M E M O R A N D U M

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DATE: February 10, 2016

SUBJECT: M-211-03 Avimor Water Reclamation Company (formerly LA-000211-02), Staff Analysis Supporting Reuse Permit Issuance

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Executive Summary

The Avimor Water Reclamation Company owns and operates a private municipal wastewater treatment plant (Avimor Water Reclamation Facility) and municipal Class B recycled water reuse facilities in the Avimor Planned Community, approximately ten miles north of the City of Eagle. Avimor Water Reclamation Company has a reuse permit to operate the reuse facilities from the Department of Environmental Quality. In 2014 the facility reused approximately 4.3 million gallons of recycled water. Recycled water is pumped from the Avimor Water Reclamation Facility to the reuse/disposal facilities. Avimor has four reuse/disposal options as follows:

- Landscaped common areas (Irrigation Areas) (reuse permit)
- Agricultural Areas (reuse permit)
- Rapid infiltration system (reuse permit)
- Surface water discharge under a National Pollutant Discharge Elimination System permit (Note: permit is in the draft stage and surface water discharge is not yet allowed)

AWRC submitted an application to renew their reuse permit on November 12, 2013. The permit application and AWRC's annual reports demonstrate that the facility has typically met permit conditions over the current permit cycle. As a result, staff recommends issuance of a reuse permit for a five (5) year term.

1 Introduction

The purpose of this memorandum is to satisfy the requirements of the *Recycled Water Rules*,

IDAPA 58.01.17 (IDAPA 2011) for issuing recycled water reuse permits. It briefly states the principal facts and significant questions considered in preparing the draft reuse permit for the Avimor Planned Community (Avimor) municipal wastewater treatment and reuse system owned and operated by the permittee, Avimor Water Reclamation Company (AWRC). It also provides a summary of the basis for the draft reuse permit conditions. The information presented in this memorandum is based on:

- Reuse Permit Renewal Application and the Technical Report (Pharmer Engineering 2013)
- Previous reuse permits for AWRC (LA-000211-01 [issued August 1, 2007] and LA-000211-02 [issued January 1, 2009])
- Staff analyses for the previous reuse permits, LA-000211-01 (Ogle 2007) and LA-000211-02 (Ogle 2008)

1.1 Permit Preparation Timeline

AWRC submitted a reuse permit renewal application and technical report (Renewal Application) for Avimor's reuse facilities on November 12, 2013. The Department of Environmental Quality (DEQ) determined the reuse permit application was complete and issued a "completeness determination" letter on December 13, 2013. The reuse permit application effective date is considered December 13, 2013. DEQ subsequently issued a preliminary letter of intent to issue a reuse permit on January 15, 2014.

AWRC will be provided the opportunity to review the draft staff analysis and preliminary draft reuse permit prior to these documents being presented for public comment. As required by IDAPA 58.01.17.44.07, the final draft reuse permit will be presented for a public comment period. After the comment period has closed, DEQ will provide written responses to all relevant comments and prepare a final reuse permit for Avimor's wastewater treatment and reuse facilities.

1.2 Background

Avimor is a master planned community located in the Boise area foothills, approximately ten miles north of the City of Eagle, on the east side of Highway 55. DEQ issued reuse permit number LA-000211-01 to the developer of Avimor, SunCor Idaho, Inc. (SunCor) on August 1, 2007 to operate a reuse system using recycled water from Avimor's private municipal wastewater treatment plant (Avimor Water Reclamation Facility [AWRF]). On January 1, 2009, DEQ issued a renewal of the reuse permit to SunCor (permit number LA-000211-02). The second reuse permit was issued shortly after the first reuse permit in order to incorporate conditions in approved compliance activities from the first permit and incorporate buffer distances to surface water that would be required by a U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) permit. SunCor applied for a NPDES permit to allow discharge of treated effluent from AWRF to Spring Valley Creek in

2006. A minor modification was made to the permit on October 6, 2010 to change the name of the permittee to the Avimor Water Reclamation Company and recognize the purchase of AWRC by Avimor Partners, LLC.

Until the summer of 2013, AWRF was not in full operation because wastewater flows from Avimor were not high enough to operate the AWRF effectively. When homes were connected to the wastewater collection system and construction of the AWRF was complete in 2008, the influent wastewater was screened and temporarily stored in the equalization basin at the AWRF. It was then pumped into a pumper truck and hauled to another wastewater treatment facility for treatment and disposal. Initially, the raw wastewater was hauled to the City Of Emmett wastewater treatment plant (WWTP). In February 2009, DEQ granted approval for AWRC to haul the raw wastewater to the Hidden Springs WWTP.

In spring 2013, AWRC determined that enough occupied homes were connected to the wastewater collection system to generate high enough quantities of wastewater to operate the AWRF. The AWRF began to treat the wastewater on June 24, 2013.

2 Site Location and Ownership

Presently, Village 1 of Avimor, which consists of 830 acres, is being developed and the reuse facilities are located in and around Village 1. Figure 2-1 is a vicinity map that shows the location of Avimor. Figure 2-2 is a site map that shows Avimor's boundary, the location of the AWRF, and the reuse facilities within Avimor's boundary.

As stated in Section 1.2, the permittee, AWRC, owns the AWRF and the reuse facilities.

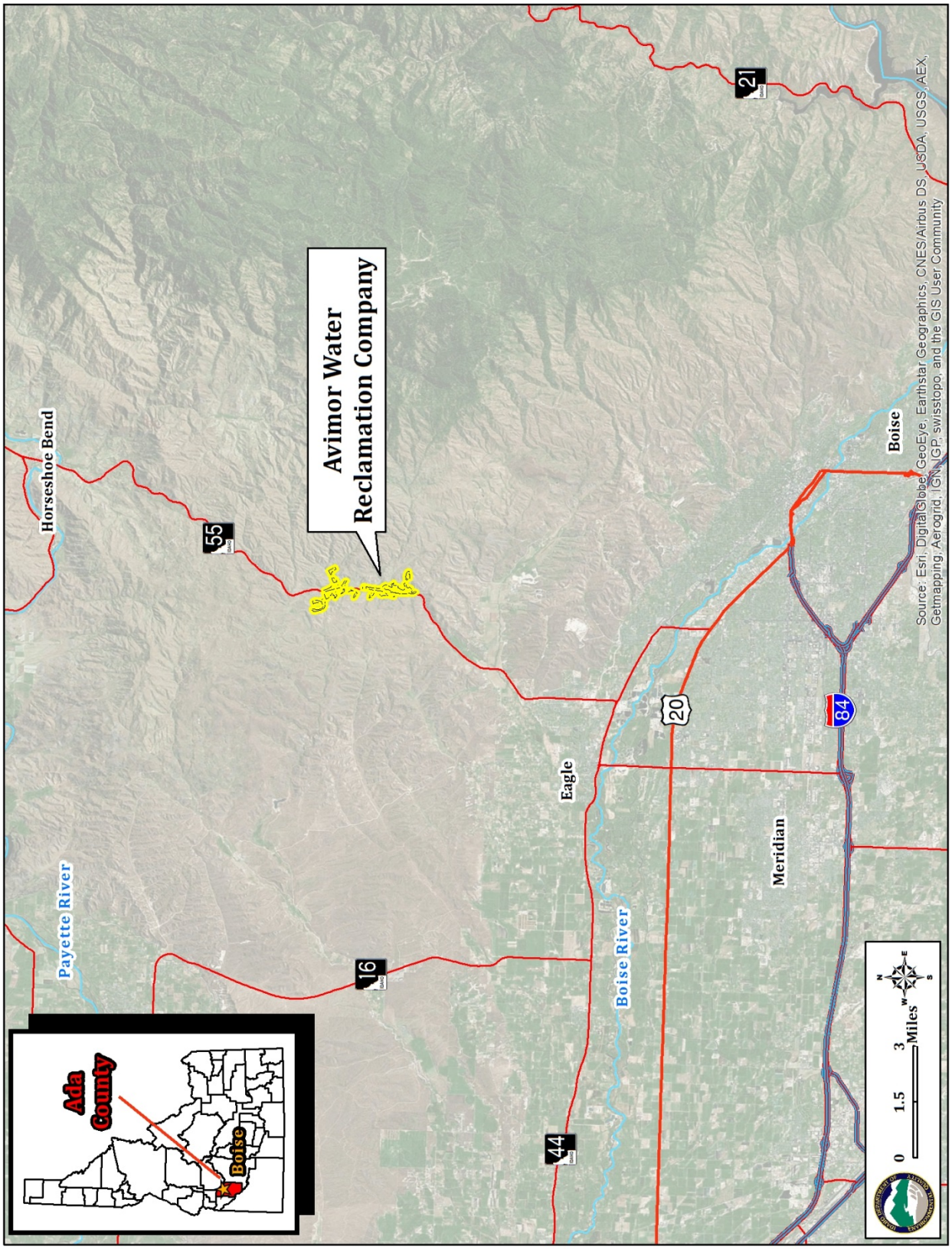

Figure 2-1 Vicinity Map

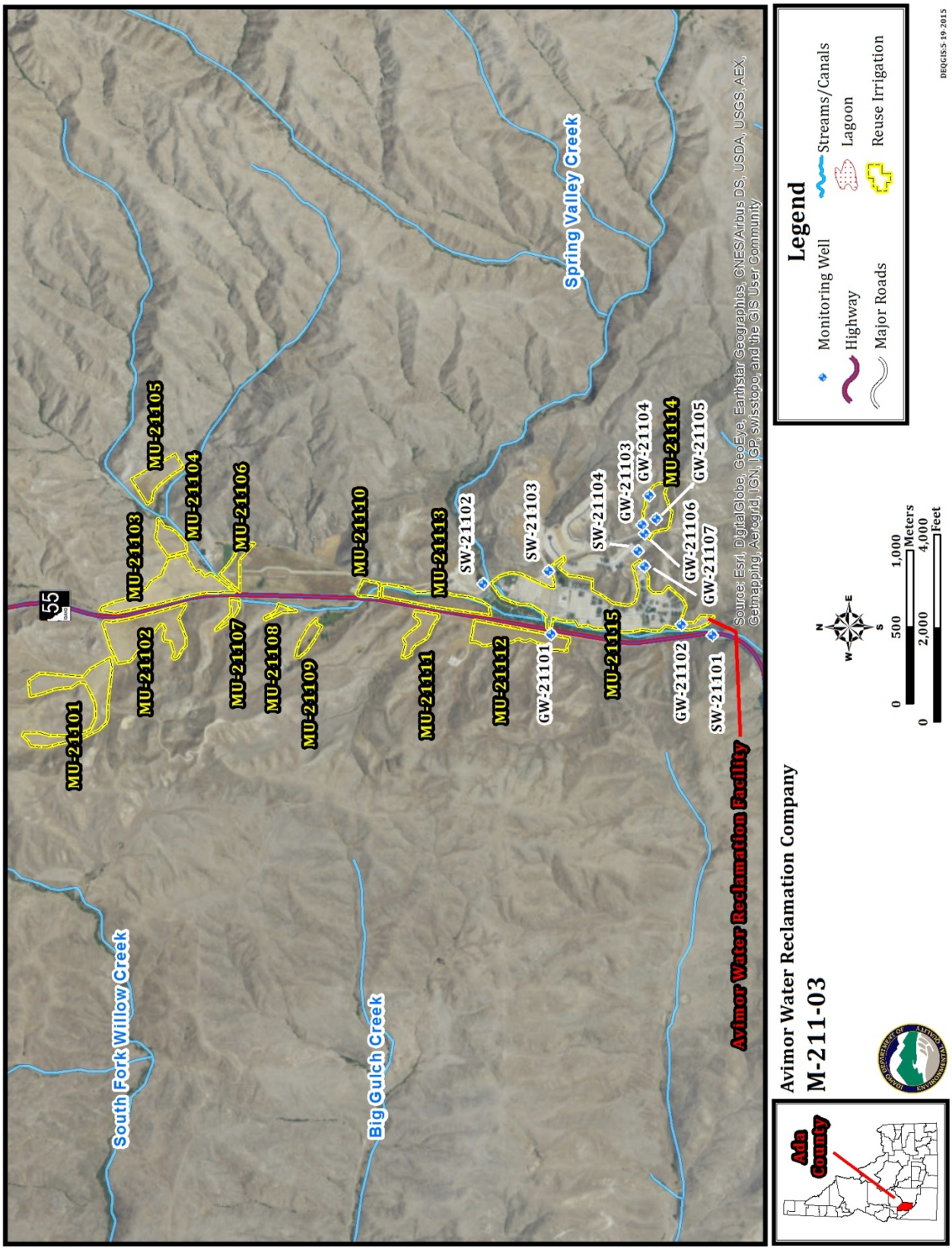

Figure 2-2 Site Map

3 Process Description

3.1 Wastewater Collection and Treatment System

The wastewater collection and treatment system discussed in the two previous staff analyses for the reuse permit has not changed. Wastewater from Avimor is collected in a wastewater collection system and is conveyed by gravity to an influent pump station at the AWRF. The design flows for AWRF are shown in Table 3-1.

Table 3-1 AWRF Design Flows

Flow Parameter	Flow (mgd)
Average Daily	0.33
Peak Daily	0.66
Peak Hour	1.16

Source: Renewal Application Documents (Operation and Maintenance Manual)

The Influent Pump Station pumps the raw wastewater into the AWRF, which consists of primary, secondary/tertiary, and disinfection treatment. The AWRF is designed to produce effluent that complies with the requirements of Class B recycled water (IDAPA 58.01.17 §§ 601.02 and 602.01 Tables 1 and 2).

Primary treatment consists of fine screening (3 mm fine screen drum screen), and a 71,000 gallon equalization basin. Screened wastewater is pumped from the equalization basin to secondary/tertiary treatment, which consists of an activated sludge membrane bioreactor (MBR) that incorporates biological nutrient removal (BNR) to reduce nitrogen levels and chemical addition for phosphorus reduction. The activated sludge MBR consists of an anoxic tank, followed by an aeration tank, followed by three membrane tanks.

Disinfection following the secondary/tertiary treatment is accomplished by chlorination. The membrane permeate is pumped into a chlorine contact chamber and sodium hypochlorite is metered into the chlorine contact chamber influent box. The chlorine contact chamber is an “L-shaped” channel, with a cross sectional area of 51 sq ft by 143 feet long on the south and west side of the AWRF. The chlorine contact chamber provides 30-minutes detention time at design peak daily flow.

The disinfected final effluent (Class B recycled water) flows over a weir into the effluent pump station and is pumped to the reuse facilities.

Waste activated sludge is pumped from the MBR tanks to an aerated sludge holding tank, thickened to 5% solids in a gravity belt thickener, and hauled off-site to a landfill. Screenings and grit are hauled off-site for disposal.

Figure A-1 in Appendix A presents the process flow diagram for the AWRF.

3.2 Reuse Facilities and Application Sites

Recycled water is pumped from the AWRF to the reuse/disposal facilities. Avimor has four permitted reuse/disposal options as follows:

- Landscaped common areas (Irrigation Areas) (reuse permit)
- Agricultural Areas (reuse permit)
- Rapid infiltration system (reuse permit)
- Surface water discharge under a draft NPDES permit

Each of these is described in more detail in the following subsections.

3.2.1 Irrigation of Landscaped Common Areas (Irrigation Areas)

A pressurized irrigation system distributes Class B recycled water for irrigating the landscaped common areas in Village 1 of Avimor during the growing season. The current reuse permit designated the landscaped common areas to be irrigated with Class B recycled water as one hydraulic management unit (MU), MU-21115, which is referred to as the Irrigation Areas. DEQ approved the plans and specifications for the MU-21115 irrigation system on September 27, 2007. Each of the Irrigated Areas in MU-21115 has specific types of irrigation systems and buffer distance requirements. A map showing the overall layout of MU-21115 from the Renewal Application is included as Figure A-2 in Appendix A. Figure A-2 shows the boundaries of MU-21115 and indicates the ten different types of landscaped common areas used in the Irrigation Areas. Figure A-2 also shows the type(s) of irrigation system used for each type of landscaped common area. Figure A-3 in Appendix A, also from the Renewal Application, presents a cross section of each of the ten types of landscaped common area that shows the buffer requirements, and describes the landscaping and irrigation system types. Figure A-2 indicates the total area of MU-21115 is 705,965.73 square feet (sq ft) or 16.2 acres.

Presently the pressurized irrigation system runs from the AWRF Effluent Pump Station throughout Village 1 of Avimor. The pressurized irrigation system includes two irrigation booster pump stations and has connections for supplemental irrigation water (SI). Figure A-4 in Appendix A presents a flow schematic of the pressurized irrigation system for MU-21115.

The Irrigation Areas (MU-21115) were irrigated exclusively with SI until recycled water became available in summer 2013. There are two sources of SI:

- Spring Valley Creek: Spring Valley Creek is diverted into the Town Lake and can be used for SI. Avimor Partners, LLC (the owner of AWRC) has a surface water right for 1.86 cfs for irrigation between March 15th and November 15th of each year. Avimor Partners, LLC must use this surface water right each year. A pump station on the Town Lake pumps SI into the pressurized irrigation system.

- Potable water: Potable water can also be utilized for SI. There is a pipe connection from the Avimor drinking water distribution system into Town Lake. The potable pipeline into Town Lake has a mechanical water meter.

The design of the Avimor reuse facilities includes an aboveground recycled water storage tank; however, this storage tank has not been constructed. The recycled water storage tank would be located a short distance southwest of the rapid infiltration basins at an elevation high enough to provide sufficient hydraulic grade for flow to the pressurized irrigation system and the rapid infiltration basins. Recycled water would be pumped from the AWRF Effluent Pump Station to the recycled storage tank and then flow into the pressurized irrigation system or to the rapid infiltration basins. The primary purpose of the recycled water storage tank is to provide storage of the Class B recycled water during the day to irrigate the landscaped common areas in MU-21115 during periods of non-use (i.e., during the night and early morning hours), as required by IDAPA 58.01.17. IDAPA 58.01.17.602.02 – Table 3 allows Class B recycled water to be used to irrigate parks, playgrounds, and schoolyards (e.g., landscaped common areas in MU-21115) during periods of non-use only. The recycled water storage tank was conceptually sized for approximately one day of recycled water flow, 315,000 gallons.

As the Avimor community expands and wastewater flows to the AWRF increase, AWRC will probably find it necessary to construct the recycled water storage tank to regulate the recycled water flows for irrigating MU-21115 during periods of non-use only. Plans and specifications for the tank construction will have to be submitted for review and approval by DEQ in accordance with Idaho Code §39-118 (Idaho Code 2011), IDAPA 58.01.17, and IDAPA 58.01.16, *Wastewater Rules* (IDAPA 2009). If this occurs during the permit cycle for the draft reuse permit, a modification will have to be made to the reuse permit.

3.2.2 Agricultural Areas

The reuse permit also allows reuse of the Class B recycled water on thirteen Agricultural Areas located north and west of Avimor during the growing season. The Agricultural Areas are shown in Figure 2-2. The Agricultural Areas are permitted to utilize slow rate land application of recycled water at agronomic rates on crops. The Agricultural Areas are not presently used to land apply recycled water because AWRC has not constructed any conveyances for recycled water to the Agricultural Areas, but AWRC plans to do so sometime in the future.

Table 3-2 shows each Agricultural Area, and its acreage, by number, from the Renewal Application documents and by the designated hydraulic management unit numbers from reuse permit LA-000211-02.

Table 3-2 Agricultural Areas

Hydraulic Management Unit Serial Number	Description	Acres
MU-21101	Agricultural Area 1	23.4
MU-21102	Agricultural Area 2	27.9
MU-21103	Agricultural Area 3	28.9
MU-21104	Agricultural Area 4	6.8
MU-21105	Agricultural Area 5	10.2
MU-21106	Agricultural Area 6	6.5
MU-21107	Agricultural Area 7	2.9
MU-21108	Agricultural Area 8	1.6
MU-21109	Agricultural Area 9	1.9
MU-21110	Agricultural Area 10	3.3
MU-21111	Agricultural Area 11	7.1
MU-21112	Agricultural Area 12	16.2
MU-21113	Agricultural Area 13	11.4
	TOTAL	148.1

Compliance Activity CA-211-02 in LA-000211-02 requires that plans and specifications for the construction of slow-rate land application irrigation facilities for the Agricultural Areas be submitted to DEQ for review and approval prior to any construction of these facilities (see Section 9.1.2). This compliance activity will be carried forward into the draft reuse permit as compliance activity CA-211-03 (see Section 9.2.3).

3.2.3 Rapid Infiltration System

As described in the Renewal Application documents, the rapid infiltration (RI) system, designated as hydraulic management unit number MU-21114 in reuse permit LA-000211-02, is the primary disposal option for Class B recycled water during the non-growing season.

The RI system consists of five basins located east of the main development in a drainage referred to as Broken Horn Draw. The RI basins are located on contour elevations with 10-feet of vertical separation. Figure A-5 in Appendix A, from the AWRF RI System record drawings, shows the layout of the RI basins and the recycled water distribution piping. According to the Renewal Application documents, soil and subsoils in this area are generally sandy soils with layers of sand/silt/clay extending over 100 feet in depth near the northwestern edge. Table 3-3 lists the five RI basins and the bottom (infiltration) area of each. The total infiltration area is 0.68 acres.

Table 3-3 Rapid Infiltration Basins (MU-211114)

RI Basin Number	Infiltration Area (acres)
1	0.28
2	0.09
3	0.18
4	0.10
5	0.03

The RI system can also be used as a secondary disposal area for Class B recycled water during the growing season when recycled water is primarily used for landscape irrigation.

3.2.4 Surface Water Discharge under an NPDES Permit

As stated in Section 1.2, a NPDES permit has been applied for, and the EPA is drafting the permit to allow discharge of treated wastewater effluent from the AWRF directly into Spring Valley Creek near the AWRF. The NPDES permit will allow direct surface water discharge of the AWRF treated effluent to Spring Valley Creek from October 1st through March 31st; direct surface water discharge to Spring Valley Creek is prohibited from April 1st through September 30th. Surface water discharge will only be used if recycled water cannot be applied to any of the reuse sites (MU-21101through MU-21115).

4 Site Characteristics

4.1 Site Management History

According to the Renewal Application documents, the land use within the Avimor boundary has historically consisted of dryland grazing and limited agricultural production of alfalfa hay. Land use within 1 mile of Avimor has been primarily dryland grazing to the north, east, and west.

