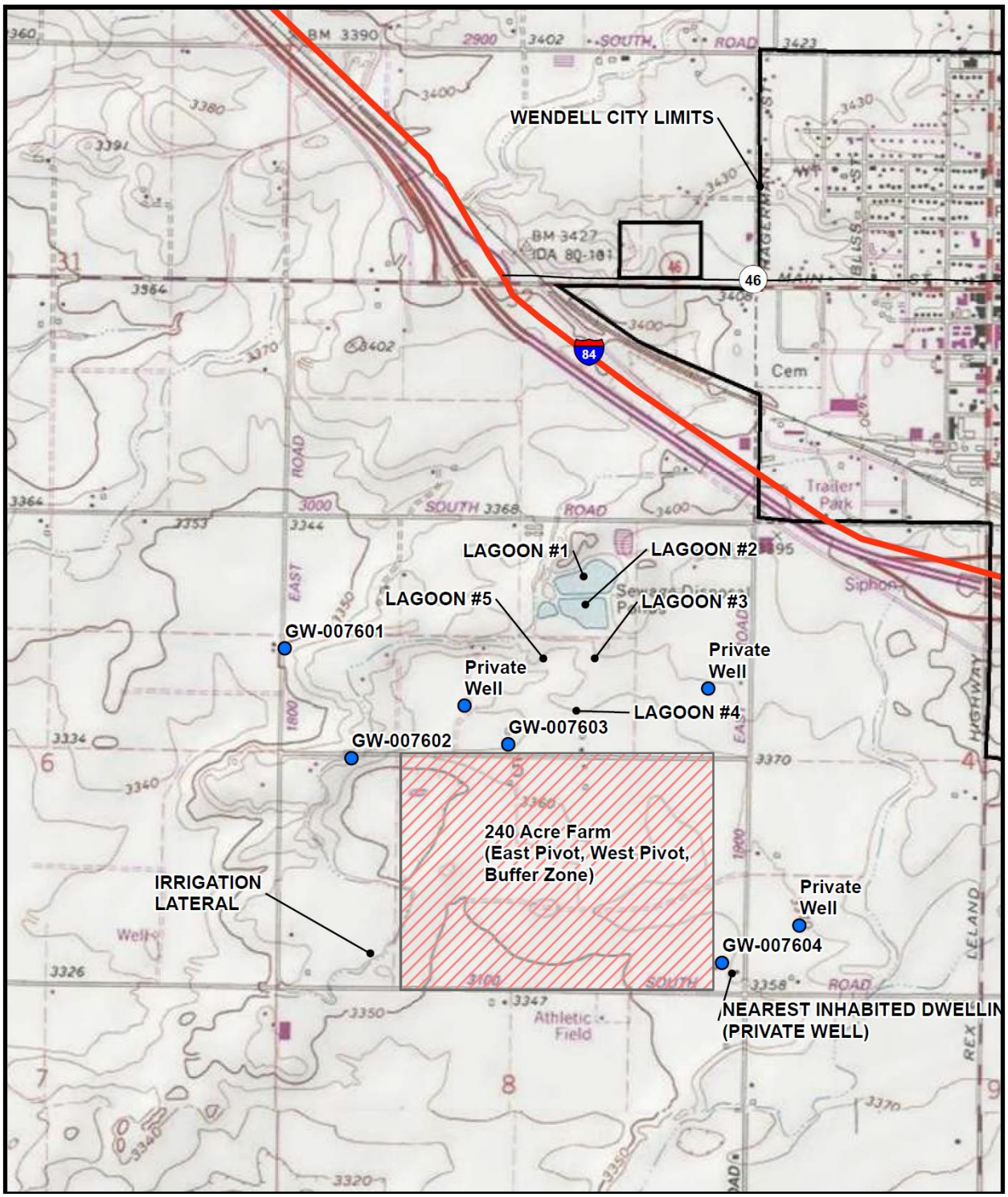

Figure A-2. City of Wendell vicinity map (JUB 2017c, Figure 2-2, p.4).