4.2 Climatic Characteristics

The climate in the Avimor area is typical for a high desert area. The summers are hot and dry and the winters are mild. Climatic data for National Weather Service Station 101017 (Boise 7N) (Latitude 43° 44' N, Longitude 116° 12' W, approximately 4 miles southeast of Avimor) (NOAA 2014) is presented below:

- Average annual temperature of 49.9°F
- Maximum monthly average temperature of 88.3°F (July)
- Minimum monthly average temperature of 22.5°F (January)
- Average annual precipitation of 18.69 inches

- 4,412 growing degree days (40°F threshold, total monthly average growing degree days during irrigation for April through October) (Western Regional Climate Center website (WRCC 2014))

4.3 Soils

According to the Renewal Application documents, soils on the Village 1 site consist of Brett-Ladd loams, Goose Creek loams, and Quincy-Brett Complex. Goose Creek Loam is the dominate soil type along Spring Valley Creek, extending to depths between 9 and 60 inches. The soils are generally characterized as possessing low strength, high shrink-swell potential, and slow percolation rates. Permeability tests performed at test pits in 2006 indicated that higher permeability soils are found in the RI basin area.

Soil monitoring was conducted in the Irrigation Areas (MU-21115) in the late fall of 2013 and 2014 and was reported in the 2013 and 2014 AWRC Reuse Permit Annual Reports (Pharmer Engineering 2013, Pharmer Engineering 2014) (Annual Report(s)). Table 4-1 presents the data.

Table 4-1 2013 and 2014 Soil Monitoring Data

Location	Date	Depth	Electrical Conductivity (umhos)	Nitrate-N (mg/kg)	Ammonium-N (mg/kg)	pH	Extractable Phosphorus (mg/kg)
MU-21115	12/17/2013	0-12"	220	0.8	5.31	6.7	19.8
MU-21115		12-24"	363	0.4	6.23	7.2	18.0
MU-21115		24-36"	383	0.8	7.70	7.3	15.5
MU-21115	11/5/2014	0-12"	293	0.7	2.44	7.1	18.9
MU-21115		12-24"	331	1.3	1.79	7.4	33.2
MU-21115		24-36"	263	1.1	2.65	7.1	26.8

Source: 2013 and 2014 Annual Reports

The nitrate, ammonium, and electrical conductivity levels shown in Table 4-1 are all considered low. The soil pH readings are typical for southern Idaho. Phosphorus levels are acceptable; the DEQ Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater (DEQ 2007) (DEQ Reuse Guidance) states that plant available phosphorus levels, for soils with ground water deeper than 5 feet below the ground surface and a likely ground water interconnection with surface water, should be less than 30 parts per million (ppm).

4.4 Surface Water

Avimor is located along the main channel of Spring Valley Creek in the lower portion of the Spring Valley Creek watershed basin. According to the Renewal Application documents, approximately 90 percent of the watershed basin develops within or upstream of the Avimor site from several intermittent and ephemeral tributaries. The major drainage channels are comprised of the main channel of Spring Valley Creek and the North Fork of Spring Valley Creek. An ephemeral tributary, called Burnt Car Draw, drains approximately the southern half

of the Avimor site. All three of these include areas that are potential jurisdictional wetlands.

The current reuse permit requires surface water monitoring. Table 4-2 presents the surface water monitoring data from the 2013 and 2014 Annual Reports. Table 4-2 shows the monitoring location with a description of the location in addition to the following water quality parameters: ammonia nitrogen, nitrate + nitrite nitrogen, total Kjeldahl nitrogen, total phosphate, ortho-phosphate, chloride, and total suspended solids. Figure 2-2 shows the surface water quality monitoring locations by surface water monitoring serial numbers.

Table 4-2 Surface Water Quality Data from 2013 and 2014 Annual Reports

Serial Number	Location	Date	Ammonia Nitrogen (mg/L)	Nitrate+Nitrite Nitrogen (mg/L)	TKN (mg/L)	Total Phosphate (mg/L)	Ortho-Phosphate (mg/L)	Chloride (mg/L)	Total Suspended Solids (mg/L)
2013									
SW-21101	WQ-1: west of Spring Valley Creek; downstream of confluence of Spring Valley Creek and North Fork of Spring Valley Creek; near entrance to Avimor off Hwy. 55	4/22/2013	<0.04	0.02	0.25	0.17	0.13	11	<3
		11/12/2013	<0.04	0.55	0.26	0.18	0.15	18	<3
SW-21102	WQ-2: Spring Valley Creek upstream of Phase 1; below existing weir upstream of McLeod Way	4/22/2013	<0.04	0.15	0.29	0.10	0.07	3	<3
		11/12/2013	<0.04	2.67	0.18	0.19	0.20	6	<3
SW-21103	WQ-3: Ephemeral drainage along Burnt Car Draw; downstream of Broken Horn Draw; east of intersection of Avimor Drive and McQuarrie Way	4/22/2013	Dry - No sample collected						
		11/12/2013							
SW-21104	WQ-4: Intermittent spring west of rapid infiltration basins	4/22/2013	Dry - No sample collected						
		11/12/2013							
2014									
SW-21101	WQ-1: west of Spring Valley Creek; downstream of confluence of Spring Valley Creek and North Fork of Spring Valley Creek; near entrance to Avimor off Hwy. 55	4/17/2014	<0.04	0.27	0.32	0.19	0.15	6	<3
		11/20/2014	<0.04	0.44	0.21	0.18	0.18	21	<3
SW-21102	WQ-2: Spring Valley Creek upstream of Phase 1; below existing weir upstream of McLeod Way	4/17/2014	<0.04	0.35	0.35	0.11	0.09	1	<3
		11/20/2014	<0.04	1.85	0.37	0.23	0.21	7	<3
SW-21103	WQ-3: Ephemeral drainage along Burnt Car Draw; downstream of Broken Horn Draw; east of intersection of Avimor Drive and McQuarrie Way	4/17/2014	Dry - No sample collected						
		11/20/2014							
SW-21104	WQ-4: Intermittent spring west of rapid infiltration basins	4/17/2014	Dry - No sample collected						
		11/20/2014							

4.5 Ground Water and Hydrogeology

According to the Renewal Application documents, there are two significant ground water regions beneath the Avimor site: a shallow aquifer beneath the floor of Spring Valley (Spring Valley Aquifer) and a deeper aquifer located under the upland areas to the east of Spring Valley. There is a third aquifer located immediately to the west of Spring Valley, referred to as the Sandy Hill Aquifer. Ground water flow direction is generally toward the west along Burnt Car Draw and to the south along the Spring Valley Creek. The gradient is steeper in the area of the RI basins and flatter to the west toward Spring Valley.

A summary of ground water depth data from the monitoring wells included in the reuse permit is presented in Table 4-3. The data presented in the table are the median values of the 2009-2014 Annual Reports data (Pharmer Engineering 2009) (OMCS 2010, OMCS 2011, OMCS 2012).

Table 4-3 Ground Water Depth Data from 2009-2014 Annual Reports

Serial Number	Location	Approx. Ground Surface Elev (ft msl)	Measuring Point Elev[a] (ft msl)	Date	Water Table	
					Median Water Depth[b] (ft)	Median Water Surface Elev (ft msl)
GW-021101	MW-1	3217	3219.98	Spring	16.77	3203.21
				Fall	17.73	3202.26
GW-021102	MW-6R	3172	3171.69	Spring	15.39	3156.31
				Fall	16.11	3155.59
GW-021103	RAMW-7	3320	3322.56	Spring	92.20	3230.36
				Fall	91.26	3231.31
GW-021104	RAMW-8	3360	3361.50	Spring	21.89	3339.62
				Fall	23.54	3337.97
GW-021105	RAMW-9	3338	3341.18	Spring	17.84	3323.34
				Fall	21.26	3319.92
GW-021106	RAMW-10	3321	3322.13	Spring	95.28	3226.85
				Fall	94.90	3227.23
GW-021107	RAMW-11	3233	3232.57	Spring	45.10	3187.48
				Fall	44.27	3188.30

a Elevation from 2008 Revised Monitoring Plan
b Below the top of the casing

Ground water depth data from the Renewal Application documents (2006 Preliminary Technical Report) are presented in Table 4-4. These include monitoring wells that are included in the reuse permit and other monitoring wells (MW-2 through 5) that were used to develop ground water data for the original reuse permit application. Some or all of monitoring wells MW-2 through 5 may be included in future reuse permits as Avimor develops.

The locations of the reuse permit ground water monitoring wells (listed in Table 4-3) are shown in Figure 2-2. Figure A-6 in Appendix A (from the Preliminary Technical Report in the Renewal Application) shows the locations of all the monitoring wells in Table 4-4.

In relation to the RI system, RAMW-8 is upgradient, RAMW-7 is downgradient, slightly to the north, RAMW-9 is crossgradient, slightly to the south, RAMW-10 is downgradient to the west, and RAMW-11 is downgradient further to the west.

The ground water data shows that the ground water depths are approximately 10 to 25 ft below the ground surface for most of the monitoring wells, except for those downgradient to the north and west of the RI system. The ground water depths in the wells north and west of the RI system are approximately 90 ft below the ground surface. As stated previously, the ground water gradient is much steeper going west from the RI system.

Table 4-4 Ground Water Depth Data from the 2008 Revised Monitoring Plan

	Measuring Point Elevation (ft msl)	Water Level Elevations (ft msl)									
		4/3/2006	6/7/2006	6/27/2006	8/11/2006	8/18/2006	11/15/2006	12/18/2006	2/23/2007	5/23/2007	11/30/2007
MW-2	3345.17	3335.97	3322.08	Dry	Dry	--	--	--	--	--	--
MW-3	3279.18	3257.77	3263.18	3262.67	3260.71	--	3260.40	--	3262.00	3260.83	3258.62
MW-4	3248.03	--	3239.65	3239.43	3238.87	--	3238.43	--	3238.80	3238.42	3237.43
MW-5	3285.03	3272.73	3272.86	3270.65	3268.99	--	--	--	--	--	--
MW-1	3219.98	3204.89	3203.14	3202.89	3202.13	--	--	--	3202.88	3202.96	3201.78
MW-6[a]	3174.49	3161.73	3161.17	3160.81	3160.13	--	--	--	--	--	--
RAMW-7	3322.56	--	--	--	--	--	3229.28	3229.02	--	3228.50	3228.54
RAMW-8	3361.50	--	--	--	--	3339.19	3337.74	--	--	3336.32	3335.48
RAMW-9	3341.18	--	--	--	--	3325.31	3324.38	--	--	3323.22	3317.74
RAMW-10	3322.13	--	--	--	--	--	--	--	--	3224.64	3224.44

a MW-6 was replaced by MW-6R

Table 4-5 presents ground water quality data from the Annual Reports for the reuse permit monitoring wells. The data presented in Table 4-5 are the maximum and median values for each constituent from the 2009 through 2014 Annual Reports. Most of the data values are low and below the limits in the *Ground Water Quality Rule*, IDAPA 58.01.11 (IDAPA 2011), except for nitrates. The maximum nitrate level is 13.50 mg/l, from RAMW-8 (GW-21104), which exceeds the nitrate ground water standard of 10 mg/L in IDAPA 58.01.11.200.01.a. This value is from spring 2010. The next highest value in the reporting period from GW-21104 is 10.30 mg/L nitrate (spring 2014); the median value for GW-21104 is 6.83 mg/L nitrate and the average value is 7.58 mg/L nitrate over the reporting period. GW-21104 is an upgradient monitoring well. The monitoring wells downgradient of GW-21104 all have lower nitrate levels. The highest nitrate level in a downgradient well was in MW-6R (GW-21102), located near Highway 55, near the AWRF. GW-21102 has a maximum nitrate level of 10.60 mg/L (fall 2010), slightly higher than the ground water standard. The next highest nitrate value at GW-21102 is 10.2 mg/L (fall 2012). The median nitrate value for GW-21102 was 8.03 mg/L. It should be noted that there has been only a minimal amount of recycled water land applied for irrigation or applied to the RI system. The values presented are background ground water quality data.

Table 4-5 Ground Water Quality Data from 2009-2104 Annual Reports

Serial Number	Location	Date	Total Kjeldahl Nitrogen (mg/L)		Nitrate (mg/L)		Ammonia (mg/L)		Total Phosphate (mg/L)		TDS (mg/L)		Chloride (mg/L)	
			Maximum	Median	Maximum	Median	Maximum	Median	Maximum	Median	Maximum	Median	Maximum	Median
GW-021101	MW-1	Spring	0.15	0.13	8.98	3.57	0.04	0.04	0.30	0.23	316	284	17	14
		Fall	0.31	0.12	6.09	2.99	0.04	0.04	0.33	0.25	324	281	20	15
GW-021102	MW-6R	Spring	1.65	0.27	6.48	3.57	0.24	0.04	1.10	0.30	365	261	41	6
		Fall	0.45	0.28	10.60	8.03	0.04	0.04	0.22	0.19	428	308	18	8
GW-021103	RAMW-7	Spring	3.81	0.10	2.12	1.78	0.20	0.04	2.87	0.38	176	150	5	4
		Fall	0.71	0.11	2.15	1.49	0.06	0.04	0.93	0.31	176	151	4	4
GW-021104	RAMW-8	Spring	0.22	0.10	13.50	9.11	0.04	0.04	0.19	0.13	390	321	7	4
		Fall	0.25	0.10	7.04	6.50	0.07	0.04	0.21	0.12	306	247	15	4
GW-021105	RAMW-9	Spring	0.28	0.22	0.80	0.74	0.04	0.04	0.12	0.11	114	88	1	1
		Fall	0.31	0.31	0.82	0.82	0.06	0.06	0.23	0.23	66	66	2	2
GW-021106	RAMW-10	Spring	0.10	0.10	1.75	1.45	0.04	0.04	0.19	0.14	166	122	4	3
		Fall	0.12	0.10	3.50	1.42	0.05	0.04	0.15	0.13	158	124	4	3
GW-021107	RAMW-11	Spring	0.16	0.10	4.44	3.95	0.04	0.04	0.45	0.33	180	156	4	3
		Fall	0.19	0.10	6.31	4.27	0.04	0.04	0.29	0.27	214	166	4	3

4.6 Wastewater / Recycled Water Characterization and Loading Rates

4.6.1 Wastewater / Recycled Water Characterization

The AWRF is designed to produce effluent that complies with the requirements of Class B recycled water (IDAPA 58.01.17 §§ 601.02 and 602.01 Tables 1 and 2). The draft reuse permit classifies the effluent as Class B Municipal recycled water. Class B recycled water requires limits on wastewater constituents and water quality parameters on the AWRF effluent. The AWRF began fully treating wastewater influent on June 24, 2013. The monthly and annual average wastewater parameters and constituent concentrations for the equalization basin effluent, the membrane permeate and the recycled water from the 2014 Annual Report are shown in Table 4-6. 2014 is the first year with a full year of data (January through December).

The draft reuse permit continues the following limits from the current permit:

- Turbidity, prior to disinfection (monitoring point WW-21103): The daily arithmetic mean of all measurements of turbidity cannot exceed 2 NTU. Turbidity cannot exceed 5 NTU at any time. See the discussion below in Section 4.6.1.1.

- Total coliform (monitoring point WW-21104): The median number of total coliform organisms cannot exceed 2.2 total coliform organisms/100 mL, as determined from the bacteriological results of the last 7 days for which analyses have been completed. No single confirmed sample can exceed 23 total coliform organisms/100 mL.

- 5-day Biochemical Oxygen Demand (BOD_5) (monitoring point WW-21104): The monthly arithmetic mean of all measurements of BOD_5 cannot exceed 5.0 mg/L.

- Total nitrogen when discharging any wastewater effluent to the RI system (MU-21114) (monitoring point WW-21104): The monthly arithmetic mean of all measurements of total nitrogen cannot exceed 8.0 mg/L.

The draft permit includes the following limits, which have been modified from the current permit.

- Disinfection Requirements: The total chlorine residual at the point of compliance (monitoring point WW-21104) cannot be less than one (1) mg/L after a minimum contact time of 30 minutes at peak flow. The current permit does not specify a contact time.

- Total phosphorus when discharging any wastewater effluent to the RI system (MU-21114) (monitoring point WW-21104): The monthly arithmetic mean of all measurements of total phosphorus cannot exceed 0.35 mg/L. See Section 4.6.3.3.3 for a detailed discussion.

Table 4-6 Wastewater Water Quality Parameter and Constituent Data from 2014

	Equalization Basin	Recycled Water										
		Turbidity[a]										
Month	BOD (mg/L)	Average (NTU)	Maximum (NTU)	BOD[b] (mg/L)	COD[b] (mg/L)	TKN[b] (mg/L)	Nitrate[b] (mg/L)	Total Nitrogen[b] (mg/L)	Ammonia[b] (mg/L)	Total Phosphorus[b] (mg/L)	Free Chlorine Residual[b] (mg/L)	Total Coliform[b] (MPN/100 ml)
January	73	1.23	3.00	<5	64.5	6.09	0.38	6.47	9.30	0.14	0.38	<2
February	398	0.15	0.23	16	58.2	3.33	0.03	3.36	3.60	0.06	0.34	<2
March	257	0.16	1.52	<3	34.2	12.60	<0.02	12.60	11.40	<.05	0.41	<2
April	259	0.05	0.12	<3	25.4	5.11	0.09	5.20	8.18	0.07	0.27	<2
May	91	0.13	0.41	<3	<20	1.00	2.84	3.84	<0.04	0.99	1.88	<2
June	<57	0.08	0.10	<3	<20	0.66	2.68	3.34	<0.04	3.52	2.32	<2
July	<93	0.09	0.19	<3	<20	0.75	3.44	4.19	<0.04	4.75	2.31	<2
August	126	0.11	0.17	<3	<20	0.85	3.30	4.15	<0.04	5.49	5.09	<2
Sept.	226	0.09	0.12	<3	<20	0.52	3.13	3.65	0.08	4.43	3.84	<2
October	254	0.11	0.14	<3	<20	0.42	2.90	3.32	<0.04	3.68	2.44	2.3
November	290	0.15	0.31	<3	29.7	0.59	4.87	5.46	<0.04	0.12	0.36	<2
December	158	0.25	0.73	<3	<20	0.39	0.37	0.76	<0.04	0.07	0.54	<2
Monthly Average	**213**	**0.13**	**0.28**	**4.25**	**29.33**	**0.59**	**3.00**	**3.59**	**2.74**	**3.09**	**2.43**	**<2**

a Sample location - Membrane Permeate Pump discharge (WW-021102)

b Sample location - Reuse Pump Station discharge (WW-021104)

Source: 2014 Annual Report

4.6.1.1 Turbidity Limits

The current reuse permit turbidity limits are based on the 2007 version of IDAPA 58.01.17, at that time titled *Rules for the Reclamation and Reuse of Municipal and Industrial Wastewater* (IDAPA 2007). The turbidity limits in the current version of IDAPA 58.01.17 for Class B recycled water are less stringent than the 2007 version. The current rules state that the daily arithmetic average of all measurements of turbidity cannot exceed 5 NTU and the turbidity cannot exceed 10 NTU at any time for granular or cloth media filters (IDAPA 58.01.17.602.a – Table 2) (Table 2 in §602.a does not include membrane filters for Class B recycled water). The microfiltration membranes in the AWRF MBR, with an average pore size 0.4 µm, are designed to achieve a lower turbidity than the Class B recycled water turbidity limits in the current Recycled Water Rules. The turbidity limits in the current reuse permit are continued in the draft reuse permit.

The turbidity data from the 2013 and 2014 Annual Reports support these limits. In 2013, the monthly daily arithmetic average turbidity was 0.61 NTU (July through December). The daily arithmetic average exceeded 2 NTU twice in July and eleven times at the end of December. No turbidity measurement exceeded 5 NTU. The 2013 Annual Report reported that the increased turbidity was likely due to the WWTP's batch operating process (due to low wastewater influent flows) when water is recycled internally while the turbidimeters are still sampling. In 2014 the monthly daily arithmetic average turbidity was 0.22 NTU for the full year (January through December). In 2014, the daily arithmetic average turbidity exceeded 2 NTU eight times, all between January 1st and January 10th. The highest daily arithmetic average turbidity value in 2014 after January 10th was 1.52 NTU on March 21st. Following this, the highest daily arithmetic average turbidity value was 0.73 NTU on December 31st. No turbidity measurement exceeded 5 NTU in 2014.

4.6.2 Hydraulic Loading Rates

This subsection addresses the hydraulic loading rates for the application of recycled water and supplemental irrigation water (SI) for the Irrigation Areas (MU-21115), the Agricultural Areas (MU-21101 through 21113), and the RI system (MU-21114).

4.6.2.1 Irrigation Areas (MU-21115)

The current reuse permit requires that the hydraulic loading rate on the Irrigation Areas be no greater than the irrigation water requirement (IWR). The draft reuse permit requires that the hydraulic loading be substantially at the IWR. The IWR is based on the irrigation water demand (IR_{net}) of a specific crop for specific conditions (climatic and soil conditions) and the method of applying the irrigation water.

The IWR is estimated using the equation:

$$IWR = IR_{net}/E_i$$

where,

IR_{net} = Net Irrigation Requirement
E_i = Irrigation System Efficiency (percentage)

Also,

$IR_{net} = P_{def}$

where,

P_{def} = Precipitation Deficit

Estimates of the P_{def} for specific crops and locations in Idaho can be found on the ETIdaho 2012 – University of Idaho Evaporation and Consumptive Irrigation Water Requirements for Idaho website (Kimberly Research and Extension Center, University of Idaho 2012) (ETIdaho2012).

The irrigation system efficiency (E_i) can be based on values found in the literature. Table 4-12 of the DEQ Reuse Guidance lists the E_i for different types of irrigation systems.

The draft reuse permit requires that each year in the annual report, AWRC determine and report what the IWR is for each irrigated MU and compare it to the hydraulic loadings actually applied to the associated MU.

The Irrigation Areas are landscaped with turf grass, shrubs, trees, some native grasses, and rock mulch, as shown in the cross sections for the types of landscaped common areas in Figure A-3. From Figure A-2 and Figure A-3 it can be estimated that turf grass is the largest component of the types of vegetation in the Irrigation Areas. Based on this, it would be reasonable to base the IWR on turf grass. AWRC did base the IWR for the Irrigation Areas on turf grass in the 2013 and 2014 Annual Reports. The P_{def} was determined using ETIdaho2012 for the Boise WSFO Airport Station (National Weather Service station no. NWS-101022) for "Grass – Turf (lawns) – Irrigated."

The growing season established in the current permit is May 1 through October 31. The draft reuse permit establishes the growing season as April 1 through October 31, in consideration of the precipitation deficit for April. This is the typical irrigation season for the Idaho Treasure Valley and provides 30 additional days for land applying recycled water.

Table 4-7 shows the monthly and the total P_{def} and IWR for April through October. The 2014 recycled water and SI hydraulic loads to MU-21115 from May 1 through October 31 are also presented in the table. For this analysis, the April recycled water hydraulic load to the RI system (MU-21114) is included in the table because if the current permit included April in the growing season (as does the draft reuse permit) this loading would have been applied on MU-21115. Only 6.79 acres of the total 16.2 acres of MU-21115 was irrigated in the 2013 and 2014 growing seasons.

Table 4-7 IWR and Hydraulic Loadings for 2014

							Hydraulic Loading		
Month	P_{def}[a] (mm/day)	(in/mo)	acres	IR_{net} (ac-in/mo)	IWR (ac-in/mo)	IWR (gal)	Recycled Water (gal)	Supplemental Water (gal)	Total (gal)
April	2.97	3.51	6.79	23.82	34.03	923,816	392,261[b]	NA	392,261
May	4.30	5.25	6.79	35.63	50.91	1,382,095	373,149	1,551,597	1,924,746
June	5.80	6.85	6.79	46.51	66.45	1,804,085	305,042	1,762,893	2,067,935
July	6.62	8.08	6.79	54.86	78.37	2,127,784	342,681	4,252,188	4,594,869
August	5.74	7.01	6.79	47.57	67.95	1,844,937	299,401	4,252,188	4,551,589
September	4.04	4.77	6.79	32.40	46.29	1,256,639	349,781	2,362,902	2,712,683
October	2.19	2.67	6.79	18.15	25.93	703,904	370,293	2,312,342	2,682,635
Growing Season Total	31.66	38.14		258.94	369.92	10,043,261	2,432,608	16,494,110	18,926,718

Source: 2014 Annual Report
a - P_{def} is for Grass – Turf (lawns) – Irrigated
b - This was the hydraulic loading to the RI system as the current permit does not allow hydraulic loading to MU-21115 during April.

The growing season total hydraulic loading (recycled water plus SI) exceeded the IWR for the entire growing season by 88%. Figure 4-1 presents a graph of the hydraulic loadings and the IWR for the 2014 growing season.

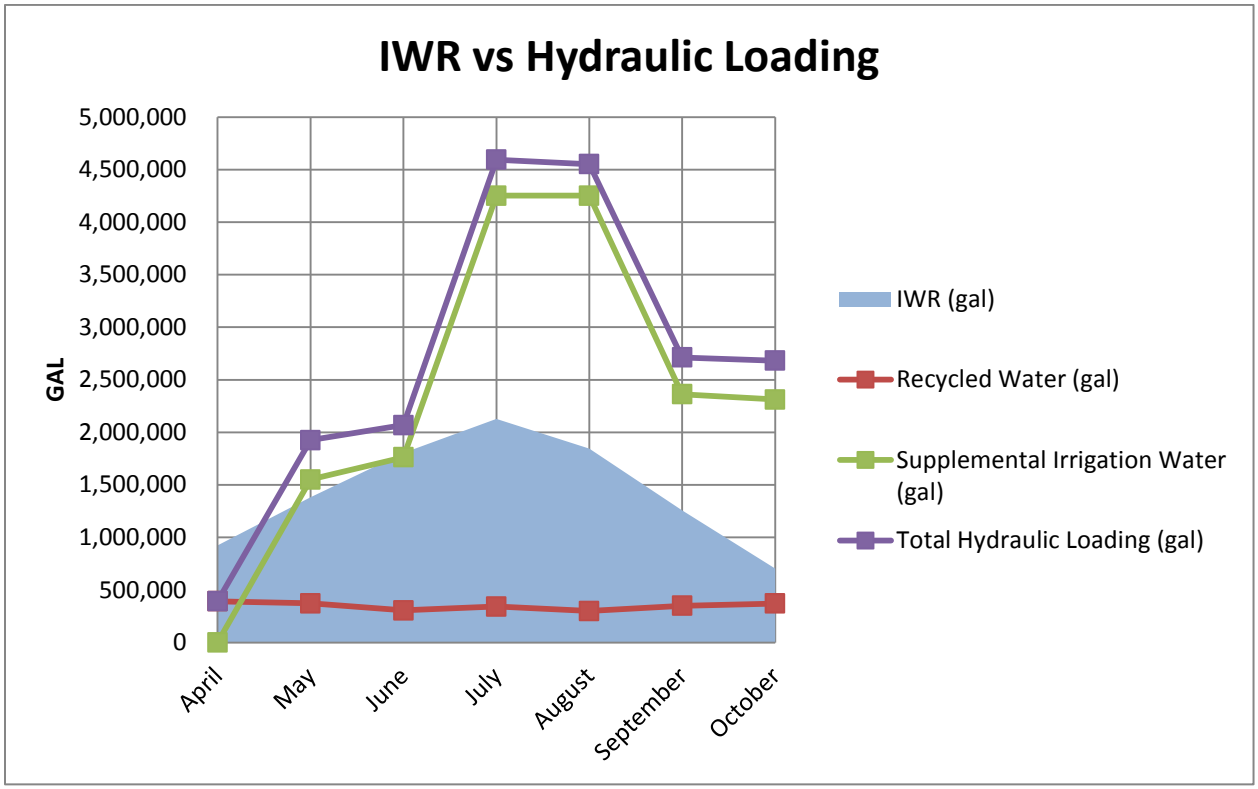

Figure 4-1 -- IWR vs Hydraulic Loading in 2014

Figure 4-1 shows that the amount of recycled water generated and applied in 2014 was well below the IWR. The SI hydraulic loading exceeded the IWR in all months of the growing season when it was applied, except May (SI was not applied in April). The total monthly hydraulic

loading exceeded the IWR up to 139% in May and June, over 200% in July, August, and September, and 380% in October. The 2013 growing season total hydraulic load also exceeded the growing season IWR, but by 27%. The 2013 and 2014 Annual Reports explained that in order to keep the landscaped common areas green and well watered, the Irrigation Areas hydraulic loading exceeded the IWR. The Annual Reports also state that the hydraulic loadings were managed to prevent standing water or runoff from occurring.

In 2013 and 2014, 6.79 acres of the Irrigation Areas was irrigated. The total permitted acreage for the Irrigation Areas is 16.2 acres. Table 4-8 shows the growing season IWR for the entire 16.2 acres for irrigated turf grass.

Table 4-8 IWR for 16.2 Acres

Month	IWR (gal)
April	2,204,097
May	3,297,488
June	4,304,298
July	5,076,598
August	4,401,763
September	2,998,166
October	1,679,418
Growing Season Total	23,961,830

Table 4-8 shows that the IWR for the entire growing season is 23,961,830 gal. This equates to an available average day hydraulic loading rate of approximately 112,000 gpd. In comparison, the average day effluent flow (recycled water) from the AWRF in 2014 was 11,843 gpd. The 2007 AWRF Engineering Report used 300 gpd per equivalent dwelling unit (EDU) to determine the design flowrates for the AWRF. Using this rate, the 112,000 gpd available hydraulic loading rate would support up to approximately 370 EDUs. Avimor could develop up to approximately 370 homes before additional land application area, in excess of 16.2 acres, for irrigation would need to be developed. This additional land application area could be additional landscaped common area or the Agricultural Areas could be developed.

4.6.2.2 Agricultural Areas (MU-21101 – MU-21113)

As stated in Section 3.2.2, the Agricultural Areas have not been developed yet for application of recycled water. If the Agricultural Areas are developed during this permit cycle, the draft reuse permit requires that the hydraulic loading on these management units be substantially at the IWR.

4.6.2.3 Rapid Infiltration System (MU-21114)

The hydraulic loading rate to the RI system is limited to a maximum of 0.19 mgd in the draft reuse permit, which has been carried over from the current reuse permit. This is the initial design rate used to design and size the RI system.

4.6.3 Constituent Loading Rates

Table 4-6 shows the concentrations of constituents in the recycled water for 2014. The primary constituents of concern for land application of recycled water are typically total nitrogen and total phosphorus (plant nutrients), and chemical oxygen demand (COD).

4.6.3.1 Irrigation Areas (MU-21115)

The monthly loadings of the wastewater constituents on 6.79 acres of MU-21115 for 2014 are shown in Table 4-9.

Table 4-9 2014 Constituent Loading Rates on MU-21115

Month	BOD (mg/L)	Total Nitrogen (lbs/mo)	Total Phosphorus (lbs/mo)	Total COD (lbs/mo)
May	<3	11.95	3.08	62.24
June	<3	8.50	8.96	50.88
July	<3	11.97	13.58	57.16
August	<3	10.36	13.71	49.94
September	<3	10.65	12.92	58.34
October	<3	10.24	11.36	61.76
Total (lbs/year)		63.67	63.61	340.32
(lb/acre-year)		9.38	9.37	50.12

Source: 2014 Annual Report

These loadings are based on the monthly constituent concentrations in Table 4-6 and the monthly recycled water flows (loads) in Table 4-7. April 2014 is not included in Table 4-9 because the current permit allows a growing season from May 1 through October 31, so irrigation with recycled water is not allowed in April.

4.6.3.1.1 Biochemical Oxygen Demand (BOD_5) Loading Rates and Limits

The current reuse permit has a BOD_5 concentration limit of no more than 5.0 mg/L in the recycled water applied to the Irrigation Areas, as monitored on a monthly basis. Table 4-9 shows the BOD_5 concentration in the recycled water for the 2014 growing season. The limit was not exceeded in 2014. This limit is not necessary for the Irrigation Areas and is modified in the draft reuse permit to only apply to the recycled water when it is discharged to the RI system (MU-21114).

4.6.3.1.2 Nutrient Loading Rates and Limits

Nutrients (nitrogen and phosphorus) in recycled water applied to vegetation promote plant growth, but in excess can become pollutants. In order to prevent nitrogen and phosphorus in recycled water from becoming pollutants, DEQ puts limits on the amounts of nitrogen and phosphorus that can be applied to vegetation. DEQ bases nutrient loading limits on harvested crops, or vegetation, on the uptake of the nutrients from the soil into the vegetation. The nutrient uptake into the crop is determined by crop harvest monitoring (i.e., the yield (i.e., weight) of the harvested crop) and tissue monitoring of the harvested crop for each harvest each year.

As pointed out in Section 4.6.2.1, turf grass is the largest component of vegetation in MU-21115, so it is reasonable to base nutrient loading limits for MU-21115 in the draft reuse permit on turf grass. Typically, turf grass lawns are mowed on a frequent basis and the waste grass clippings are either removed and disposed of or left on the lawn. The grass clippings are not weighed. Even if turf grass clipping tissue monitoring was conducted, it would be quite burdensome to determine the actual nutrient uptake for a specific lawn. Therefore, nutrient loading limits for turf grass for the draft reuse permit will be based on turf grass nutrient uptake rates from research and other appropriate sources.

4.6.3.1.2.1 Nitrogen Loading Rates and Limits

The Hidden Springs Sewer Company (Hidden Springs) wastewater treatment and reuse facilities are located about three miles from Avimor. Hidden Springs uses Class B recycled water to irrigate common area lawns (turf grass), in addition to other reuse options. The Hidden Springs reuse permit was recently renewed (permit no. M-174-04). The DEQ staff analysis for the Hidden Springs draft reuse permit had a thorough analysis of turf grass nitrogen uptake rates (Bussan 2014). The pertinent sections of this staff analysis addressing nitrogen uptake rates and nitrogen loading limits are presented in Appendix B.

The Hidden Springs staff analysis concluded that expected nitrogen uptake rates in a region with conditions and a growing season similar to southern Idaho could range from 116 to 350 lbs N/ac-year. The Hidden Springs staff analysis also concluded that leaving grass clippings on the lawn recycles about 22 to 45 lbs N/ac-year into the soil. Utilizing the recommendations of the Hidden Springs staff analysis, the nitrogen loading limit in the draft reuse permit is 330 lbs N/ac-year (the Hidden Springs nitrogen loading limit is 220 lbs N/ac-year, with up to an additional 110 lbs N/ac-year allowed if grass clippings are removed after every mowing event). The current reuse permit requires that grass clippings be collected and removed after each mowing event. This requirement is continued in the draft reuse permit, thereby allowing the additional 110 lbs N/ac-year to be included in the nitrogen loading limit.

The 2013 Annual Report indicated that in the first three months of operating the AWRF, the nitrate concentrations in the recycled water were higher than typical for a MBR WWTP. It was determined that a supplemental carbon source was needed. Once the carbon addition was stabilized, the nitrate concentration reduced significantly. The 2014 Annual Report showed the nitrate concentrations in the recycled water were consistent throughout the year, ranging from 0.03 to 4.87 mg/L. The 2014 Annual report data is used in this analysis. Table 4-9 shows that the nitrogen loading for May through October of 2014 was 63.67 lbs N for the 6.79 acres irrigated, or 9.38 lbs N/ac. This loading rate is much lower than the nitrogen loading limit discussed above (330 lbs N/ac-year). Table 4-9 does not include the constituent loadings for April because, as previously discussed, the current permit permits a growing season of May through October. In April 2014, the recycled water was applied to the RI basins. The nitrogen load in April was 17.00 lbs N. If this is added to the nitrogen loading for May through October, the nitrogen loading equals 80.61 lbs N for April through October, or 11.88 lbs N/ac for 6.79 acres irrigated. Again, this is much lower than the loading limit of 330 lbs N/ac-year.

For the near future, total nitrogen loading rates on the Irrigation Areas are not likely to approach

the nitrogen loading limit. The draft reuse permit requires that the monthly and annual nitrogen loading be calculated and reported in the annual report. This will show whether the actual nitrogen loading begins to approach the nitrogen loading limit.

4.6.3.1.2.2 Phosphorus Loading Rates and Limits

Phosphorus uptake rates for turf grass apparently have not been studied as much as nitrogen uptake, not being as critical to turf grass growth as nitrogen. Some sources indicate turf grass has a phosphorus uptake rate of about 40 lbs P/ac-year (EPA 1981) (Minnesota Department of Agriculture 2004). Table 4-9 shows that the phosphorus loading in the recycled water for May through October 2014 was 63.61 lbs P for 6.79 acres, or 9.37 lbs P/ac-year. This is much lower than the uptake rate above.

DEQ does not usually include a phosphorus loading rate limit in municipal reuse permits that land apply recycled water by irrigation of vegetation, unless there is a concern with the phosphorus in the recycled water reaching surface water. It does not appear that this will be a concern for the Irrigation Areas; consequently, it is recommended that no total phosphorus loading rate limit for land application of recycled water to MU-21115 be required in the reuse permit at this time. The draft reuse permit does require monitoring phosphorus in the recycled water and calculating the total phosphorus loading to MU-21115 and reporting it in the annual report. This is done to monitor the phosphorus loadings for any adverse impacts that could occur as the facilities are operated over time.

4.6.3.1.2.3 COD Loading Rates and Limits

The current reuse permit requires monitoring of the recycled water COD, and calculating and reporting the annual COD loading rate on the irrigated land application sites. However, the draft reuse permit eliminates monitoring and calculating the loading rate for COD. Typically, DEQ does not impose a loading limit for COD for municipal reuse facilities, nor is COD monitoring required.

4.6.3.2 Agricultural Areas (MU-21101 – MU-21113)

As stated in Section 3.2.2, the Agricultural Areas have not been developed yet for application of recycled water. If the Agricultural Areas are developed during this permit cycle, the draft reuse permit requires that the nitrogen loading limit be no more than 150% of the uptake rate of the crop. The rationale for setting the nutrient loading rate at 150% of the annual nutrient loading uptake rate for the crop is explained in the DEQ Reuse Guidance as follows:

> *"General rates for nitrogen loading have typically been 150% of crop uptake. This approach is somewhat general and allows for a 50% loss of N through various pathways including volatilization, denitrification, microbial/biomass fixation, and leaching."*

The draft reuse permit states that the determination of the nitrogen uptake rate may initially be based on available crop nutrient uptake and crop yield data, if approved in advance by DEQ.

Then, after three years of operating the reuse facilities and growing the crop, the nutrient uptake is based on the 3-year median crop yield and crop nutrient uptake results for the site.

Based on the data for the Irrigation Areas, phosphorus loadings to the Agricultural areas are anticipated to be low. Therefore, the draft reuse permit does not have loading limits for phosphorus for the Agricultural Areas.

The current reuse permit has a BOD_5 concentration limit of no more than 5.0 mg/L in the recycled water, as monitored on a monthly basis. As discussed in Section 4.6.3.1.1, the limit is not necessary for irrigated land application areas and the limit is modified in the draft reuse permit to only apply to the recycled water when it is discharged to the RI system (MU-21114)

4.6.3.3 Rapid Infiltration System (MU-21114)

Table 4-10 presents the monthly loadings of the recycled water constituents and the monthly recycled water hydraulic loads for the RI system (MU-21114) for 2014. Table 4-10 shows the monthly recycled water constituent concentrations for BOD_5, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen, total nitrogen (the sum of total Kjeldahl nitrogen and nitrate plus nitrite nitrogen), total phosphorus, and COD. The table also shows the monthly loadings of the last three constituents in lbs and lbs/ac. In 2014, recycled water was only applied to Cell No. 1 (0.28 ac) of the RI system. The current reuse permit requires monthly sampling of the recycled water constituents.

Table 4-10 2014 Recycled Water Constituent Loading Rates on MU-21114

Month	Recycled Water (mgal)	BOD_5 (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Nitrate plus Nitrite Nitrogen (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	COD (mg/L)	Total Nitrogen (lbs)	Total Phosphorus (lbs)	Total COD (lbs)
January	314,591	<5	6.09[a]	0.38[a,b]	6.47[a]	0.14[a]	64.5	16.96	0.35	169.23
February	339,212	16	3.33[a]	0.03	3.36[a]	0.06	58.2	9.51	0.17	164.65
March	350,628	<3	12.6	0.02	12.62	0.05	34.2	36.9	0.15	100.01
April	392,261	<3	5.11[a,c]	0.09[c]	5.2[a,c]	0.07[c]	25.4	17	0.23	83.1
November	330,966	<3	0.59	4.87	5.46	0.12	29.7	15.07	0.33	81.98
December	554,757	<3	0.39	0.37	0.76	0.07	20	3.52	0.32	92.53
Total	2,282,415							98.96	1.55	691.5
lb/acre/year								353.43	5.54	2,469.64

a Values are the average of more than one sample taken that month

b Nitrate nitrogen only

c Samples of MBR permeate (WW-21103)

Source: 2014 Annual Report

4.6.3.3.1 Biochemical Oxygen Demand (BOD_5) Loading Rates and Limits

The current reuse permit has a BOD_5 concentration limit of no more than 5.0 mg/L in the recycled water being applied to the RI system, as monitored on a monthly basis. In 2014, this limit was only exceeded in February (16.0 mg/L). The 2014 Annual Report indicated this may have been a sampling error. This limit is continued in the draft reuse permit for the recycled water when it is discharged to the RI system (MU-21114).

4.6.3.3.2 Nitrogen Loading Rates and Limits

The current reuse permit has a total nitrogen concentration limit of no more than 8.0 mg/L in the recycled water being applied to the RI system, as monitored on a monthly basis. In 2014, this limit was exceeded only in March (12.62 mg/L N). The Renewal Application documents (2006 Preliminary Technical Report and the Operations and Maintenance Manual [OMM]) explain that the RI system is designed to further reduce nitrogen levels and will be operated to meet ground water anti-degradation objectives.

The components of total nitrogen that are a concern for degradation of ground water are nitrate and nitrite nitrogen. The *Ground Water Quality Rule*, IDAPA 58.01.11 (IDAPA 2011) has a nitrate nitrogen limit of 10 mg/L and a nitrite nitrogen limit of 1 mg/L. Table 4-10 shows that the concentration of nitrate plus nitrite nitrogen in the recycled water to the RI system has been less than the nitrate nitrogen limit. In 2014, the maximum nitrate plus nitrite nitrogen concentration was 4.87 mg/L in November. All other monthly concentrations were less than 1.0 mg/L nitrate plus nitrite nitrogen.

An analysis of the nitrate levels in the ground water monitoring wells around the RI system, GW-21103 (RAMW-7) through GW-21107 (RAMW-11), from 2009 through 2014, as reported in the Annual Reports, shows that the upgradient ground water monitoring well GW-21104 (RAMW-8) consistently has higher levels of nitrate than the downgradient ground water monitoring wells. Figure 4-2 presents a graph of the nitrate levels in each of these wells from 2009 through 2014. Recycled water began to be applied to the RI system in October 2013.

Figure 4-2 indicates that applying the recycled water to the RI system has had no negative impact on the nitrate levels in the ground water through the fall of 2014.

AWRC needs to continue to closely monitor and evaluate total nitrogen and nitrate in the ground water monitoring wells upgradient and downgradient of the RI system. Each annual report should thoroughly address potential degradation of the ground water by nitrate.

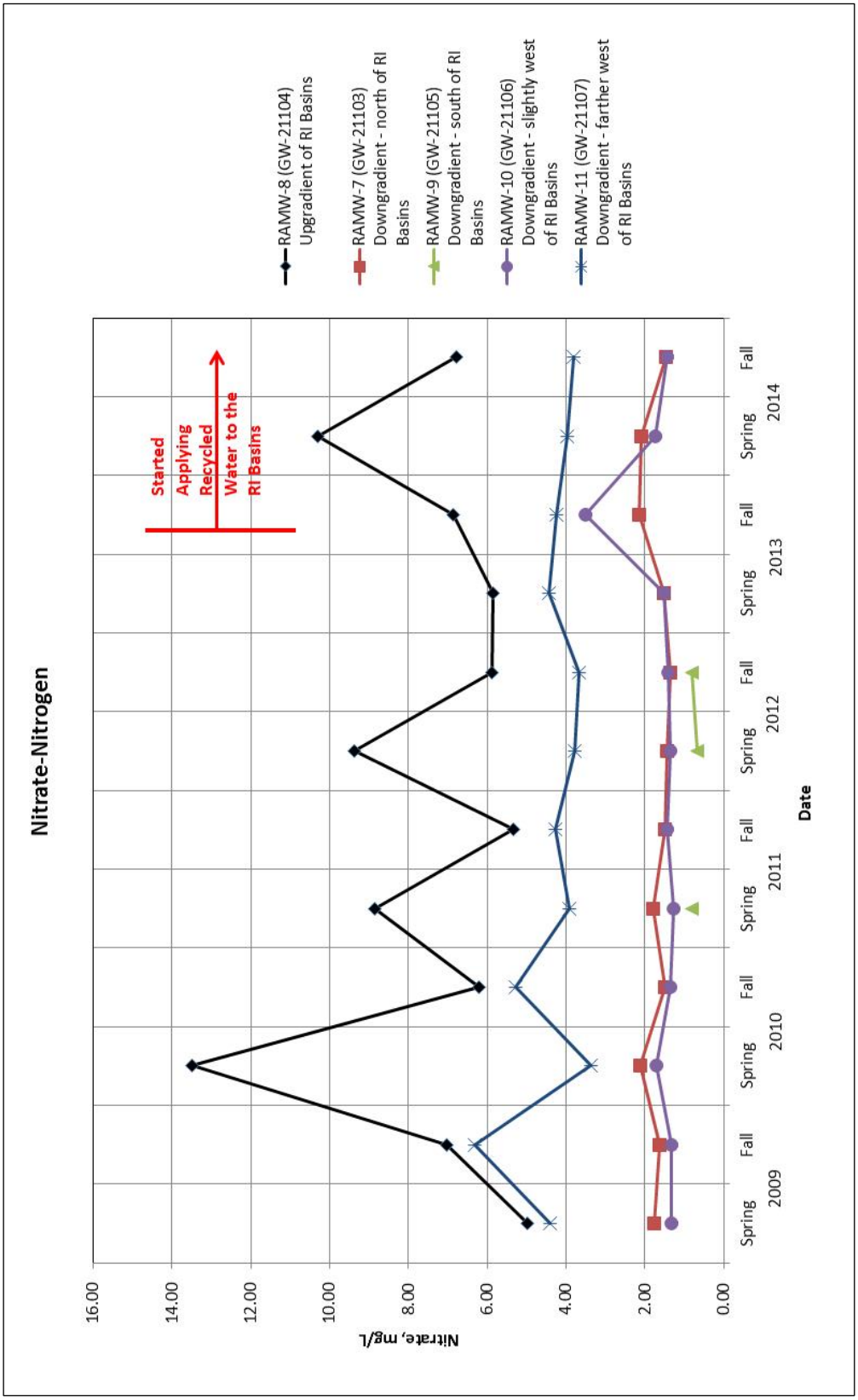

Figure 4-2 -- Nitrate-Nitrogen in Ground Water Monitoring Wells around the RI System

4.6.3.3.3 Phosphorus Loading Rates and Limits

The previous and current reuse permits for AWRC recognized the interconnectivity between the ground water flowing under the RI basins and Spring Valley Creek, which eventually flows into the Boise River, and the possibility of phosphorus in the recycled water reaching the Boise River. Because of this interconnectivity, the current reuse permit has a phosphorus concentration limit of no more than 0.2 mg/L in the recycled water being applied to the RI system, as monitored on a monthly basis. The current reuse permit also has a compliance activity, CA-211-06, which states that when the TMDL for phosphorus for the Lower Boise River is finalized, AWRC is required to evaluate the TMDL requirements that are applicable to the AWRF and its operations, and "will propose operational requirements and methodologies sufficient to meet and demonstrate compliance with such requirements. Upon review of this proposal, DEQ will modify the wastewater reuse permit as needed to incorporate the proposal in a manner that will satisfy the requirements of the TMDL." The public review and comment period has concluded for the draft Lower Boise River Phosphorus TMDL and DEQ anticipates sending it to EPA for approval in August 2015. The TMDL includes a total phosphorus wasteload allocation of 0.35 mg/L.