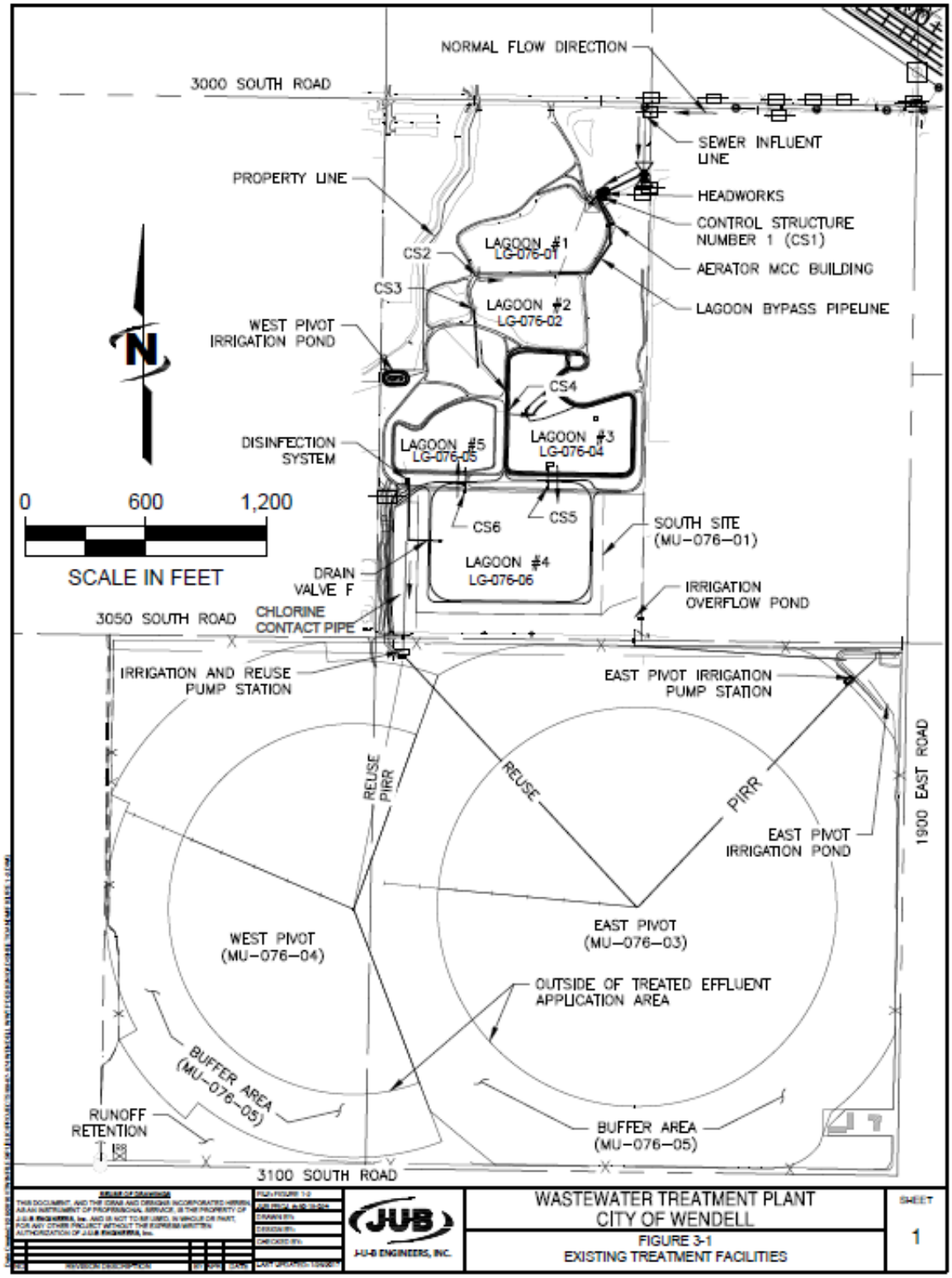

Figure A-3. City of Wendell WWTP and reuse site plan (JUB 2017c, Figure 3-1, p. 6).