As discussed in Section 3.2.4, EPA is preparing a draft NPDES permit for AWRC to discharge treated wastewater effluent from the AWRF directly into Spring Valley Creek near the AWRF. The draft NPDES permit will only allow direct discharge of the AWRF effluent into Spring Valley Creek from October 1st through March 31st. The draft NPDES permit will prohibit direct discharge of the AWRF effluent into Spring Valley Creek from April 1st through September 30th. Based on the total phosphorus wasteload allocations in the draft Lower Boise River Phosphorus TMDL, a total phosphorus average monthly discharge limit of 1.2 lb/day is included in the NPDES permit, which is equivalent to 0.35 mg/l at the facility design flow of 0.42 MGD. In order to be consistent with the NPDES permit, the draft reuse permit has a phosphorus concentration limit of no more than 0.35 mg/L in the recycled water applied to the RI system, as monitored on a monthly basis. This assumes no reduction in phosphorus by soil treatment as the recycled water potentially flows from the RI basins via ground water into Spring Valley Creek. This limit is higher than the total phosphorus limit of 0.2 mg/L in the current permit. The monthly total phosphorus concentrations of the recycled water in Table 4-6 from November 2013 through April 2014 were all well below 0.35 mg/L.

An analysis of the total phosphate levels in the ground water monitoring wells around the RI system, GW-21103 (RAMW-7) through GW-21107 (RAMW-11), from 2009 through 2014, as reported in the Annual Reports, shows that the total phosphate levels in all the ground water monitoring wells, except GW-21103 (RAMW-7), have consistently been lower than 0.50 mg/L. Since fall 2011, GW-21103 (RAMW-7) has also been below 0.50 mg/L total phosphate. Figure 4-3 presents a graph of the total phosphate levels in each of these wells from 2009 through 2014. Recycled water began to be applied to the RI system in October 2013.

Figure 4-3 indicates that applying the recycled water to the RI system since October 2013 has not increased the total phosphate levels in the ground water through the fall of 2014.

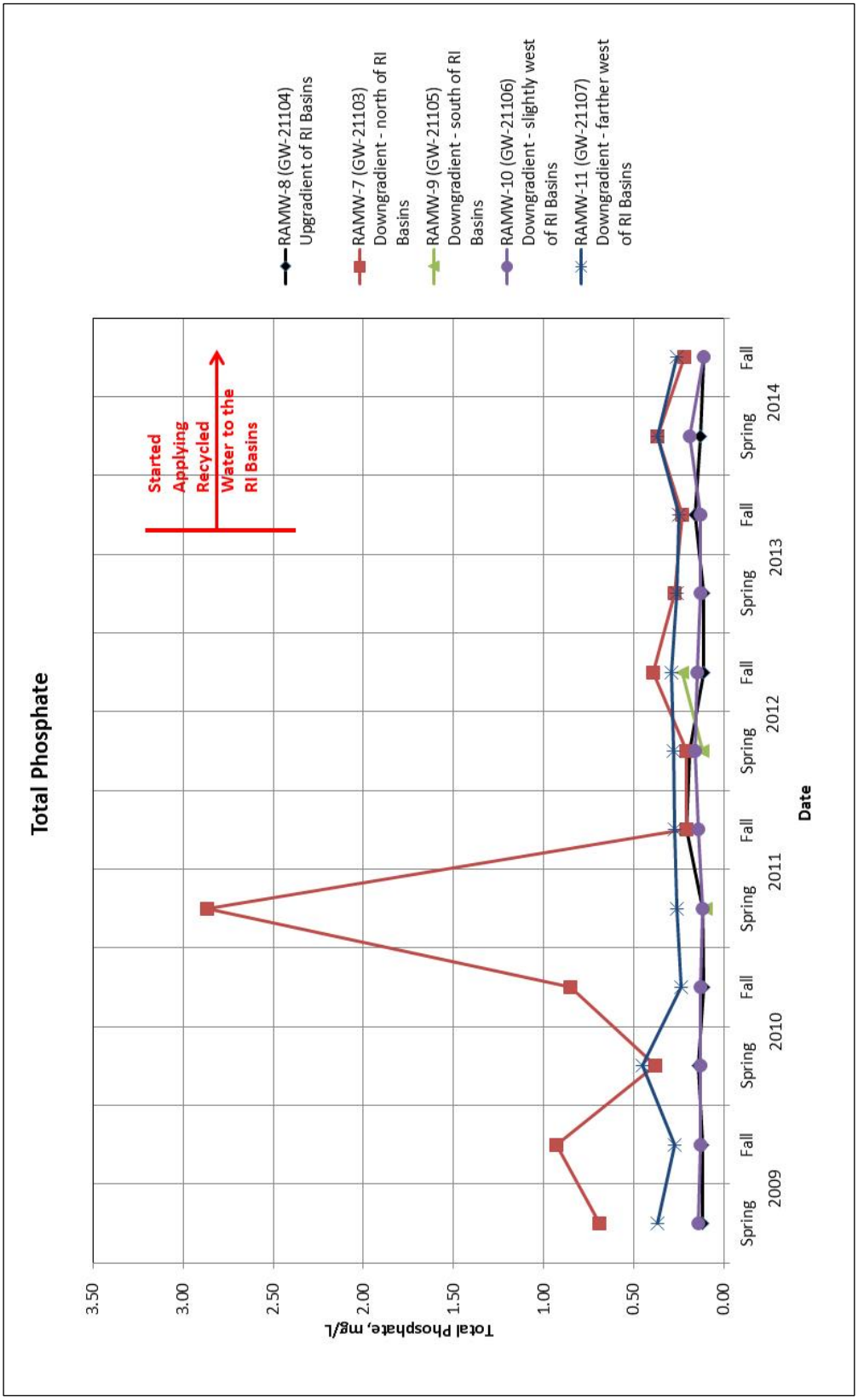

Figure 4-3 -- Total Phosphate in Ground Water Monitoring Wells around the RI System

4.6.3.3.4 COD Loading Rates and Limits

The draft reuse permit does not have loading limits for COD for the RI system.

5 Site Management

5.1 Buffer Zones

The current reuse permit requirements for buffer distances between the boundary of a management unit and a physical feature are presented in Table 5-1. These buffer distances are continued in the draft reuse permit.

Table 5-1 shows that for public water supply wells the buffer distance is site specific. Presently there are no public water supply wells in Avimor or near any AWRC reuse facilities. Plans and specifications for public water supply wells have to be submitted to DEQ for review and approval prior to construction. The buffer distances to any reuse facilities will be reviewed by DEQ at that time and an appropriate buffer distance will be determined. Unless there are specific circumstances that require otherwise, the buffer distance between public water supply wells and reuse facilities will be 1,000 ft.

Table 5-1 Required Buffer Distances

	Recommended Buffer Distance	
Physical Feature	Agricultural Areas (MU-21101 – MU-21113) and RI System (MU-21114)	Irrigation Areas (MU-21115)
Inhabited Dwellings	100 ft	As specified in Figure A-3 in Appendix A
Public Access	0 ft	0 ft
Waters of the United States (including designated wetlands)	10 ft	10 ft
Irrigation wells	100 ft	100 ft
Private Water Supply Wells	500 ft	500 ft
Public Water Supply Wells	Site specific	Site specific

The draft reuse permit also requires that the permitted land application sites be posted with warning signs as required in IDAPA 58.01.17.603.03.

5.2 Runoff Management

Runoff from any permitted land application site is prohibited. The initial reuse permit (LA-000211-01) had a compliance activity that required the development of a runoff management plan. This management plan was submitted to DEQ on February 19, 2008 and approved by DEQ on February 29, 2008. The draft reuse permit requires the update of the runoff management plan as a component of the Plan of Operation (PO) within 90 days of the date of issuance of the reuse permit (compliance activity CA-211-01).

5.3 Sludge/Biosolids/Solid Waste

Managing sludge, biosolids, and solid waste (i.e., screenings, grit) are addressed in the OMM, which is a component of the PO. The draft reuse permit requires that any changes in the management of sludge, biosolids, and solid waste must be addressed in updates of the OMM and submitted to DEQ for review and approval.

5.4 Nuisance Odors

The potential for nuisance odors and prevention of such are addressed in the OMM. Up to this point of operation of the AWRF and the reuse facilities, there have been no issues with nuisance odors. If nuisance odors become an issue, the draft reuse permit requires that a nuisance odor management plan be developed as a component of the PO.

5.5 Irrigation Management Plan

5.5.1 Irrigation Areas (MU-21115)

Irrigation of the Irrigation Areas using Class B recycled water is only allowed during periods of non-use (IDAPA 58.01.17.602.01 – Table 3). In addition to irrigation scheduling, the irrigation management plan should include irrigation application rates and discussions of irrigation pressures and pressure fluctuations. Irrigation efficiencies for the irrigation systems must also be included. The irrigation management plan should include a discussion of managing irrigation application rates and duration to control runoff.

The irrigation management plan is a component of the PO and is required by compliance activity CA-211-01 in the draft reuse permit (see Section 9.2.1). The irrigation management plan can be incorporated into the OMM, or be developed as a stand-alone document.

5.5.2 Agricultural Areas (MU-21101 – MU-21113)

As stated in Section 3.2.2, the Agricultural Areas have not been developed yet for application of recycled water. If the Agricultural Areas are developed during this permit cycle, the draft reuse permit requires that the Irrigation Management Plan be modified to include these management units. Section 5.5.1 explains what should be addressed in the Irrigation Management Plan.

5.5.3 Rapid Infiltration System (MU-21114)

Irrigation management is not applicable to the RI system.

5.6 Crop Management Plan

5.6.1 Irrigation Areas (MU-21115)

Since the vegetation being irrigated with recycled water in the Irrigation Areas is primarily turf grass and landscaping plants and trees, the draft reuse permit does not require a crop management plan.

5.6.2 Agricultural Areas (MU-21101 – MU-21113)

As stated in Section 3.2.2, the Agricultural Areas have not been developed yet for application of recycled water. However, if these management units are developed during this permit cycle, compliance activity CA-211-01 in the draft reuse permit requires the development of a crop management plan for the Agricultural Areas as a component of the PO (see Section 9.2.1). The plan should include the crops grown and include typical planting and harvest times, typical production for the area, irrigation water requirements, and typical nutrient uptake for each crop. A discussion of crop rotation and any fertilizer recommendations should also be included. Irrigation efficiency for the site irrigation systems must be included.

5.6.3 Rapid Infiltration System (MU-21114)

Crop management is not applicable to the RI system.

5.7 Grazing Management

5.7.1 Irrigation Areas (MU-21115)

Grazing is not allowed on the Irrigation Areas.

5.7.2 Agricultural Areas (MU-21101 – MU-21113)

As stated in Section 3.2.2, the Agricultural Areas have not been developed yet for application of recycled water. If the Agricultural Areas are developed during this permit cycle, grazing will not be allowed on these management units unless a grazing management plan is developed and approved by DEQ. This is addressed in Section 4.5 of the draft reuse permit.

5.7.3 Rapid Infiltration System (MU-21114)

Grazing is not applicable to the RI system.

6 Monitoring Requirements

Table 6-1 presents the proposed monitoring requirements for the draft reuse permit. All monitoring will have to be conducted in accordance with the AWRC Quality Assurance Project Plan (QAPP). See Section 7 for reuse permit requirements regarding the QAPP. Monitoring requirements are discussed in more detail in the following subsections

Table 6-1 Monitoring Requirements

Media	Location	Methodology	Frequency	Parameters
Wastewater Influent Flow	AWRF Influent Pumping Station	Flowmeter	Continuous	Flow/volume (mgd, mgal/month, mgal annual total)
Recycled Water Flow	AWRF Effluent Pumping Station	Flowmeter	Continuous	Flow/volume (mgd, mgal/month, mgal annual total)
Supplemental Irrigation Water Flow	Town Lake Pump Station	Pump run time or flowmeter	Continuous, when utilizing	Flow/volume (mgd, mgal/month, mgal annual total)
	Town Lake	Water meter (potable water into Town Lake)	Continuous, when utilizing	Flow/volume (mgd, mgal/month, mgal annual total)
Influent Wastewater Quality	AWRF Influent Equalization Basin	24-hour composite sample	Monthly	Biochemical Oxygen Demand (BOD_5)
MBR Effluent Water Quality	MBR	In-line continuously monitoring and recording Turbidimeter	Continuous	Turbidity
Recycled Water Quality	AWRF Effluent Pumping Station Discharge	24-hour composite sample	Monthly	Total Phosphorus (TP)
			Monthly	BOD_5, Total Kjeldahl Nitrogen (TKN), Nitrate+nitrite-nitrogen, Ammonia-nitrogen
		Grab sample	Daily	Total coliform, Total chlorine residual, pH
Supplemental Irrigation Water Quality	Town Lake Pump Station Discharge	Grab sample	Monthly, when utilizing	TKN, Nitrate-nitrogen, TP
Ground Water Monitoring Wells Quality & Physical	Each Ground Water Monitoring Well	Unfiltered grab sample	Twice annually: April and October	Water table elevation (feet), Water table depth (feet); TKN, Nitrate-nitrogen, Ammonia-nitrogen, TP, pH, Total Dissolved Solids (TDS), Specific conductance/electrical conductivity (µmhos/cm), Chloride, Total coliform, Temperature (°C)
Soil Quality	Locations and number of samples for each Management Unit in the Agricultural Areas as specified in the Plan of Operations or QAPP	Composited samples taken at depths of: 0-12 Inches 12-24 Inches 24-36 Inches or refusal	Annually: March	Electrical conductivity (µmhos/cm in saturated paste extract), Plant available phosphorus, Nitrate-nitrogen, Ammonium-nitrogen, pH
			Second year (before commencement of irrigation) and last year of permit cycle	DTPA Extractable Iron, DTPA Manganese, Sodium Adsorption Ratio (SAR), % Organic Matter
			Second year of permit cycle (before commencement of irrigation)	Cation Exchange Capacity (CEC)
Surface Water Quality	Each Surface Water Quality Monitoring location	Grab sample	Twice annually: April and October	TKN, Nitrate+nitrite-nitrogen, Ammonia-nitrogen, TP, Dissolved orthophosphorus, Chloride, pH, Temperature (ºC), Dissolved oxygen

6.1 Wastewater/Recycled Water Monitoring Requirements

Monitoring of flow and wastewater and recycled water quality and constituents is required in the draft reuse permit for the AWRF influent and effluent.

Flow will be required to be monitored and recorded on a continuous basis, and will be reported on a daily, monthly, and annual basis (mgd, mgal/month and annual total). The flow monitoring locations are listed in Table 6-1.

The water quality parameters and constituents to be monitored are shown in Table 6-1, along with the monitoring locations and monitoring/recording frequency. The required sampling frequency in the draft reuse permit is the same as in the current reuse. Limits are based on the monthly arithmetic mean of samples taken for those constituents that have limits in the draft reuse permit.

It is necessary to monitor these parameters and constituents to provide information for managing the reuse facilities and to assure that ground water and surface waters are protected. Turbidity, disinfectant residual, and total coliforms are monitored to confirm compliance with Class B recycled water quality requirements (IDAPA 58.01.17.601.02). BOD_5 is monitored in the wastewater influent and in the recycled water to indicate the effectiveness of the treatment processes. Some constituents are monitored to determine loading rates on the land application sites (nutrients) and confirm compliance with the reuse permit limits to the RI system.

6.2 Soil Monitoring Requirements

The purpose of requiring soil monitoring is provided by Section 7.4.1 of the DEQ Reuse Guidance, which states:

> *"Soil monitoring has a dual purpose within the wastewater-land application program. The first is a nutrient management purpose . . .. Testing for macro-nutrients such as nitrogen, phosphorus, and potassium; pH; and micro-nutrients, are needed so that nutrient loading through wastewater and/or fertilizer can be managed to maximize both crop growth and the efficiency with which nutrients are being utilized. . . .*
>
> *The second purpose of soil monitoring is to assess soil quality. This involves characterizing the chemical and physical properties of soils of wastewater-land application sites initially during site characterization as well as over time. . . . Soil quality monitoring can signal the accumulation of constituents which may constitute a risk to ground water, given leaching conditions. Soil data can then be utilized to determine appropriate loading rates and management."*

The current permit requires soil monitoring in the Agricultural Areas management units (MU-21101 through 21113) if they were developed and utilized. This requirement is included in

the draft reuse permit if the management units are developed and utilized during this permit cycle.

Soil monitoring in the Irrigation Areas (MU-21115) is not required under the current permit. However, soil monitoring was conducted in 2013 and 2014 in MU-21115, and the results have been reported in the Annual Reports. Soil monitoring is worthwhile for the reasons listed above; therefore, the draft reuse permit requires that this practice be continued in MU-21115.

Soil Monitoring is required once a year, in the early spring (March), prior to the commencement of irrigation for the growing season. The required monitoring parameters are shown in Table 6-1. Monitoring of the Soil Adsorption Ratio (SAR), iron, manganese, and percent organic matter are only required in the second year of the reuse permit cycle, for characterization of the soil, and the fourth year, to help determine if land application of recycled water may have impacted the soil. For the Agricultural Areas, this monitoring is required prior to commencement of irrigation with recycled water. Monitoring of the cation exchange capacity (CEC) is only required in the second year of the permit cycle or prior to commencement of irrigation with recycled water for the Agricultural Areas. The soil sampling protocols must be defined in the QAPP. Several soil samples are necessary at each land application site to provide representative samples. The number of samples depends on the acreage of each site. Guidance for determining the number of samples needed can be found in Section 7.4.5.2 of the DEQ Reuse Guidance. At each sampling location, soil samples must be taken at soil depths of 0 to 12 inches, 12 to 24 inches, and 24 to 36 inches (or refusal). All the samples for the site are composited for each soil depth.

Soil monitoring is not required in the RI basins (MU-21114).

6.3 Ground Water Monitoring Requirements

The current reuse permit requires ground water monitoring at seven monitoring wells in the Avimor development. Most of these monitoring wells are around the RI system. Their locations are shown in Figure 2-2 and ground water quality data for these monitoring wells from the 2009 through 2014 Annual Reports is shown in Table 4-5.

The draft reuse permit continues to require monitoring of these seven monitoring wells. The required ground water monitoring parameters and sampling frequency are shown in Table 6-1. Monitoring of specific conductance/electrical conductivity, temperature, and pH is not required in the current permit, but these parameters have been added to the draft reuse permit because they can provide data about the potential of ground water contamination.

Section 7.2 of the DEQ Reuse Guidance states the following regarding the necessity of conducting ground water monitoring for reuse facilities:

> *"Ground water monitoring provides data that can be used to evaluate a facility's impact on ground water as well as evaluate ground water quality changes with respect to changes in wastewater land treatment management and loading changes. Ground water monitoring also serves to assess compliance with a*

> *wastewater land application permit, including ground water quality standards as specified in the Ground Water Quality Rule (IDAPA 58.01.11.200) and/or permit specific limits. Ground water monitoring is necessary in most circumstances to define ambient conditions and establish a water quality baseline for the facility. Ground water monitoring often plays a major role in evaluating and modifying treatment processes, management, and loading practices to protect and maintain ground water quality."*

The draft reuse permit has a compliance activity, CA-211-04, that requires the development of a ground water monitoring plan that establishes a ground water monitoring well network to monitor ground water quality impacts from the Agricultural Areas if any are developed and utilized in this permit cycle. The parameters monitored and the sampling frequency that will be required are shown in Table 6-1. See Section 9.2.4 for the requirements of the ground water monitoring plan.

6.4 Surface Water Monitoring Requirements

The current reuse permit requires surface water monitoring at four locations. These locations are shown in Figure 2-2 and surface water quality data for each monitoring location is shown in Table 4-2.

The draft reuse permit continues to require monitoring of these four locations. The required surface water monitoring parameters and sampling frequency are shown in Table 6-1. Three parameters are included that are not monitored in the current permit. These are pH, temperature, and dissolved oxygen. Monitoring of these three parameters was recommended in the monitoring plan submitted by SunCor to DEQ on February 16, 2008, which was required by compliance activity CA-211-03 of the original reuse permit, LA-000211-01. DEQ approved the monitoring plan on February 29, 2008.

6.5 Supplemental Irrigation Water (SI) Monitoring Requirements

The concentrations of nutrients and other constituents in any SI used should be known in order to accurately calculate constituent loadings on a land application site. Therefore, the monitoring of nutrients and other constituents in the SI is required in the draft reuse permit. Flow monitoring of any SI is also required so the hydraulic loading to each land application site can be accurately determined and compared to the IWR for the land application site. The SI monitoring requirements for the Irrigation Areas (MU-21115) are shown in Table 6-1. The SI constituent monitoring location (WW-21105) is shown on Figure A-4 in Appendix A.

As discussed in Section 3.2.1, SI is pumped out of Town Lake into the pressurized irrigation system for MU-21115. There are two sources of SI into Town Lake, Spring Valley Creek and potable water discharged from the drinking water distribution system via pipeline and water meter. The 2014 Annual Report included SI flow monitoring data based on the water meter readings from United Water Idaho. This does not account for any water that might be diverted into Town Lake from Spring Valley Creek. Flow monitoring of SI should also be determined by how much SI is pumped into the pressurized irrigation system. This can be accomplished by

monitoring the pump run time on the pumps in the Town Lake pump station and multiplying it by the flowrate estimated by the pump curves. Flow measurement locations to monitor the SI flow are identified in the draft reuse permit. These are FM-21105, which is the discharge of the pumps in the Town Lake pump station, and FM-21106, which is the mechanical water meter on the potable water pipe discharging into Town Lake. The SI flow monitoring locations (FM-21105 and 21106) are shown on Figure A-4 in Appendix A. AWRC may want to simplify the flow monitoring at FM-21105 by installing a flowmeter on the discharge piping of the Town Lake pump station.

6.6 Crop Yield and Tissue Monitoring Requirements

In order to determine the crop nutrient uptake rate for the land application site, several crop harvesting parameters and crop tissue monitoring parameters should be monitored.

6.6.1 Irrigation Areas (MU-21115)

Since the vegetation being irrigated with recycled water in MU-21115 is primarily turf grass and landscaping plants and trees, the draft reuse permit does not require any crop yield or plant tissue monitoring.

6.6.2 Agricultural Areas (MU-21101 – MU-21113)

As stated in Section 3.2.2, the Agricultural Areas have not been developed yet for application of recycled water. If the Agricultural Areas are developed during this permit cycle, the draft reuse permit requires that the following parameters be monitored for each harvest for each crop at each management unit:

- Crop type
- Harvest date
- Sample collection date
- Harvested acreage (acres)
- As-harvested (‘wet’) yield in customary harvested units (tons, bushels, cwt, etc.)
- As-harvested (field) moisture content (%)
- Dry yield (lb)

The reuse permit also requires the following crop tissue parameters be monitored for each harvest of each crop at the land application site:

- Moisture content (%)
- Total Kjeldahl nitrogen (%)
- Nitrate nitrogen, as N (ppm)

- Phosphorus, as P (ppm)
- Ash (%)

6.6.3 Rapid Infiltration System (MU-21114)

Crop yield or plant tissue monitoring is not applicable to the RI system.

6.7 Meteorological Monitoring Requirements

No Meteorological monitoring is required in the draft reuse permit.

6.8 Compliance Reporting

In order to demonstrate compliance with the reuse permit, AWRC is required to submit an annual report that includes results of all required monitoring, including calculations of various parameters using those results, and status of compliance activities. The reuse permit reporting requirements are explained thoroughly in Section 6 of the draft reuse permit.

Table 6-2 provides a list of parameters to be reported that are calculated using the monitoring results and other specific data sources. The methodologies for calculating these parameters and the data sources for the calculations (for example, ETIdaho2012) must be specified in the PO. It is recommended that when questions arise over calculation methodologies that AWRC refer to the Wastewater Land Application Operators Study and Reference Manual located at http://www.deq.idaho.gov/media/531164-operator_training_manual_entire.pdf (DEQ 2014), which gives a review of calculation methodologies, including example problems.

Table 6-2 Annual Report Calculated Parameters

Calculated Parameter	Reporting Units
Recycled water hydraulic loading rate at each MU	inches/month (excluding MU-21114) inches/ac-month (excluding MU-21114) inches/growing season (excluding MU-21114) inches/ac-growing season (excluding MU-21114) mgal/month mgal/ac-month mgal/growing season (or application period [MU-21114]) mgal/ac-growing season (or application period [MU-21114])
Supplemental irrigation water hydraulic loading rate at each MU (excluding MU-21114)	inches/month inches/ac-month inches/growing season inches/ac-growing season mgal/month mgal/ac-month mgal/growing season mgal/ac-growing season

Table 6-2 Annual Report Calculated Parameters

Calculated Parameter	Reporting Units
Irrigation water requirement (IWR) for the crop at each MU (excluding MU-21114)	inches/month inches/ac-month inches/growing season inches/ac-growing season mgal/month mgal/ac-month mgal/growing season mgal/ac-growing season
Recycled water loading rate for nitrogen and phosphorus at each MU	lb/month lb/ac-month lb/growing season (or application period [MU-21114]) lb/ac-growing season (or application period [MU-21114])
Recycled water loading rate for nitrogen and phosphorus (total)	lb/month lb/ac-month lb/year lb/ac-year
Supplemental Irrigation water loading rate for nitrogen and phosphorus at each MU (excluding MU-21114)	lb/month lb/ac-month lb/growing season lb/ac-growing season
Supplemental Irrigation water loading rate for nitrogen and phosphorus (total) (excluding MU-21114)	lb/month lb/ac-month lb/growing season lb/ac-growing season
Fertilizer nitrogen and phosphorus application rates (as elemental N and P) (excluding MU-21114)	lb/month lb/ac-month lb/growing season lb/ac-growing season
Agricultural Areas (MU-21101-MU-21113)	
Crop harvest and yield for each harvest and annual total for each MU	Total ‘wet’ yield lb/harvest lb/acre-harvest lb/growing season lb/ac-growing season Total ‘dry’ yield lb/harvest lb/acre-harvest lb/growing season lb/ac-growing season
Crop nitrogen and phosphorus uptake (removal) rates for each harvest and annual total (dry-basis) for each MU	lb/harvest lb/acre-harvest lb/growing season lb/ac-growing season

7 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) is a written document outlining the procedures used

by the permittee to ensure the data collected and analyzed meets the requirements of the permit.

In support of the agency 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 stand-alone 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. The reason DEQ does not approve QAPPs is that the responsibility for validation of the facility 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 1) the Assurance and Data Processing sections of the DEQ Guidance and 2) EPA QAPP guidance documents. EPA QAPP guidance documents are available at the following website: http://www.epa.gov/quality/qapps.html.

AWRC submitted a QAPP with the Renewal Application documents. Overall, the submitted QAPP addresses many of the DEQ quality assurance and data processing recommendations. There are some elements of the QAPP that should be more detailed. The QAPP should be very explicit and complete on media-specific monitoring frequency, sampling collection procedures, sampling equipment, analytical methods, and any calculations that need to be performed. Also, in-depth information should be included on calibrating and maintaining specific monitoring devices and instrumentation.

The QAPP must also be updated to include the new soil monitoring requirements in MU-21115. See Section 6.2.

Compliance activity CA-211-02 of the draft reuse permit, which is discussed in Section 9.2.2, requires that AWRC submit an amended QAPP to DEQ for review and acceptance. A final copy of the QAPP along with written notice that the permittee has implemented the QAPP must be provided to DEQ.

AWRC must amend the QAPP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAPP. AWRC must notify DEQ of material changes to the QAPP and copies are to be kept on site and made available to DEQ upon request.

8 Site Operation and Maintenance

Since the construction of the Avimor wastewater collection system, the AWRF, and the reuse

facilities, AWRC has retained Operations Management Consulting, LLC (OMCS) as the contract operator for the Avimor wastewater and reuse facilities. A copy of the contract between AWRC and OMCS was included in the Renewal Application documents and is included in Appendix C.

Table 8-1 presents the Avimor wastewater facilities and classification, and the wastewater system current operators, their level of responsibility and their licensure. The wastewater system is required to have a licensed operator with a license at least the equivalent of the system classification.

A wastewater treatment plant classification worksheet was submitted to DEQ on July 7, 2014, and the AWRF was classified as a Class IV treatment system. A wastewater collection system classification worksheet was submitted to DEQ in 2009 and the collection system was classified as a Class I collection system. A new wastewater collection system classification worksheet needs to be submitted to DEQ. Public wastewater system operator licensure record forms for the collection system and the treatment system were submitted to DEQ in 2013 indicating the responsible charge operator and the substitute responsible charge operator; these are presently considered up to date, but must be resubmitted if there are any changes made in the operations staff.

Table 8-1 Wastewater Systems Classifications and Operator Responsibility and Licensure

Facility	System Classification	Operator Name	Responsibility	Licensure
Wastewater Collection System	Class I	Bill Duncan	Responsible Charge Operator	Wastewater Collection Class IV (WWC4-13743)
		Chris Linder	Substitute Responsible Charge Operator	Wastewater Collection Class IV (WWC4-14155)
Wastewater Treatment Facility	Class IV	Bill Duncan	Responsible Charge Operator	Wastewater Treatment Class IV (WWT4-10479)
		Chris Linder	Substitute Responsible Charge Operator	Wastewater Treatment Class IV (WWT4-11004)
		Roger Jacobson	Operator	Wastewater Treatment Class II (WWT2-10843)
	Reuse Facilities	Bill Duncan	Responsible Charge Operator	Wastewater Treatment Land Application (WWTLA-14151)
		Chris Linder	Substitute Responsible Charge Operator	Wastewater Treatment Land Application (WWTLA-14154)

9 Compliance Activities

9.1 Status of Compliance Activities in Current Permit

9.1.1 CA-211-01

This compliance activity required that an updated Plan of Operation (PO) be submitted to DEQ for review and approval 60 days after one complete year of operation of the reuse facilities. The PO has not been modified after the first year of operation of the AWRF and reuse facilities. CA-211-01 in the draft reuse permit requires that the PO be maintained up to date.

9.1.2 CA-211-02

This compliance activity required that plans and specifications for any slow rate land application facilities in the Agricultural Areas (MU-211-01 through MU-211-13) be submitted to DEQ for review and approval prior to construction. This compliance activity is continued in the draft reuse permit.

9.1.3 CA-211-06

This compliance activity required that within 60 days after the issuance of the phosphorus TMDL for the Lower Boise River, AWRC submit a proposal to DEQ for managing the effluent to the RI system to comply with the allocation of the TMDL. The public review and comment period has concluded for the draft Lower Boise River Phosphorus TMDL and DEQ anticipates sending it to EPA for approval in August 2015. The draft reuse permit has new total phosphorus limits for the recycled water applied to the RI system to account for the TMDL allocation.

9.2 Compliance Activities required in New Permit

The following Compliance Activities are specified in the draft reuse permit:

9.2.1 CA-211-01

The draft reuse permit requires that AWRC maintain an updated PO that incorporates the following separate plans:

1. Operation and Maintenance Manual for the WWTP and all the reuse facilities, including management of sludge, biosolids, and solid waste, and management of nuisance odors. This must be submitted to DEQ for review and approval within 180 days of the date of issuance of the reuse permit.

2. Crop Management Plan: A Crop Management Plan for the Agricultural Areas (MU-21101-021113) must be developed and submitted to DEQ for review and approval at least 60 days prior to application of recycled water on any of the Agricultural Areas management units (see Section 5.6).

3. Irrigation Management Plan(s): An Irrigation Management Plan for the Irrigation Areas (MU-21115) must be developed and submitted to DEQ for review and approval within 180 days of the date of issuance of the reuse permit. An Irrigation Management Plan for the Agricultural Areas (MU-21101-021113) must be developed and submitted to DEQ for review and approval at least 60 days prior to application of recycled water on any of the Agricultural Areas management units (see Section 5.5).

4. Runoff Management Plan: The Runoff Management Plan must be updated and submitted to DEQ for review and approval within 180 days of the date of issuance of the reuse permit (see Section 5.2).

9.2.2 CA-211-02

Submit an amended Quality Assurance Project Plan, including verification that the plan has been implemented by the facility, within 180 days of permit issuance. See Section 7 for a more detailed discussion of the QAPP requirements.

9.2.3 CA-211-03

Pursuant to Idaho Code §39-118 and IDAPA 58.01.16.400, detailed plans and specifications for the construction of slow rate land application facilities to and at the Agricultural Areas (MU-21101 through MU-21113) must be submitted to DEQ for review and approval prior to construction and/or application of any recycled water. The plans for the reuse systems shall clearly delineate the locations of all potable water lines, existing and proposed wells, and surface waters, sufficient to assess/establish compliance with the buffer zone requirements of this permit. See Section 3.2.2.

9.2.4 CA-211-04

Six months prior to construction of slow rate land application facilities for any of the Agricultural Areas (MU-21101 through MU-21113), AWRC must submit a Ground Water Monitoring Plan, prepared by a qualified, registered professional in the State of Idaho, that addresses how ground water will be monitored to assure compliance with IDAPA 58.01.11, *Ground Water Quality Rule*, for these MUs. The plan must include at least an assessment of ground water monitoring needs; plans for a monitoring well network; and construction plans and specifications for the existing wells, and any proposed wells, including top-of-casing elevations for the monitoring wells. The plan must be implemented prior to construction of any of these land application facilities to collect baseline data. This must include obtaining any necessary permits from the Department of Water Resources (IDWR).

9.2.5 CA-211-05

If AWRC intends to continue operating the reuse facility beyond the expiration date of this reuse permit, AWRC must contact DEQ and schedule a pre-application workshop 12 months prior to

the reuse permit expiration date to discuss the compliance status of the facility and the content required for the reuse permit application package.

9.2.6 CA-211-06

If AWRC intends to continue operating the reuse facility beyond the expiration date of this reuse permit, AWRC must submit a complete reuse permit renewal application package, which fulfills the requirements specified at the pre-application workshop identified in CA-211-05 at least six months prior to the reuse permit expiration date.

10 Recommendations for Issuance of the Reuse Permit

Staff recommends the reuse permit be issued for a five (5) year term. The reuse permit specifies hydraulic and constituent loading limits and establishes monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance.

TRIM Record 2015AGH1054

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Appendix A

- Figure A-1 – AWRF Process Flow Diagram
- Figure A-2 – Plan of Landscaped Common Areas in Irrigation Areas (MU-21115)
- Figure A-3 – Cross-Sections of Landscaped Common Areas in Irrigation Areas (MU-21115)
- Figure A-4 – Schematic of Irrigation Areas (MU-21115) Pressurized Irrigation System
- Figure A-5 – AWRF RI System Record Drawings
- Figure A-6 – Ground Water Monitoring Wells (2008 Revised Monitoring Plan)

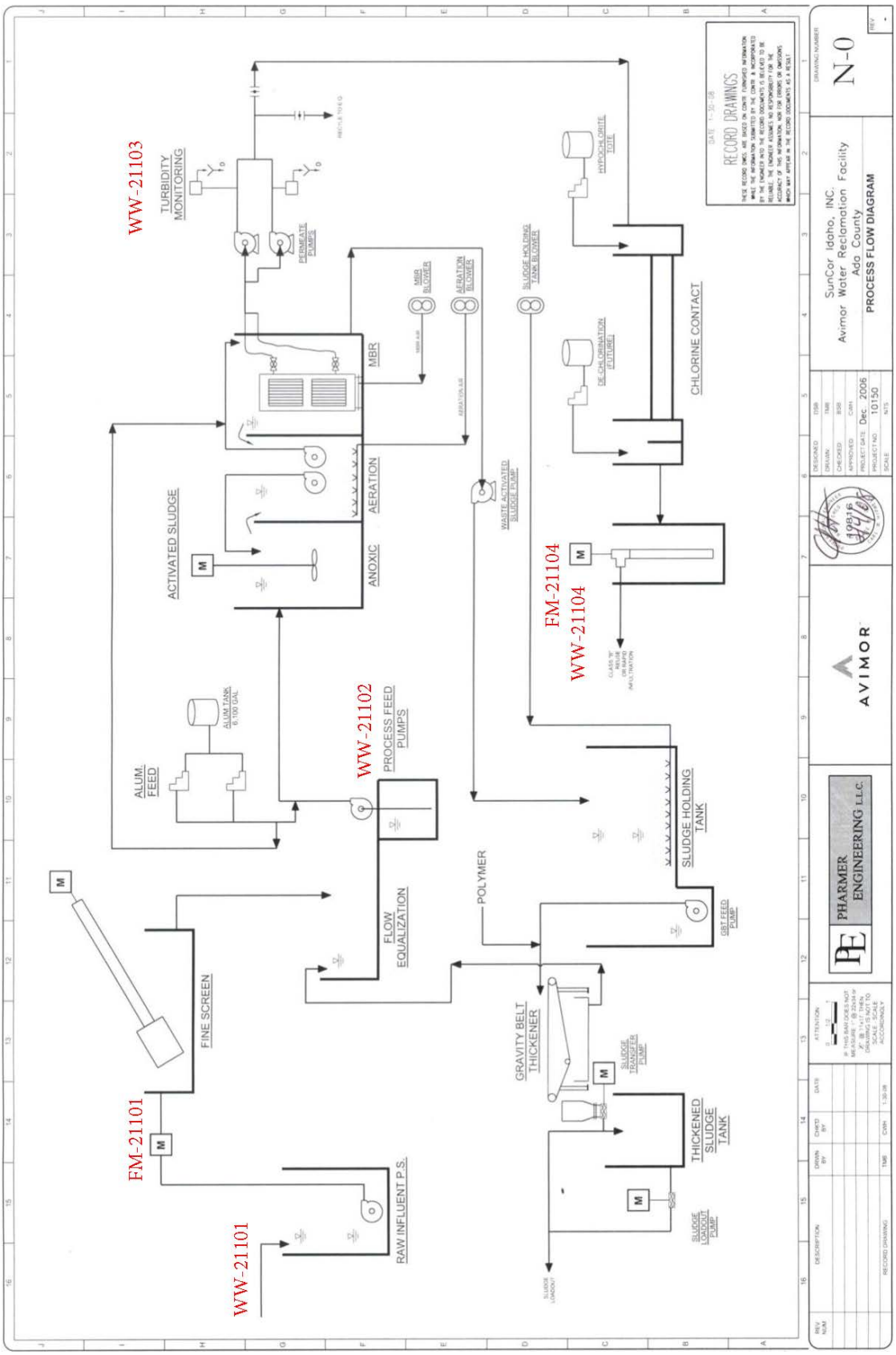

Figure A-1 -- AWRF Process Flow Diagram

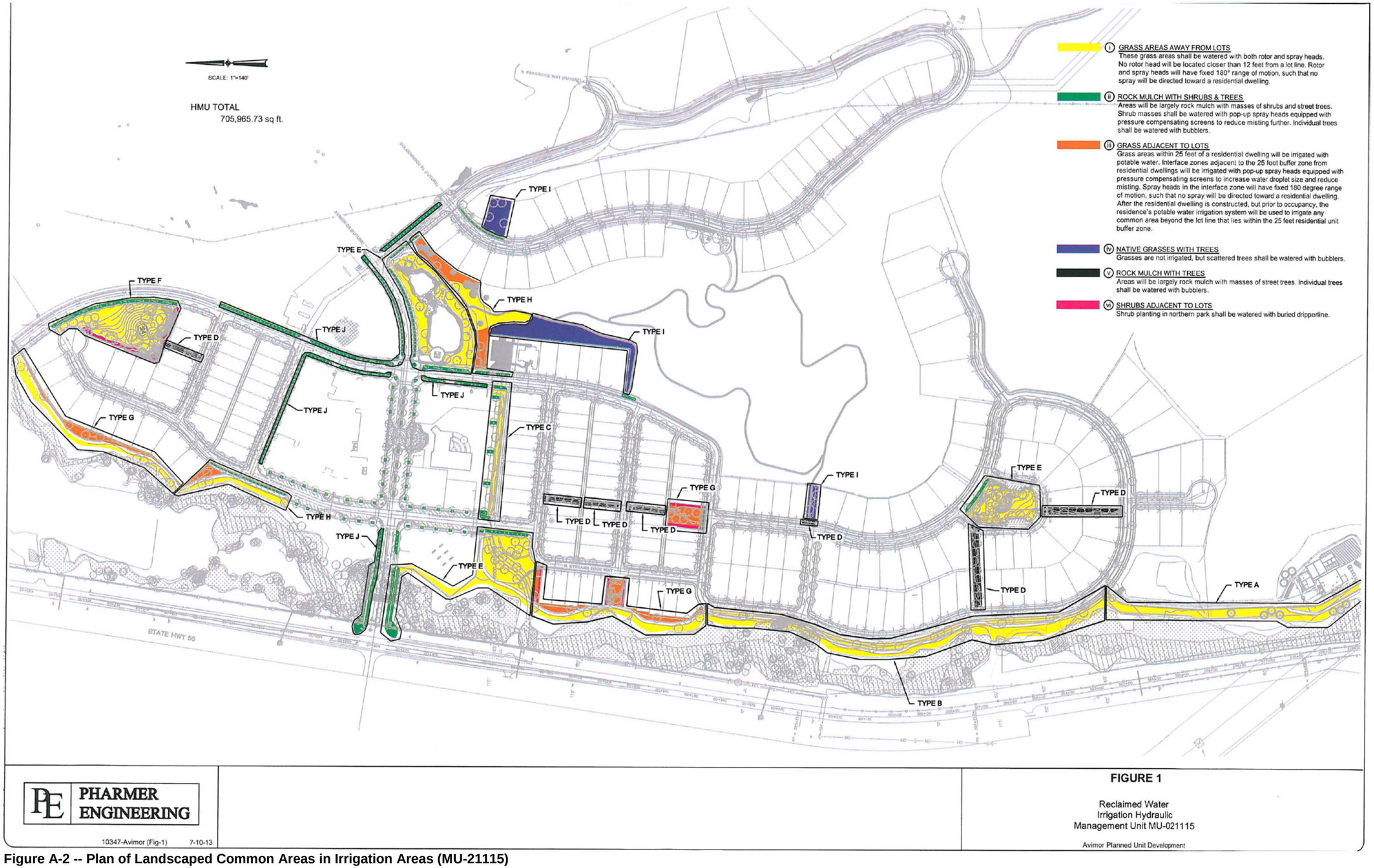

Figure A-2 -- Plan of Landscaped Common Areas in Irrigation Areas (MU-21115)