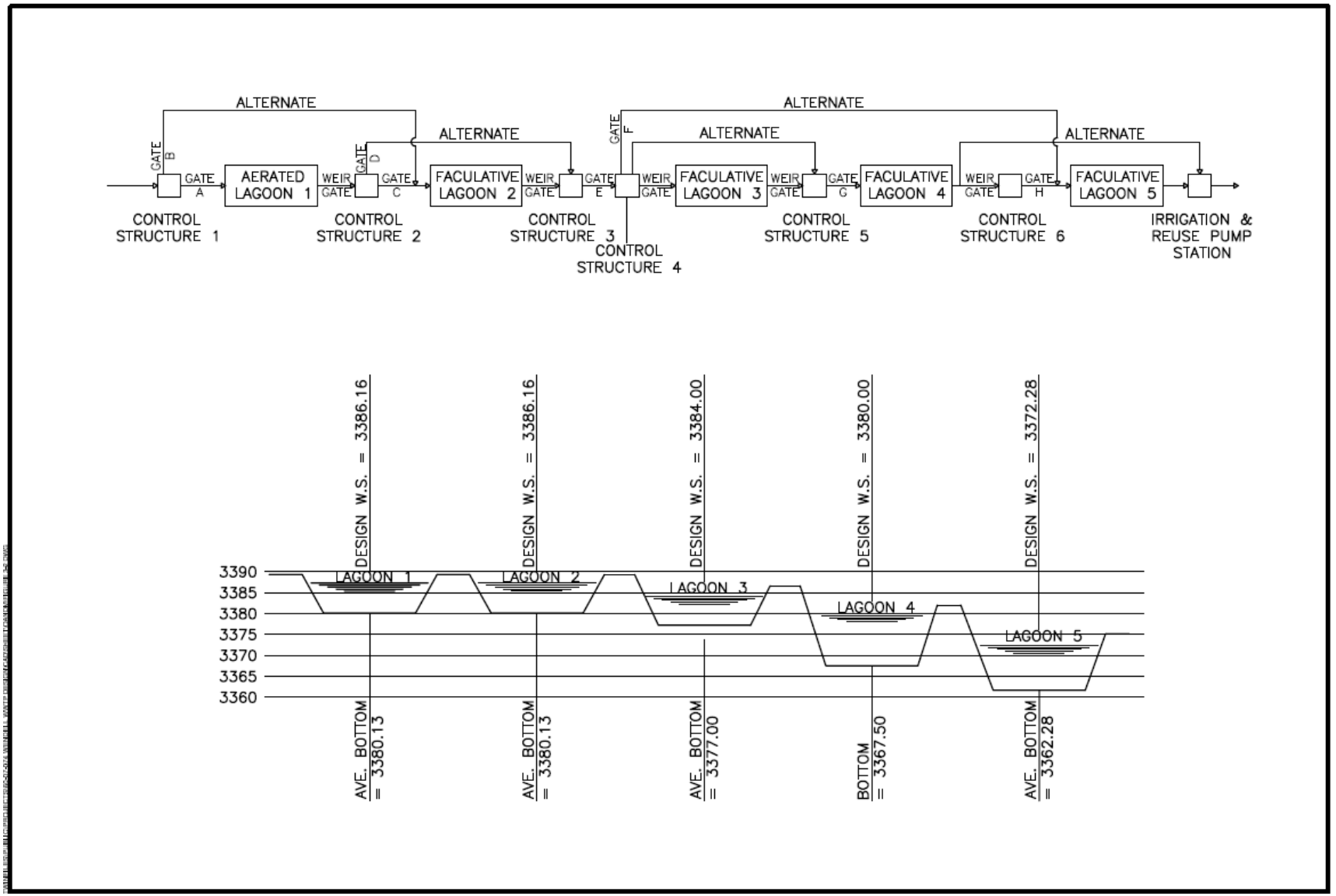

Figure A-4. City of Wendell wastewater treatment process flow diagram and hydraulic profile (JUB 207c, Figure 3-2, p. 7).