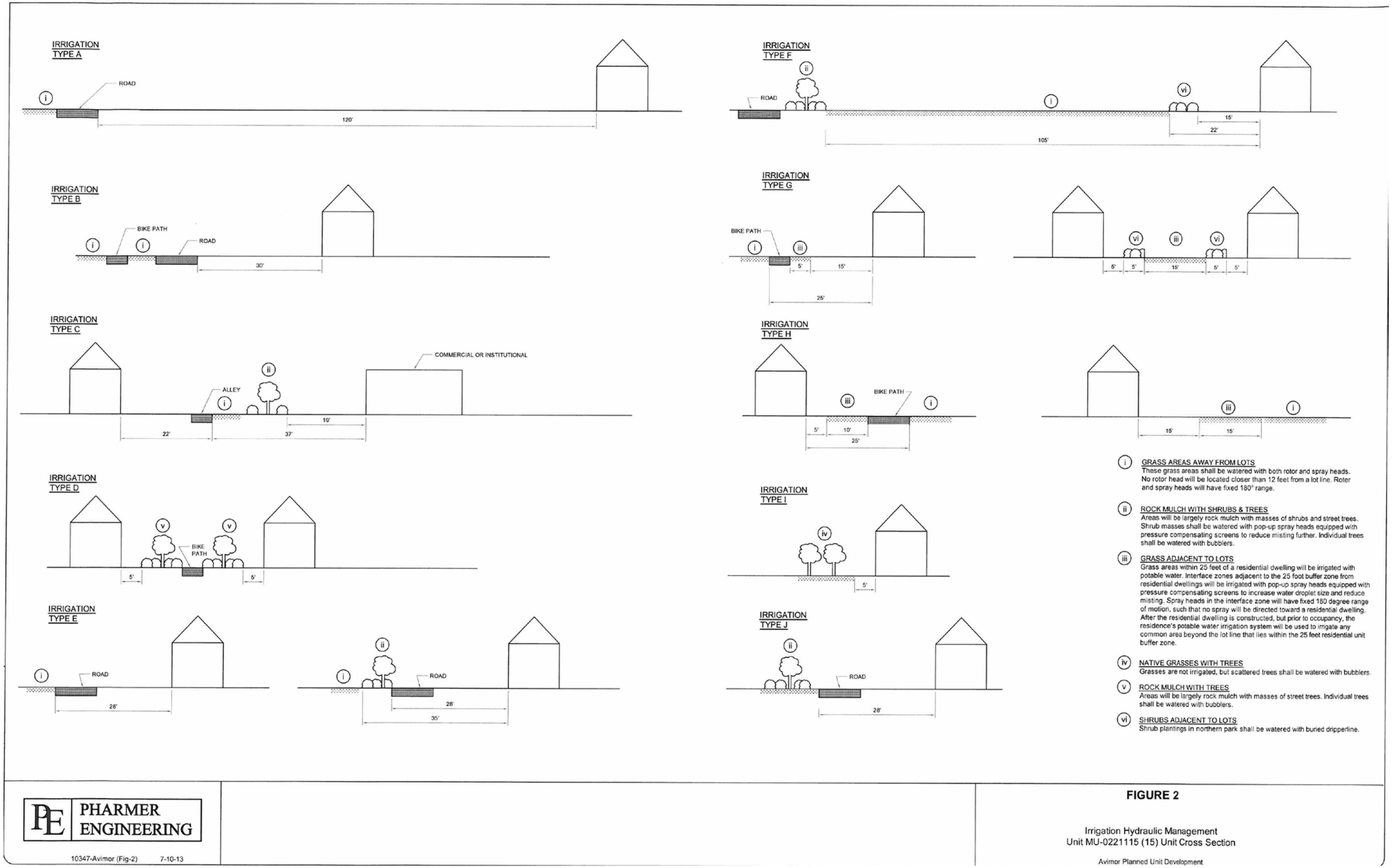

Figure A-3 -- Cross Sections of Landscaped Common Areas in Irrigation Areas (MU-21115)

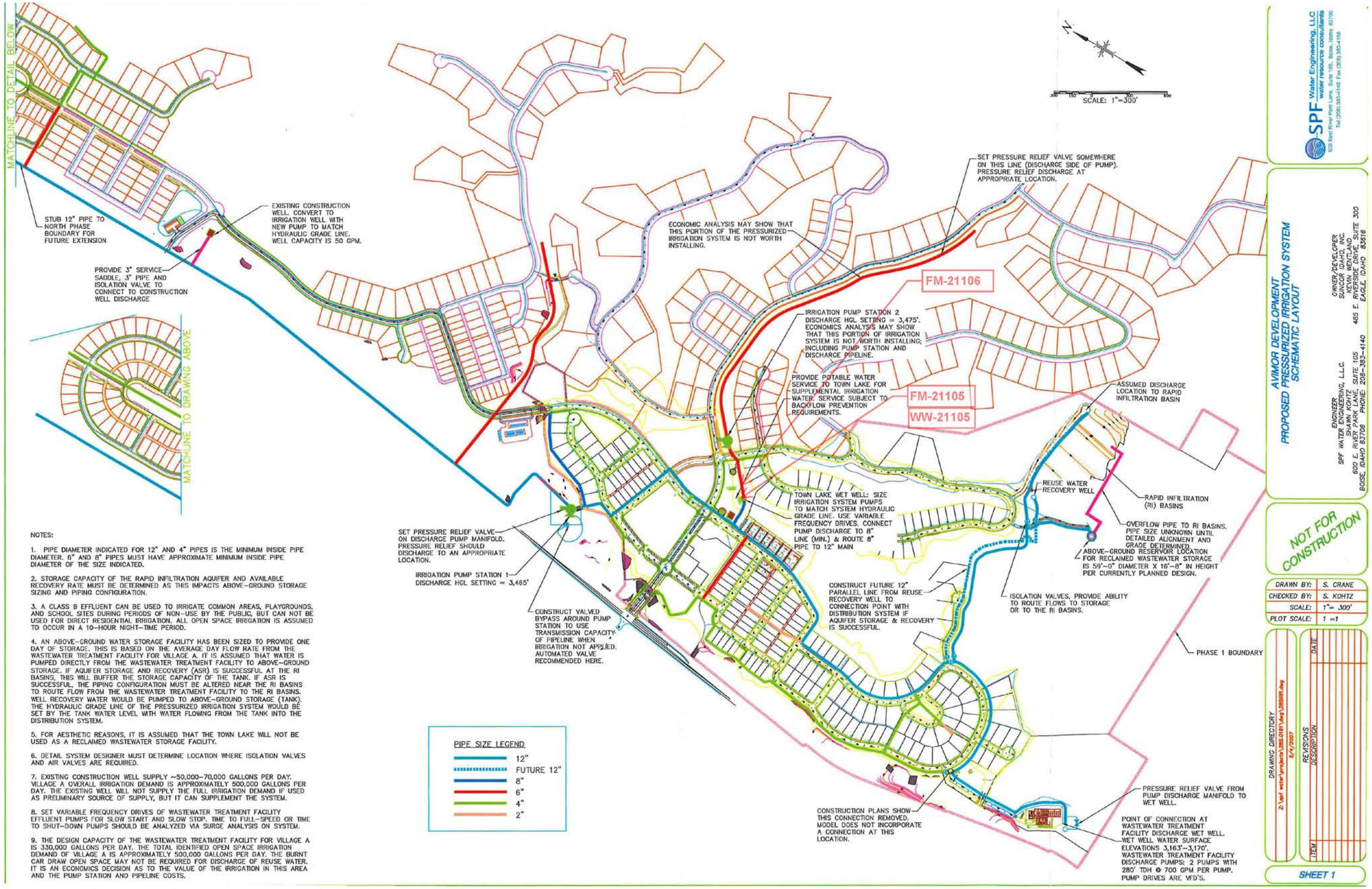

Figure A-4 -- Schematic of Irrigation Areas (MU-21115) Pressurized Irrigation System

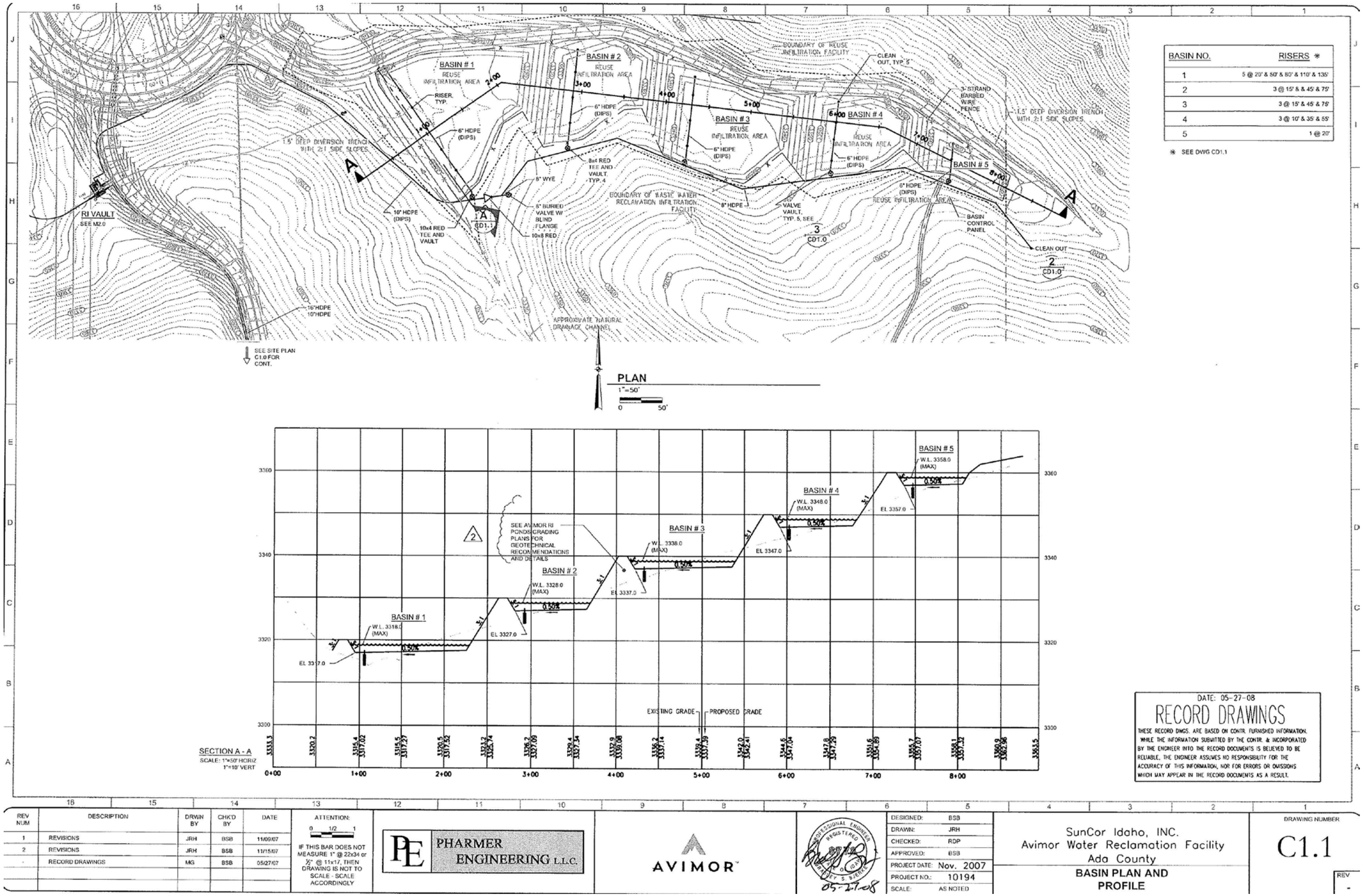

Figure A-5 -- AWRF RI System Record Drawing

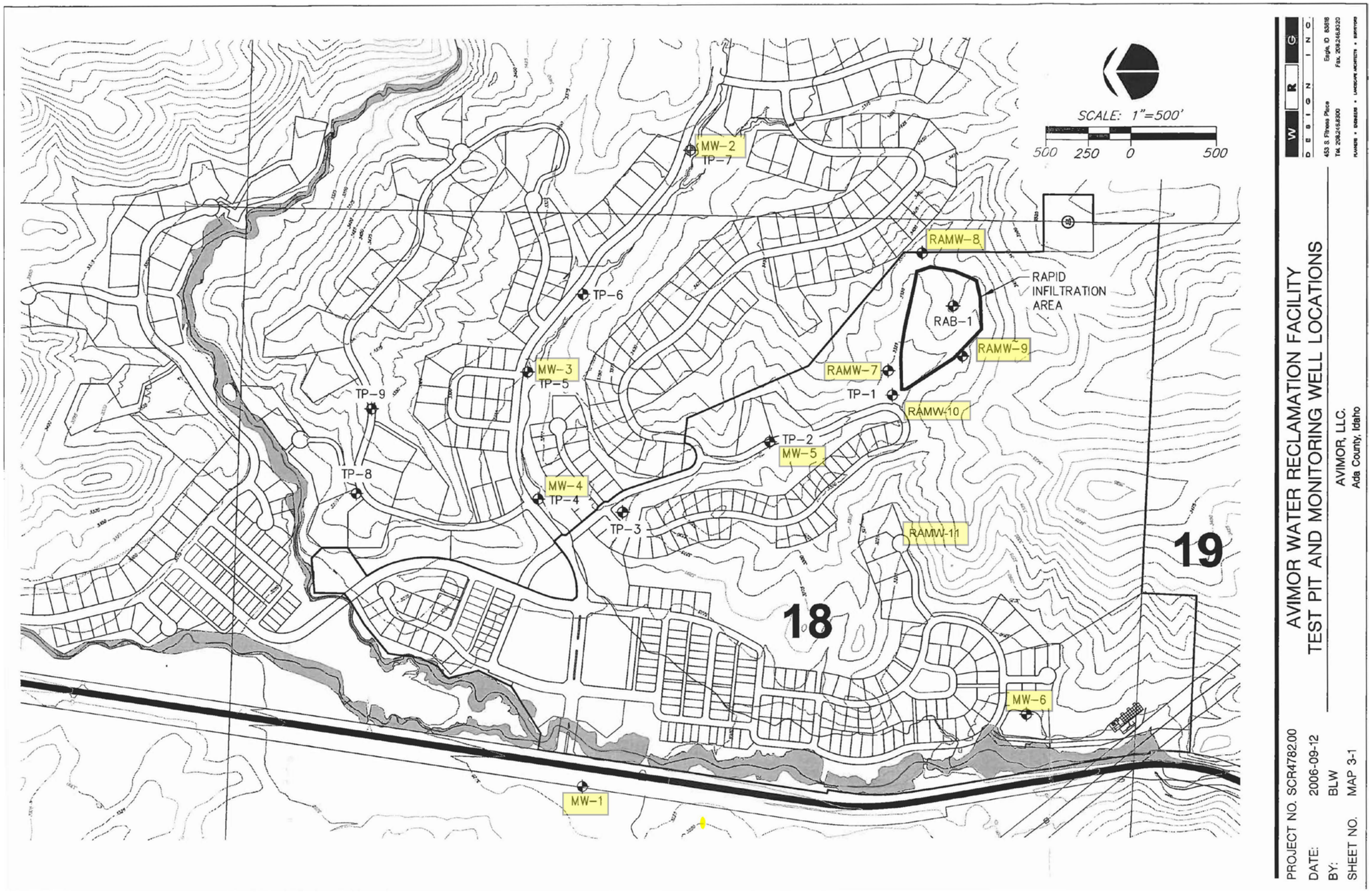

Figure A-6 -- Ground Water Monitoring Wells (2008 Revised Monitoring Plan)

Appendix B

- M-174-04 Hidden Springs Sewer Company – Reuse Permit Staff Analysis – pages 19-22 and 25-36 –August 21, 2014

Appendix B

M-174-04 Hidden Springs Sewer Company

Reuse Permit Staff Analysis – pages 19-22 and 25-36
August 21, 2014

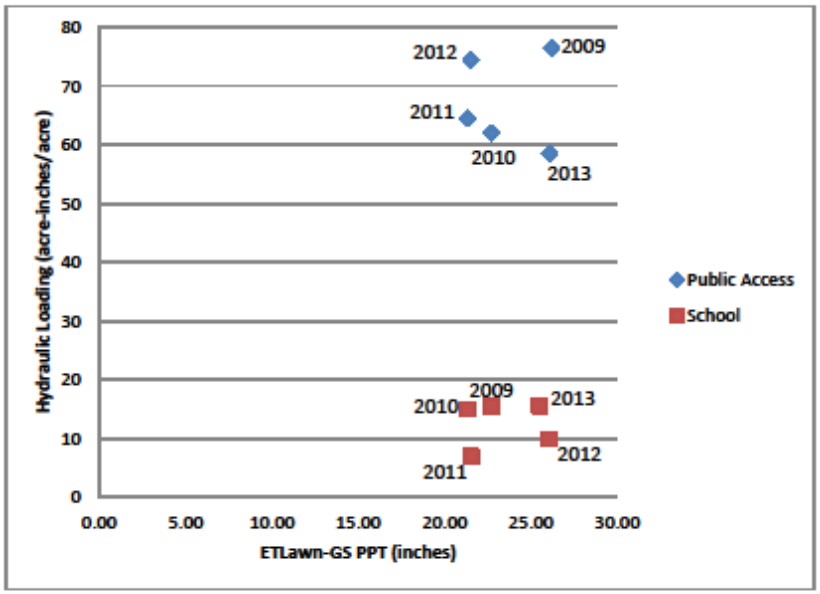

Figure 5. Relationship between reference lawn evapotranspiration minus cumulative spring, summer, and fall precipitation and hydraulic loading rate at MU-17408, 2009 to 2013.
Source: (United States Bureau of Reclamation 2014, NOAA 2014)

If flow rates have been measured accurately, nitrogen loading to the turfgrass is likely above crop uptake rates (discussed in Section 4.6.3), and excessive hydraulic loading rates could lead to nitrate leaching into the ground water. Even if ponding and runoff are avoided, a soil with a high enough infiltration rate could allow the applied irrigation water to percolate past the root zone faster than the nitrate can be taken up by the grass. Special concern should be placed on the hydraulic loading to the landscaped and turfgrass MUs, (MU-17407 and MU-17408), since together they appear to receive 75 percent of the total hydraulic loading.

4.6.3 Constituent Loading Rates

4.6.3.1 *Nitrogen Loading Rates*

Nitrogen loading doubled between 2008 and 2009, as shown in Table 10, almost immediately after Permit LA-000174-03 was issued. This explosion in nitrogen loading rates was a result of the increase in nitrogen concentration discussed in Section 4.6.1, since total recycled water volume did not increase much between these years, and may be related to the expanded treatment system being brought on-line after its construction in 2007. Still, most MUs had nitrogen loading rates below prospective limits calculated during the 2008 application process (Centra 2008a). Exceptions were the nitrogen loading rates to the Public Access Areas and the Landscape Areas. If flow rate measurements are accurate, almost 70 percent of the facility's nitrogen was loaded to these two units, at rates between one and a half and two times the suggested 174.6 lbs/acre/year turf nitrogen loading limit.

Table 10. Nitrogen Loading from 2008 to 2013.

	MU-17401				-06	-07	-08		
Year	Orchard (lbs/acre)	Farm 1 (lbs/acre)	Farm 2 (lbs/acre)	Farm 3 lbs/acre)	Natural Open Spaces (lbs/acre)	Landscape (lbs/acre)	School (lbs/acre)	Public Access (lbs/acre)	Total (lbs)
2008	58.3	59.5	5.2	0	24.7	142.8	—[a]	89.1	4,016
2009	31.9	63.4	181.9	22.4	47.3	273.6	70.4	327.1[d]	8,334
2010	59.7	83.1	140.1	0.0	47.2	272.9	80.2	326.3[d]	8,484
2011	60.6	60.0	62.2	19.6	43.1	249.6	32.5	298.4[d]	7,035
2012[b]	33.1	42.7	59.0	0.0	51.9	300.1	44.3	358.9	7,852
2013[b]	97.9	88.8	2.9	37.2	42.9	248.4	78.1	297.0	7,881
average	*56.9*	*66.2*	*75.2*	*13.2*	*42.8*	*247.9*	*61.1*	*321.5*	*7,917*
Percentage of total loading	*6.9%*	*3.0%*	*4.2%*	*0.8%*	*4.4%*	*11.3%*	*9.0%*	*57.1%*	—
Limit (est)[c]	*174.6*	*165.6*	*143.6*	*143.6*	*42.6*	*174.6*	*174.6*	*174.6*	—

a. Flow to the School Area was included in the reported flow to the Public Access Areas in 2008.
b. Nitrogen loading calculations in 2012 and 2013 were based on total hydraulic load instead of the recycled water volume, and so are reported as being slightly higher than they actually were.
c. From Table 10-2 (Centra 2012), though MU-17406 was the only MU with an established nitrogen loading limit in LA-000174-03.
d. Nitrogen loading calculations for the Public Access areas made in the Annual Reports for 2009 through 2011 divided the total nitrogen load by the 26.96 acres of MU-17408 instead of the 14.07 acres specifically designated for the Public access areas. The loading rates presented in Table 10 have been recalculated using an application area of 14.07 acres.

During the first renewal of the Hidden Springs permit in 2005, projections for nitrogen and phosphorus loading were considered to be so low that nutrient loading limits would not be required. Nitrogen loading was only expected to be 36.2 lbs/acre/year at this time, much lower than the 132 lbs/acre/year that was cited as an expectation of the nitrogen load that could be removed from a lawn where clippings were not returned. (Gaeddert and Wakagawa 2005). Phosphorus loading was projected to be 25 lbs/acre/year, similar to a referenced phosphorus uptake rate of 19 lbs/acre/year. As the permit was being renewed again in 2008, updated projections for future nitrogen and phosphorus loading rates to the lawns, when applying recycled water at the IWR (assumed to be the maximum allowable application rate), were 165 lbs N/acre/year and 85 lbs P/acre/year respectively (Centra 2008b). Nutrient uptake rates for turfgrass were also re-calculated during the permit re-application process, based on typical yields and nutrient content for Kentucky Bluegrass, as 116.4 lbs/acre/year nitrogen and 17.2 lbs/acre/year for phosphorus. Since the maximum nitrogen loading rate to turfgrass was assumed to be below the prospective nitrogen loading rate limit of 174.6 lbs/acre/year, set at 150 percent of the uptake rate, and that constituent concentrations in the wastewater were still within the range of the concentrations measured in the shallow aquifer (see Sections 4.5 and 4.6.1), no nitrogen loading limit was established in Permit LA-000174-03 either.

The highest nitrogen loading rates at the Public Access Areas and Landscape Areas are now typically higher than 250 lbs/acre/year, which is far above previous conceptions of what appropriate levels of nitrogen allowed to be loaded to turfgrass should be. EPA guidances and manuals for water reuse corroborate the nutrient uptake rates for typical turfgrass species referenced during previous permit renewals. Nitrogen uptake rates of grasses like Kentucky bluegrass, quackgrass, and ryegrass were noted as having nitrogen uptake rates ranging between 180 lb/acre/year and 250

lb/acre/year (EPA 1981). If the nitrogen uptake rates were listed for grasses specifically managed as turfgrass, uptake was expected to be even lower, ranging from 116 lbs/acre/year to 155 lb/acre/year (EPA 2006).

Most recommendations made by university extension services for nitrogen fertilization rates to a typical lawn were 175 lbs N/acre/year or less, sometimes decreased to 130 pounds N/acre if clippings are not removed (Minnesota Extension Service 1995). The highest recommended fertilization rate from a survey of these extension service recommendations was 220 lbs N/acre/year (Keeley and Whitney 1998). An introductory textbook on turfgrass management suggests that the highest nitrogen application rate to turfgrass in the bluegrass family to be 260 lbs N/acre/year (Turgeon 2005). These recommended fertilization rates may be higher than limits calculated from expected nitrogen uptake because they account for the loss of a fraction of the applied nitrogen through processes like denitrification, ammonia volatilization, and the immobilization of nitrogen into the soil. The Hidden Springs recycled water's nitrogen content is, on average, around 80 percent nitrate, so nitrogen loading from the recycled water is not likely to diminish much through denitrification or ammonia volatilization.

Applying nitrogen at high rates may even lead to increased growth or luxury consumption, allowing grass to take up an increased amount of nitrogen (DEQ 2007). Such luxury consumption may contribute to a few outlying reports of nitrogen uptake at rates far higher than those recommended nitrogen fertilization rates. On closer inspection though, these reported nitrogen uptake rates came from studies performed under conditions very different than what would be seen at Hidden Springs. The DEQ *Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater* mentions a turfgrass that had a measured nitrogen uptake rate of 525 lbs/acre/year, but the study measuring this rate was completed at latitude far to the south of Boise, allowing year round irrigation, and was performed with a subtropical grass species known for its high nitrogen needs (EPA 2006). A study carried out in a region with a growing season more like that found in Idaho showed nitrogen uptake rates from a number of forage grasses, when fertilized with manure, ranging from 525 lbs N/acre/year to 675 lbs N/acre/year (Downing 2002). However, the fields where the experiment was undertaken were managed as pasture, with grass species that are not likely to comprise a significant portion of a lawn.

Comparing nitrogen loading at Hidden Springs to recommended nitrogen loading rates may be less relevant if the amount of nitrogen applied to other lawns is much higher than the recommended rates. However, a survey conducted in Virginia recorded that only 9 percent of professional turfgrass managers reported that they applied between 222 lbs N/acre/year and 305 lbs N/acre/year of nitrogen to lawns, with less than 2 percent applying more, and only around 7 percent of golf course superintendents reported applying more than 222 lbs N/acre/year of nitrogen (Hall, Chalmers and McKissack 2009). The same survey respondents, managing turf areas or fairways, reported only removing clippings less than 10 percent of the time. With calculated nitrogen loading rates to the turfgrass at Hidden Springs often above 300 lbs N/acre/year, Hidden Springs' turfgrass could have nitrogen applied to it at rates greater than at least 90 percent of other lawns.

While few studies have looked at potential ground water impacts from applying treated wastewater to lawns, many have examined impacts from nitrogen applied with fertilizer. A survey of these studies showed an average of 10 to 14 percent of all applied nitrogen eventually leaches to the ground water (Horsley Witten Group 2009). It may be difficult to make generalizations from these

studies, though, since leaching rates found in individual studies varied between 0 and 95 percent. Some investigators deemed nitrogen loading rates between 218 lbs N/acre/year and 307 lbs N/acre/year pose little risk to ground water quality, while others discovered that loading rates between 229 lbs N/acre/year and 244 lbs N/acre/year could result in leachate nitrate concentrations of up to three times the GWQS (Frank 2006). One study that did specifically evaluate leaching rates from land application of treated wastewater to grass, though at a field that was managed as pasture, showed that even if nitrogen loading was held relatively constant around 350 lbs N/acre/year, nitrate uptake rates may be only half of the application rate at one site but uptake exceeded the loading rate at another (Barton, et al. 2005). The difference in uptake rates lead nitrogen leaching rates to vary between from 8 lbs N/acre/year to 82 lbs N/acre/year. It can only be concluded from these studies that at high nitrogen loading rates, ground water impacts will depend on a host of independent variables, some of which may favor Hidden Springs, but others that would lead to the loss of more nitrate to the ground water system. See Section 5.4 for site specific recommendations.

4.6.3.2 *Phosphorus Loading Rates*

Phosphorus loading has not, on average, increased as much as nitrogen loading during the past six years, though it is potentially being loaded at a rate that exceeds its uptake rate to an even greater degree than nitrogen. There has not been a detailed analysis performed of how such a high phosphorus loading rate could impact surface water quality.

Table 11. Phosphorus Loading from 2008 to 2013.

	MU-17401				-06	-07	-08		
Year	Orchard (lbs/acre)	Farm 1 (lbs/acre)	Farm 2 (lbs/acre)	Farm 3 (lbs/acre)	Natural Open Spaces (lbs/acre)	Landscape (lbs/acre)	School (lbs/acre)	Public Access (lbs/acre)	Total (lbs)
2008	16.6	16.9	1.3	—	7.1	41.2	—[b]	25.7	1,155
2009	8.9	21.8	49.5	6.1	13.3	76.9	19.4	92.0	1,726
2010	10.2	14.4	24.0	0.0	8.9	51.3	14.8	61.3	1,566
2011	11.1	9.2	10.9	3.6	7.9	45.6	6.1	54.6	1,281
2012[b]	5.4	6.9	9.7	0.0	8.5	49.4	6.9	59.1	1,287
2013[b]	23.6	20.8	1.4	9.3	10.4	60.2	18.9	72.0	1,910
average	*12.6*	*15.0*	*16.1*	*3.2*	*9.4*	*54.1*	*13.2*	*59.0*	*1,554*
Percentage of total loading	*7.8%*	*3.5%*	*4.6%*	*1.0%*	*4.9%*	*12.5%*	*11.0%*	*53.4%*	—
Uptake (est)[c]	*17.2*	*2.4*	*17.4*	*17.4*	*5.4*	*17.2*	*17.2*	*17.2*	—

a. Flow to the School Area was included in the reported flow to the Public Access Areas in 2008.
b. Phosphorus loading calculations in 2012 and 2013 were based on total hydraulic load instead of the recycled water volume, and so are reported as being slightly higher than they actually were.
c. From Table 10-2 (Centra 2012).

The irrigation efficiency of the sprinkler system at the Landscape Irrigation Area has been set to 0.70, which is still at the lower end of expected irrigation efficiencies for landscape areas (Asano, et al. 2007). An appropriately designed irrigation system should not have an irrigation efficiency of 0.4, as has been the case for the Landscape Area since LA-000174-04 was issued. A low irrigation efficiency caused by excessive runoff from the turf to the small area of the storm water detention basin would likely lead to increased leaching of nitrate during storm events.

5.4.2 Nitrogen Loading Limits

5.4.2.1 *Community Farm*

The nitrogen loading limit recommended for the Community Farm Area should depend on the crop grown at each specific plot. If field crops, like alfalfa or grass hay, are grown, nitrogen should be limited to 150 percent of crop uptake. Actual yields of the harvested crop should be measured, and the nitrogen uptake calculated from published crop content values.

If fruits or vegetables are grown, nitrogen loading should be limited to agronomic values recommended by published fertilizer guides or an equivalent reference. The required soil sampling results should be consulted before the beginning of the growing season to help determine the necessary amount of nutrients that should be added to these plots. The highest recommended nitrogen fertilization rates for berries are 100 lbs/acre/year for blueberries, 65 lbs/acre/year for raspberries, and 50 lbs/acre/year for strawberries (Mahler and Barney n.d.). Higher nitrogen fertilization rates are typically required when the fruit is being established. Agronomic nutrient loading rates would also be highly variable for vegetables, harvesting broccoli and cauliflower can remove between 85 to 90 lbs/acre/year of nitrogen, but harvesting peppermint can remove 200 lbs/acre/year (Sullivan, Hart and Christensen 1999).

Since the Orchard section of MU-17401, is not densely planted and a substantial portion of it is covered by turfgrass, nitrogen loading to the orchard should be limited to whichever is higher, agronomic rates for orchards or to the turfgrass limit set for MU-17407 and MU-17408.

5.4.2.2 *Natural Open Space*

The 42.6 lbs/acre/year loading rate limit presented in Table 10, was first submitted to DEQ during the reapplication process for LA-000174-02 (Centra 2008b). This loading limit was calculated as 150 percent of the typical uptake of wheatgrass, which was assumed to have the same nutrient uptake as the native vegetation planted at Hidden Springs (NRCS 2009)(Table 6-6). Similar nutrient uptake and loading recommendations can be found in other sources as well. Draft DEQ guidance for recycled water application to forested sites, states that areas with 100 percent woody vegetation as understory has a nitrogen-N uptake of 40 lbs/acre/year and one with 100 percent herbaceous vegetation as understory has a nitrogen uptake rate of 75 lbs/acre/year (DEQ In Preparation). The conditions of uncultivated fields are different from those that are actively managed, so the conventional DEQ practices of setting nitrogen loading limits as 150 percent of nitrogen uptake may not be appropriate, but 20 percent of applied nitrogen can be expected to be denitrified. Taking denitrification into account, the nitrogen loading limit would be between 50 lbs/acre/year and 94 lbs/acre/year. These loading rates are slightly higher, than the estimated ability of pasture to assimilate nitrogen, which was 75 lbs/acre/year for productive, highly managed pasture and 28 lbs/acre/year less productive pasture (NRCS 2000). A review of the measured nitrogen uptake rates

for different herbaceous cover crops that could be used in vegetated buffer strips, showed a range from 23 lbs/acre/year to 179 lbs/acre/year (Ducnuigee, Williard and Steiner 1997).

Taking into account the uncertainty in the measurements of nitrogen uptake rates for native vegetation, the nitrogen loading limit for the native vegetation growing in the Natural Open Space Area, MU-17406, included in M-174-04 has been set to 50 lbs/acre/year. Since it is within the conservative end of the range of likely nitrogen uptake rates for native vegetation, the limit should be protective of the environment for a wide range of vegetation types that could be growing at the many dispersed sections of this MU.

5.4.2.3 *Turfgrass*

If it is unknown how significantly nitrogen loading at Hidden Springs may be impacting ground water, and since efficacious monitoring would be difficult to implement, the turfgrass areas should be managed as best as possible to reduce the nitrogen load to any particular site. Obvious steps would be to optimize irrigation rates to minimize leaching and to remove clippings after each mowing. One years' worth of clippings could contain more than 90 lbs/acre of nitrogen, 25 to 50 percent of which would be recycled in the turf-soil system if clippings are returned (Turgeon 2005) (Kopp and Guillard 2002) (Horsley Witten Group 2009). Kopp and Guillard (2005) showed that if nitrogen fertilization rates were held constant, removing clippings dropped leaching rates from a range of 12.8 to 23.6 percent to range of 0.9 to 7.6 percent.

As an inducement for the permittee to continue or increase their removal of clippings, nitrogen loading limits have been established for landscaped MUs. This loading limit has been set so that nitrogen loading is not to exceed 220 lbs/acre/year with up to an additional 110 lbs/acre/year allowed if clippings are removed after every cutting. If clippings are removed during only a fraction of the cuttings, then the allowable loading would increase by 110 lbs/acre/year times the same percentage. This limit assumes a high nitrogen uptake rate for turf of 220 lbs/acre/year, with the loading limit set at 150 percent of crop nitrogen to be consistent with DEQ convention, and that 50 percent of the nitrogen content of the clippings is returned to the Turf Soil System (EPA 2006, Example 2-2).

6 Monitoring

6.1 Wastewater/Recycled Water Monitoring

Turbidity requirements in the Idaho Recycled Water Rules for Class B recycled water have been revised since Permit LA-000174-03 was issued. Previously filtered water at the Hidden Springs treatment plant was required to meet a 5 NTU instantaneous turbidity limit; and if exceeded, the rejected effluent was required to be recirculated through the lagoon system. The new turbidity limits set in the draft reuse permit have been raised so that daily arithmetic mean of turbidity in the filter effluent does not exceed 5 NTU, and filter effluent that has an instantaneous turbidity reading of more than 10 NTU is not allowed to be added to the irrigation system. These turbidity limits conform to the current turbidity requirements for Class B recycled water in IDAPA 58.01.17.601.02.b.i. Additionally the disinfection requirements in Section 601.02.a.i., for Class B Recycled Water, was changed so that the disinfection process must provide a 1 mg/L total chlorine

Appendix C

- Avimor Water Reclamation Facility Operations and Maintenance Agreement – Contract between OMCS, LLC and AWRC

Project: Avimor Water Reclamation Facility Operations and Maintenance Agreement
RCE- 16391

Avimor Water Reclamation Company
485 East Riverside Drive
Suite 300
Eagle, Idaho 83616

WASTEWATER COLLECTION, TREATMENT, RECLAMATION, IRRIGATION SYSTEMS OPERATIONS, MAINTENANCE AND MANAGEMENT SERVICES AGREEMENT

This Agreement is made this 1 day of Feb, 2008, by and between Avimor Water Reclamation Company ("Owner") and OMCS, LLC an Idaho corporation ("Operator"), Boise, Idaho Certified Operator and Operator's License No. WWT4-10479, relating to the project known as Avimor Water Reclamation Facility Operations and Maintenance Agreement (the "Project") on Owner's property located at Eagle, Idaho and legally described in Exhibit A attached hereto and incorporated herein by this reference. Owner and Operator agree as follows:

Whereas, Owner owns and provides for the operation of wastewater collection and related treatment and reclamation facilities; and

Whereas, Owner desires to employ the services of Operator in the management, operation and maintenance of these facilities and Operator desires to perform such services in return for the compensation provided for herein.

Whereas, both Parties explicitly acknowledge the incomplete state of construction of the Avimor Development and the following required or intended activities:

a. Oversight and proper disposal of sewage from wastewater treatment system during initial phases of the Avimor development construction will be required due to the lack of available influent to maintain an active biology in the treatment system; and

b. Provide documentation of "Responsible Charge Personnel" to Idaho Department of Environmental Quality.

Now, therefore, inconsideration of the mutual covenants and agreements hereinafter set forth, Owner and Operator agree as follows:

1. General

1.1. Definitions:

a. Annual Fee shall mean a mutually agreed upon predetermined sum to be paid to Operator by Owner for its services. The Annual Fee shall include compensation for all Operator's direct costs incurred with respect to the services provided under this Agreement, including overhead and profit.

b. Capital Expenditures shall mean any expenditures for (1) the purchase of new equipment or facility items that cost more than Two thousand dollars ($2,000.00); or (2) major repairs which significantly extend equipment or facility service life and cost more than Two thousand dollars ($2,000.00); or (3) non-routine, planned and budgeted expenditures by OWNER.

c. Cost shall mean all direct and indirect costs determined on an accrual basis in accordance with general accepted accounting principles.

d. Facilities shall mean all grounds, equipment, structures, rights-of-way, piping, and facilities required for the collection, treatment, storage and conveyance to the location of re-use of wastewater generated within the boundaries of the Avimor Planned Community.

e. Maintenance shall mean those routine or repetitive activities required or recommended by the equipment or facility manufacturer or by Operator to maximize the service life of the Facilities.

f. Pipelines shall mean (1) all sewage collection gravity pipelines, (2) all sewage force mains, (3) all reclaimed water return pipelines, and (4) all irrigation distribution pipelines.

g. Spare Parts shall mean equipment and components thereof maintained on hand for the prompt replacement of either frequently, routinely replaced parts, or parts infrequently replaced but requiring long lead times, i.e., not generally available on hand in local parts houses. Spare parts may have been purchased by Operator with funds specifically allocated by OWNER, or purchased by Operator with monies from a budget funded by OWNER periodic or special payments to Operator. All "special tools" acquired by OWNER or Operator for Avimor will remain with OWNER.

h. Special Tools shall mean implements provided by OWNER, equipment vendors or installers, or Operator, purchases with funds provided either directly or indirectly by OWNER, specifically for the operation, maintenance, repair or improvement of the OWNER Facilities. Where provided by Operator, "Special Tools" is intended to encompass tools, materials and supplies not generally available at a local store or supplier, or tools not generally available at a local store or supplier, or tools not generally available in the tool box of an experienced, qualified plant operator.

i. Unforeseen Circumstances shall mean any event or conditions which has an effect on the rights of obligations of the parties under this Agreement, or upon the Facilities, which is beyond the reasonable control of the party relying thereon and constitutes a justification for a delay in or non-performance of action required by this Agreement including but not limited to (1) and act of God, landslide, lightening, earthquake, tornado, fire, explosion, flood, acts of the public enemy, war, blockade, sabotage, insurrection, riot or civil disturbance: (2) preliminary or final order of any administrative agency or governmental body of competent jurisdiction; (3) any change in law, regulation, rule, requirement, interpretation or statute adopted, promulgated, issued or otherwise specifically modified or changed by any governmental body; (4) labor disputes, strikes, work slowdowns or work stoppages, but specifically excluding labor disputes, strikes, work slowdowns or work stoppages by employees of Operator; and (5) loss of or

inability to obtain service from a utility necessary to furnish power to the operation and maintenance of the Facilities.

j. WWTP (Wastewater Treatment Plant) shall mean the Avimor Water Reclamation Facility, collection system and complete Reuse Permit System including but not limited to land application through pressurized irrigation system and rapid infiltration site.

k. Calendar Days. The term "day" as used in this Agreement or the Contract Documents shall mean calendar day unless otherwise specifically defined.

1.2 All land, buildings, facilities, easements, licenses, rights-of-way, equipment, Special Tools, supplies and Spare Parts presently or hereinafter acquired (whether by OWNER or Operator) expressly for use under this Agreement, or owned by OWNER shall remain the exclusive property of OWNER unless specifically provided for otherwise is this Agreement.

1.3 This Agreement shall be governed by and interpreted in accordance with the laws of the State of Idaho. In the event of a dispute, OWNER and Operator agree that the appropriate venue for any litigation shall be in the District Court of the Fourth Judicial District of the State of Idaho, in and for the County of Ada.

1.4 The Agreement shall be binding upon the successors and assigns of each of the parties, but neither party shall assign this Agreement without the prior written consent of the other party. Consent shall not be unreasonably withheld. Operator acknowledges that projects such as Avimor occasionally undergo changes of ownership in their entirety or assignment during the normal course of financial transactions and will not create an impediment to such changes or transactions.

1.5 All notices shall be in writing and transmitted to the receiving party's address. All notices shall be deemed effectively given when delivered, if delivered personally or by courier mail service, i.e., Federal Express or Airborne Express, delivered after such notice has been deposited in the United States mail postage prepaid, if mailed certified or registered U.S. mail, return receipt requested; or received by the party for which notice is intended if given in any other manner, including facsimile where electronic acknowledgement of receipt is provided.

Addresses for giving notices:

If to Avimor Water Reclamation Company:

Avimor Water Reclamation Company
485 East Riverside Drive
Suite 300
Eagle, Idaho 83616

If to Operator:

OMCS, L.L.C.
9245 W. Bay Stream Ct.
Boise, Idaho 83714

With a copy to:

SunCor Development Company
Attn: Legal Department
80 E. Rio Salado Parkway, Suite 410
Tempe, Arizona 85281

1.6 This Agreement, including Exhibits, is the entire Agreement between the parties. This Agreement may be modified only by written amendment signed by both parties.

1.7 If any term, provision, covenant or condition of this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions shall remain in full force and effect and shall in no way be affected, impaired or invalidated. In such event, OWNER and Operator agree that the Agreement shall be reformed to replace such invalidated provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

1.8 It is understood that the relationship of Operator to OWNER is that of independent Operator. The services provided under this Agreement are of a professional nature and shall be performed in accordance with good and accepted industry practices for contract operators similarly situated. However, such services shall not be considered engineering services and nothing herein is intended to imply that Operator is to supply professional engineering services to OWNER unless specifically stated in this Agreement to the contrary.

1.9 If any litigation is necessary to enforce the terms of this Agreement, the prevailing party shall be entitled to reasonable attorney's fees, which are directly attributed to such litigation in addition to any other relief to which it may be entitled.

1.10 Nothing in this Agreement shall be construed to create in any third party or in favor of any third party any right(s), license(s), power(s).

1.11 Prior to the commencement of work under this Agreement, each party shall designate in writing an employee or other representative of the designating party who shall have full authority to approve changes in the Scope of Work and compensation therefore, execute written Change Orders reflecting such changes, render decisions promptly, and furnish information expeditiously to the other party when necessary.

2. The Work and Contract Documents. Operator agrees to furnish, at its sole expense, to the satisfaction of Owner, all labor and expertise necessary to complete the work described below (the "Work"):

The Contract Documents are listed on Exhibit B attached hereto and incorporated herein by this reference. The Contract Documents consist of this Agreement, and all other relevant documents set forth in Exhibit B.

3. Payment and Terms. Payment shall be conditioned upon Operator's compliance with the payment terms and conditions set forth below, and payment shall be made within thirty (30) days of Operator's full compliance with said terms and conditions. Payment shall not constitute acceptance by Owner or evidence thereof of any Work performed. Invoices are due on the 5th of each month and must be accompanied by laboratory bills or other backup documentation for expenses incurred for which Operator is seeking reimbursement.

3.1 Form of Payment. Owner may pay Operator by check made payable to Operator or by joint check made payable to Operator and any sub-operator, lower-tier sub-operator or materialmen.

3.2 Bulk Material Orders. With the prior written approval of Owner, Operator may advance order the bulk delivery of work materials to be incorporated into the Work over the course of this

Agreement, and upon delivery and receipt of Operator's proper application for payment Owner shall pay the full amount billed in the supplier invoice either directly to the Operator, or to the vendor or by joint check to Operator and vendor, and shall receive a full lien release for the amount paid from vendor and Operator. Operator agrees to assume full responsibility for the safekeeping of all said materials and shall guarantee to Owner that said materials shall remain safe from theft or damage from any and all causes (unless caused by the sole negligence of Owner). Operator shall immediately replace, repair or restore said materials to their original condition so as to not cause any delay in the Work, and Operator shall indemnify and hold harmless Owner from and against any and all loss, cost, liability or expense resulting from any loss or damage to any of the materials described herein from any cause unless due to Owner's sole negligence. Should Owner have reason to believe Operator is not properly safeguarding any of the said materials, Owner shall have the right to immediately take such steps as it deems necessary to do so, including removing Operator from the job, replacing any materials or expending any sums to properly carry out Operator's responsibility hereunder, and any amounts so expended shall be billed back to Operator or deducted from any sums then or thereafter due to Operator. Operator shall fully insure all materials stored on site as required by Owner, and if such insurance is not obtainable due to a lack of insurable interest, Owner shall have the right to obtain such insurance and charge the amount thereof back to Operator or deduct said amount from any funds then or thereafter due to Operator.

3.3 Term. The initial term of this Agreement shall be one (1) year commencing February 1, 2008. Thereafter, this Agreement may be renewed for a successive term of one (1) year unless canceled in writing by either party no less than forty-five (45) days prior to expiration.

4. Contactor's Services

4.1 Contactor shall operate and maintain the Facilities in conformance with the EPA and the Idaho Department of Environmental Quality or any other designated regulatory entity.

4.2 Operator shall assume all liabilities, including payment of fines and penalties that are the result of the Operator's negligence.

4.3 Operator will staff the Project with employees who have met the appropriate licensing and certification requirements of the State of Idaho. All such personnel must hold current licenses, certificates or authority to perform the work required of their respective positions.

4.4 Operator shall provide ongoing training and education for appropriate personnel in all necessary areas of modern wastewater process control, operations, maintenance, safety, and supervisory skills, as appropriate to the position held by each person.