Figure A-5. City of Wendell monitoring well locations (JUB 2017c, Figure 6-1, p. 31).

Figure A-6. NRCS soil survey map (NRCS 2019).

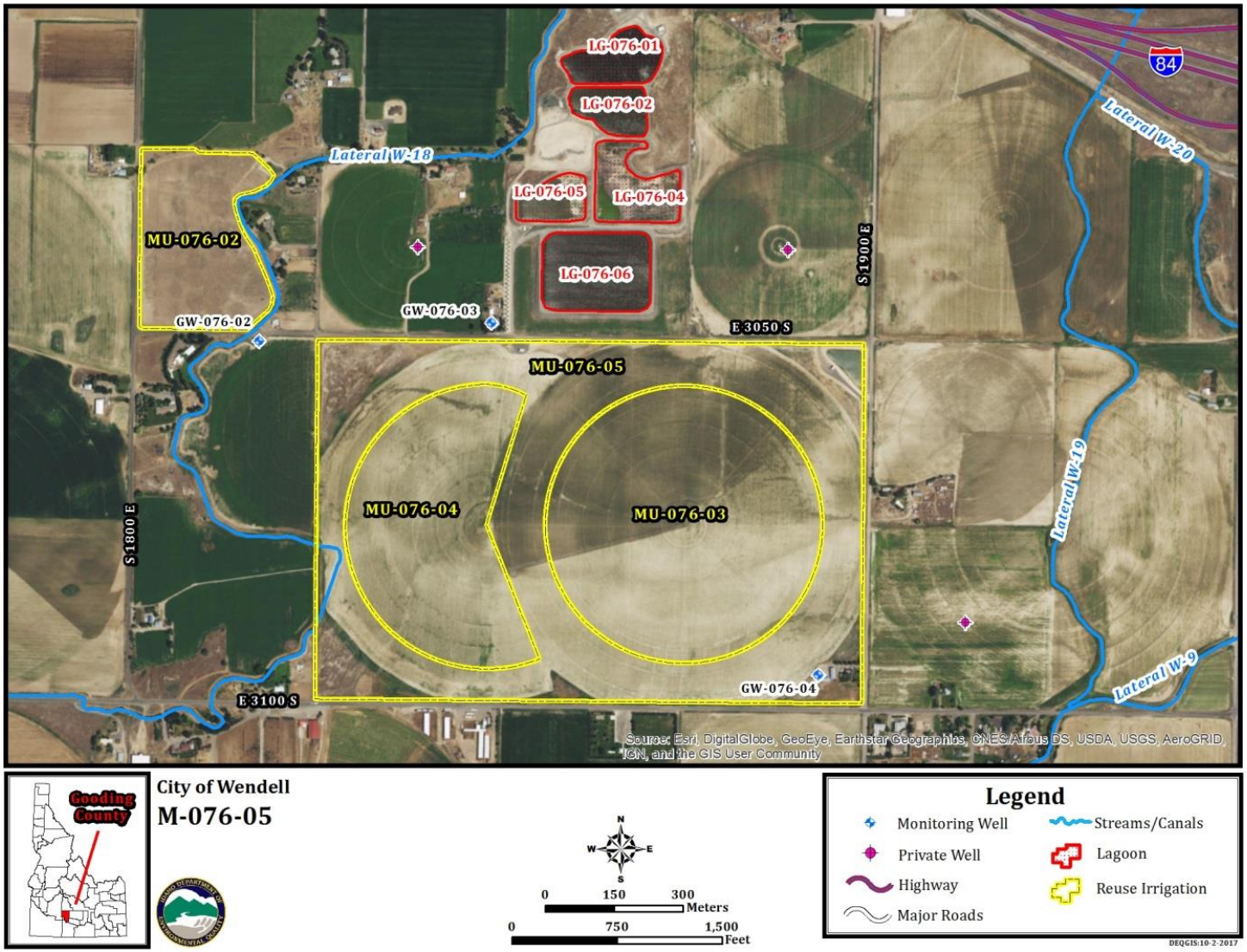

Figure A-7. City of Wendell reuse permit facility map.