4.5 Operator shall develop and/or supply and utilize their own computerized programs for maintenance, process control, operation and maintenance cost accounting, and laboratory Quality Assurance/Quality Control as necessary for the efficient performance of this Agreement.

4.6 Immediately after Operator begins service under this Agreement, Operator will provide a physical inventory of OWNER's tools, materials, supplies, Spare Parts and equipment in use at the Facility and a general statement as to the condition of each. Such inventory shall be updated and provided annually thereafter, by January 31 indicating the inventory as of December 31 of the previous year. This inventory report is due one (1) week after Operator begins service.

4.7 Operator will provide OWNER with a physical inventory of chemicals and other consumables on hand when Operator begins services under this Agreement and annually thereafter. Annual inventory reports shall be provided by January 31 indicating materials on hand as of December 31 of the previous year.

4.8 Operator shall be responsible for maintaining all manufacturers' warranties on equipment and assist OWNER in enforcing such equipment warranties and guaranties.

4.9 Operator shall provide OWNER with full documentation that preventive maintenance is being performed on OWNER's owned equipment in accordance with manufacturers' recommendations at intervals and in sufficient detail as may be determined appropriate by concurrence of OWNER and the Operator. Such a maintenance program must include documentation of corrective and preventive maintenance and a Spare Parts inventory update.

4.10 Operator shall operate, maintain and/or monitor the Facilities on a 24-hour per day, seven-day per week, 365-day per year schedule. Perform all Facilities maintenance and repairs, including emergency response and unscheduled repairs.

4.11 OWNER employees and guests designated by OWNER's representative may make visits to all Facilities. Operator shall provide OWNER three (3) sets of keys for use in such visits. New keys shall immediately be provided to OWNER whenever there are any lock changes.

4.12 Operator will perform a Comprehensive Maintenance Evaluation ("CME") on all Facilities. The CME will be performed and its written report shall be delivered to OWNER within the thirty (30) days prior to each anniversary date of the Agreement.

4.13 Operator will implement and maintain an employee safety program in compliance with applicable laws, rules and regulations and make recommendations to OWNER regarding the need, if any, for OWNER to modify the Facilities to comply with governmental safety regulations applicable to Operator operations.

4.14 Operator may recommend modifications of the Facilities to achieve the objectives of this Agreement, however, no modification shall be made without OWNER's prior written approval.

4.15 In any emergency affecting the safety of persons or property or the integrity of the Facilities, Operator may act without written amendment or change order, at Operator discretion, to prevent threatened damage, injury or loss. Operator shall be compensated by OWNER for any such emergency work notwithstanding the lack of a written amendment. Such compensation shall include Operator Costs for the emergency work plus the mark-up for overhead and profit provided by the Agreement. Operator shall make a reasonable effort to contact the OWNER-designated representative as soon as possible during or after the emergency.

4.16 As required by law, permit or court order, Operator shall assist in the preparation of plant performance reports and submit them to OWNER for signature and transmittal to appropriate authorities. Draft reports shall be furnished to OWNER no later than fifteen days prior to the due dates.

4.17 Operator will provide laboratory testing and sampling presently required by the plant performance portions of the DEQ operating agreement, permits and regulations.

4.18 Operator will provide for the collection and hauling of solid waste, screenings, grit, sludge and scum ("Waste") to OWNER-approved disposal sites. It shall be the sole right and responsibility of OWNER to designate, approve or select disposal sites to be used by Operator for OWNER's waste materials.

4.19 Operator will apprise OWNER of the need to dispose of hazardous waste materials with sufficient advance notice as to allow OWNER time to make the necessary arrangements. Operator will provide information regarding the nature, quantity and regulatory classification(s) of such wastes. No hazardous waste materials will be removed from the Facilities without OWNER's prior written consent.

4.20 Upon OWNER request or as deemed necessary by Operator, Operator will provide a list of recommended capital improvements to the Facilities. Such recommendations shall include the benefits to be obtained and the estimated cost of the improvements. Operator will not be relieved of its responsibility to perform if the recommendations are not implemented. If approved, OWNER will make arrangements for the design and construction of such improvements.

4.21 Maintain the grounds within and fifty (50) feet outside the Wastewater Reclamation Facility's fence. Maintain and remove snow from the WWTP access road.

4.22 Pay all costs during the normal operation and maintenance of the Facilities except utilities (electric power, water, telephone, natural gas and temporary compressor fuel), that shall be arranged and paid by OWNER. Operator shall obtain OWNER's written approval prior to making any commitments for Capital Expenditures unless otherwise provided by this Agreement.

4.23 Within the design capacity and capabilities of the Waste Treatment Plant, Operator will manage, operate and maintain the Facilities so that effluent discharged to the irrigation system consistently meets the requirements specified in the IDEQ Land Application agreement and NPDES Permit.

4.24 Operator shall perform the sampling and laboratory analysis program described in the Wastewater Land Application Permit. Results of all sampling and testing shall be reported to OWNER in a timely manner to allow review, revision as appropriate, and submittal to IDEQ and EPA according to the permit requirements.

4.25 Provide technical support for normal operation and maintenance of the Facilities to OWNER as requested and approved by OWNER.

4.26 Provide tools and equipment not kept on site for the normal operation and maintenance of the Facilities.

4.27 Provide vehicles required for the efficient performance of the duties contracted under this Agreement.

5. OWNER's Duties

5.1 OWNER warrants to Operator that the Facilities are designed and constructed to comply with the IDEQ Agreement, Exhibit D and all IDEQ regulations, under normal operating conditions.

5.2 OWNER shall provide the monies necessary for the operation, maintenance, repair and expansion of the facilities, including engineering and construction of the required expansions.

5.3 OWNER shall keep in force all Facility warranties, guaranties, easements and licenses that have been granted to OWNER and are not transferred to Operator under this Agreement.

5.4 OWNER shall pay all sales, excise, *ad valorem*, property, franchise, occupational and disposal taxes, or other taxes associated with operation of the Facilities, other than taxes imposed upon Operator's income and/or payroll taxes for Operator employees.

5.1 OWNER shall provide Operator and Operator's sub-operators access as necessary for the performance of the duties under this Agreement.

5.2 OWNER shall provide the Special Tools and Spare Parts necessary to be kept on site for the normal operation and maintenance of the Facilities.

5.3 OWNER shall provide property damage insurance for the Facilities owned by OWNER.

5.4 OWNER does not maintain a security force on site. The Ada County Sheriff provides public protection services. Operator shall take all reasonable precautions to safeguard its and OWNER's property against theft and vandalism.

5. Inspection, Safety and Compliance. Operator has inspected the WWTP, DEQ Agreement, Exhibit D, and is not relying on any opinions or representations of Owner. Operator agrees to perform and complete such Work in strict accordance with the Contract Documents and under the general direction of Owner. Operator agrees that any exclusions of any Work must be approved in writing by Owner prior to acceptance of this Agreement or same shall not be excluded hereunder. Operator is responsible for all safety precautions and programs and shall provide all protection and necessary supervision to implement said precautions and programs. Operator shall take all reasonable precautions for the safety of and provide reasonable protection to prevent damage, injury or loss to: (a) employees or others on the Project; (b) the Work and materials; and (c) other property at the Project or adjacent thereto. Operator shall designate a responsible person on the Project whose duty shall be prevention of accidents. Operator shall provide all competent supervision necessary to execute all Work and any Work incidental thereto in a thorough, first-class workmanlike manner. It is Operator's responsibility that all of the Work and any work incidental thereto conforms to, and is performed in accordance with all applicable federal, state, county and city laws, codes, ordinances, regulations (including NPDES and air pollution) and orders of public authorities bearing on performance of the Work by qualified, careful and efficient workers satisfactory to Owner. Operator shall obtain and maintain all applicable and relevant certification, licenses and permits for the conduct of its business and the performance of the Work.

6. Changes in Scope. A Change in Scope of services shall occur when and as Operator's cost of providing services under this Agreement change as a result of:

6.1 Any reasonably unforeseeable change in Facilities operations, personnel qualification or staffing requirements;

6.2 OWNER's request of Operator and Operator's consent to provide additional services.

6.3 For Changes in Scope of services provided, compensation shall be adjusted on the basis of the Operator-furnished hourly rates in Exhibit B, with quantities of work to be negotiated equitably between OWNER and Operator and agreed in a written Amendment hereto, prior to commencement of performance of changes in scope.

7. Work by Owner or by Separate Operators. The Owner reserves the right to perform work related to the Project with its own forces, and to award separate contracts in connection with such work. When separate contracts are awarded for different portions of the Project or other work on the site, the term "Operator" in the Contract Documents in each case shall mean the Operator who executes each separate owner-Operator agreement. The Owner will provide for the coordination of the work of his own forces and of each separate Operator with the Work of the Operator herein and the Operator herein shall cooperate with the Owner's coordination of separate Operators.

8. Performance of the Work, Scheduling and Delay Damages.

Disputes and Force Majeure

8.1 In the event activities by employee groups or unions cause a disruption in Operator's ability to perform under this Agreement, OWNER, with Operator's assistance or Operator at its own option, may seek appropriate injunctive court orders. During any such disruption, Operator shall operate the facilities on a best-efforts basis until any such disruption ceases.

8.2 Neither party shall be liable for its failure to perform its obligations under this Agreement if such failure is due to any Unforeseen Circumstances beyond its reasonable control or force majeure. However, this Section may not be used by either party to avoid, delay or otherwise affect any payments due to the other party.

8.3 Operator agrees that it shall carry on with performance of the Agreement and adhere to progress schedules during all disputes and disagreements with OWNER. No work shall be delayed or postponed pending resolution of any disputes or disagreements, except as OWNER and Operator may otherwise agree in writing.

8.4 Owner's Right to Stop, Carry Out or Correct the Work. If at any time during the performance of the Work, it should appear to the Owner, in its sole discretion, that Operator will not complete its Work within the Contract Time and pursuant to a progress schedule as the same may be revised, or if the manner in which the Operator carries out its obligations under this Agreement interferes for any reason with the ability of other Operators or workers to perform work on the same job in accordance with such time schedules, Owner shall have the sole and absolute right on seventy-two (72) hours written notice delivered to Operator's usual place of business or if said place of business is closed or Operator cannot be found at a place of business then by posting such written notice on the jobsite, to replace Operator by taking over the Work or procuring another to complete this contract. In the event Owner deems it necessary to take over, any expense incurred thereby shall be deducted from any sum due to Operator hereunder for the portion of the Work completed to the date of Owner's said take over, and if such sum is insufficient to defray such expenses, the deficiency shall be charged back to Operator and shall be due and payable immediately to Owner upon demand. Such taking over shall not constitute or be construed as a waiver by Owner of any action, claim or demand Owner may have

against Operator by reason of injury or damage resulting to Owner because of Operator's failure of performance hereunder. Operator shall pay to Owner a sum equal to Owner's total cost of completing such work, and a sum for reasonable attorneys' fees and litigation expenses in taking over and completing such Work. In no event shall any delay in performance hereunder by Operator be excused unless, and then to the extent only, such delay is excused by Owner in writing.

8.5 Damages for Delay by Operator. It is expressly understood that should Operator fail to complete the Work covered hereby within the Contract Time, then Operator shall be liable to Owner and agrees to pay Owner for all losses, costs, expenses, liabilities and damages, including direct, consequential and incidental damages, sustained by Owner or for which Owner may be liable to any other party because of Operator's delay. The obligation of Operator to Owner for delay damages under this paragraph shall be deducted from the balance due Operator. Should such obligation for delay damages exceed the sum due or to become due to Operator, then Operator shall pay to Owner such difference immediately upon written demand from the Owner.

8.6 No Damage for Delay by Owner. Operator shall adjust its operations to conform to any progress schedule changes and hereby waives and releases Owner from any liability for damages or expenses which may be caused to or sustained by Operator by reason of such changes or by reason of delays in the Work, whether caused in whole or in part by conduct on the part of Owner, including without limitation, any breach of this Agreement or delays by other Operators or sub-operators. Operator's exclusive remedy in event of delay by Owner shall be an extension of time hereunder to complete the Work.

9. Insurance. Prior to commencing any of the Work hereunder, and as a condition for payment for any work, Operator shall show proof acceptable to OWNER that it has secured, and maintains, the following insurance coverage:

9.1 **Workers' Compensation & Employer's Liability Insurance**. The Workers' Compensation Insurance shall be in the form and amount required by applicable state statute, and shall provide coverages in amounts and scope that are the greater of those required by applicable statute, or the following: (a) $500,000 Each Accident; (b) $500,000 Disease – Policy Limit; and (c) $500,000 Disease – Each Employee. The Workers' Compensation policy shall contain endorsements providing (i) a waiver of subrogation in favor of Owner; and (ii) thirty (30) days' written notice to Owner in the event of cancellation or material reduction in coverage.

9.2 **Comprehensive General Liability Insurance**. Operator shall provide broad form general liability coverage on an occurrence basis (at least as broad as ISO Occurrence form CG 0001) with a minimum limit of $1,000,000 per occurrence, and in the aggregate, that provides the following coverages: (i) Premises, operations and mobile equipment liability coverage for explosion, collapse and underground hazards; (ii) independent operator's coverage (liability an operator may incur as a result of the operations, acts or omissions of subcontractors, suppliers and their agents or employees); (iii) products and completed operations coverage; (iv) blanket contractual coverage including written contracts and obligations assumed by Operator under the Contract Documents; (v) personal injury coverage; (vi) broad form property damage coverage including completed operations; (vii) an endorsement naming OWNER as an additional insured on all coverages; and (viii) an endorsement providing thirty (30) days' written notice to Owner in the event of cancellation or material reduction in coverage. Claims-made coverage or modified occurrence is not acceptable. In addition, all aggregate coverages required pursuant to this

Section 9.2 shall be "per job" aggregate limits. No endorsement limiting or excluding a standard coverage is permitted.

9.3 **Business Auto Liability Insurance.** $1,000,000 each occurrence combined single limit for bodily injury and/or property damage liability, including coverage for (i) owned automobiles; (ii) hired or borrowed automobiles; and (iii) non-owned automobiles. Operator shall provide an endorsement naming Owner and such additional parties as Operator or Project Owner reasonably designate as additional insureds. Said endorsement shall provide thirty (30) days' written notice to Owner in the event of cancellation or material reduction in coverage.

9.4 **General Requirements.** A certificate and endorsement in a form acceptable to Owner demonstrating compliance with the above insurance requirements (or, at Owner's request , certified copies of Operator's actual policies) shall be delivered to Owner before Operator performs any of the Work or prepares or delivers material to the Project. Operator shall maintain all of the above insurance coverage in force until the completion of the Project and the Work. Operator shall maintain the Products and Completed Operations Liability Coverage, including the required endorsements, in force until expiration of the applicable statute of limitation relating to latent defects in construction of or improvements to real property.

The use of self-insured retention or deductibles in excess of $10,000 shall not be allowed unless specifically approved by Owner in advance and in writing. Operator is fully responsible for payment of any self-insured retentions or deductibles, regardless of their amount.

9.5 **Survival.** The provisions of this Section 9 shall survive the expiration or earlier termination of this Agreement.

10. Taxes. Operator shall be responsible for and shall promptly make all payments of taxes, contributions and/or premiums payable on its employees or on its operations under workers' compensation laws, unemployment compensation laws, the Federal Social Security Act, health and welfare benefit plans, gross business taxes, sales and use taxes and any other taxes, contributions and/or premiums which may become payable by operation of law or contract, including contributions payable by the employees, and Operator shall save Owner harmless from all liability, loss and expense resulting from Operator's failure to comply with such requirements. Operator shall comply with any rules and regulations at any time applicable hereto and shall, on demand, substantiate that all taxes and other charges are being properly paid.

11. Liens. If any sub-operator, laborer or materialman of the Operator or any other person directly or indirectly acting for, through or under it or any of them, files or maintains a mechanic's lien or claims against the Project or premises or any part thereof or any interests therein or any improvements thereon or against any monies due or to become due from the Owner to the Operator, or on account of any work, labor, services, materials, equipment or other items furnished for or in connection with the Work or under any change order or supplemental agreement for extra or additional work in connection with the Project or serves a stop notice or bonded stop notice on Owner or any construction lender pursuant to Idaho Revised Statutes, the Operator agrees to cause such lien claims, stop notices or bonded stop notices to be satisfied, removed or discharged at its own expense by bond, payment or otherwise within ten (10) days from the date of the filing of such lien or claim, or service of such stop notice or bonded stop notice; upon Operator's failure to do so, Owner shall have the right, in addition to all other rights and remedies provided under this Agreement and the Contract Documents by law, to cause such liens, claims or stop notices to be satisfied, removed, discharged or bonded around by whatever means Owner chooses, at the entire cost and expense of the Operator (such cost and expense to include Owner's legal fees). Further, Operator agrees to indemnify, protect and save harmless Owner from and

against any and all such liens, claims, stop notices and actions brought or judgments rendered thereon, and from and against any and all loss, damages, liability, costs and expenses as set forth in paragraph 12.1 below.

12. Operator's Indemnity; Duty to Defend. To the fullest extent permitted by law, Operator shall indemnify, defend, and hold harmless Owner, all affiliated companies of Owner, and all of such parties' partners, officers, directors, employees, successors and assigns, (collectively, the "Indemnified Parties"), from and against any and all claims, damages, judgments, penalties, liabilities, cost and expenses (individually, a "Claim"; collectively, "Claims"), which may arise directly or indirectly from the Work performed or services provided under this Agreement by Operator, its agents, employees, or any person or legal entity acting under its control, supervision or direction; but excluding any Claims arising from the gross negligence or willful misconduct of Owner. Indemnification and defense obligations hereunder shall survive the expiration or earlier termination of this Agreement. Such defense obligation shall arise immediately upon presentation of a Claim by any party and written notice of such Claim being provided to Operator.

13. Use of the Site. Operator shall at all times comply fully with all laws, orders, citations, rules, regulations, standards and statutes with respect to occupational health and safety, the handling and storage of hazardous materials, accident prevention, safety equipment and practices, including any accident prevention and safety program of Owner; provided, however, that Owner shall not be required to impose any safety requirements or administer any such programs and the review or requirement of any safety plan by Owner shall not be deemed to release Operator or in any way diminish its liability, by way of indemnity or otherwise, as assumed by it under this Agreement. Operator shall conduct inspections regularly to determine that safe working conditions and equipment exist and accepts sole responsibility for providing a safe place to work for its employees and employees of its sub-operators, laborers and suppliers of material and equipment, for adequacy of and required use of all safety equipment and for compliance with the aforesaid laws, orders, etc. When so ordered, Operator shall stop any part of the Work, which Owner deems unsafe until corrective measures satisfactory to Owner have been taken. Should Operator neglect to adopt such corrective measures, Owner may do so and deduct the cost from payments due Operator. Operator shall timely submit copies of all accident or injury reports to Owner.

14. Payment of Bills and Obligations. Operator shall pay all bills when due for all labor, equipment, material and all other charges in connection with the Work, and failure to do so shall constitute failure of performance under this Agreement. Notwithstanding anything herein to the contrary, in order to protect Owner from all claims and liens of whatever nature, it is agreed that the final payment hereunder shall not become due or payable until all labor, materials, tools, equipment, facilities, rentals of equipment, transportation, fees and permits, taxes and all other charges, without limitation by the foregoing enumeration, in connection with the Work, have been fully paid and any liens claimed or potentially claimed therefore have been waived and released

15. Termination of Agreement. Should Operator fail to pay its creditors, fail to supply a sufficient number of properly skilled workers or sufficient materials and equipment of the proper quality, fail in any respect to prosecute the Work with promptness and diligence, fail to immediately correct defective Work, fail to procure required insurance or otherwise fail in the performance of any requirements of Operator as provided in this Agreement, Owner may, at its option, terminate the employment of Operator and provide such labor, materials, equipment, work, payment or otherwise perform itself or contract with others to perform such requirements of Operator, and deduct the cost thereof, together with all loss occasioned thereby (including without limitation, attorneys' fees and costs, overhead and profit) and interest thereon at the rate of eighteen percent (18%) per annum, from any money then due or thereafter to become due to Operator. Owner shall have the right to withhold payment of any monies due Operator pending completion of such corrective action to the extent required by Owner and to the satisfaction of Owner. Owner shall provide twenty-four (24) hours prior notice to Operator except in case of emergency. In such event, and subject to the applicable provisions of Article 6, Operator shall be entitled to recover only the actual cost of work completed to the date of termination plus fifteen

percent (15%) of the actual cost of the work for overhead and profit. Operator waives any claim or lien against Owner for any additional compensation or damages in the event of such termination.

Either party many terminate this Agreement only for breach of the Agreement by the other party; only after giving written notice of breach; and only after allowing the other party thirty (30) days to cure or commence taking reasonable steps to cure the breach, provided any breach must be cured no later than sixty (60) days following written notice thereof.

In the event this Agreement is terminated for any reason prior to the termination date of the term, OWNER shall reimburse to Operator the cost of remaining supplies and consumables in excess of those available at the facility at the commencement of this Agreement upon presentation by Operator and verification by OWNER of a final physical inventory of the Facilities. Operator shall not remove any Special Tools, Spare Parts, materials or supplies from the Facilities without OWNER approval. Ordinary tools, vehicles and personal property purchased by Operator for use in the operation or maintenance of the Facilities shall remain the property of the Operator upon termination of this Agreement unless the property was directly paid for by OWNER or OWNER specifically reimbursed Operator for the cost incurred to purchase the property or this Agreement otherwise provides to the contrary, e.g. Special Tools or Spare Parts.

Upon notice of termination by OWNER, Operator shall assist OWNER in assuming or transferring operation of the Facilities. If Operator incurs additional Cost as a result of a request of OWNER, OWNER shall pay Operator such Cost as invoiced according to procedures in Exhibit B.

16. Adjustment of Payments to Operator. Owner may withhold, or on account of subsequently discovered evidence, nullify the whole or part of any payment due Operator to the extent necessary to protect Owner from loss, including costs and attorneys' fees, on account of: (1) defective work not remedied; (2) claims filed or reasonable evidence indicating the probable filing of a claim; (3) failure of Operator to make payments properly to his sub-operators or for material, labor or fringe benefits; (4) a reasonable doubt that this Agreement can be completed for the balance then unpaid; (5) damage to another Operator; (6) penalties assessed against Owner or Operator for failure of Operator to comply with State, Federal or local laws and regulations; or (7) any other ground for withholding payment allowed by State or Federal law, or as otherwise provided in this Agreement. When the above matters are rectified, such amounts as are then due and owing after any offset or charge hereunder shall be paid or credited to Operator.

17. Royalties, Patents and Licenses. Operator agrees to pay all royalties and license fees and to indemnify and hold harmless Owner from any and all loss, damage or expense to which it may be put from claims or litigation for the use or misuse of any patented or unpatented invention or process, used or furnished by Operator, unless required by the Contract Documents and not originated or prepared by Operator.

18. Strikes and Labor Disputes. No strike, picketing or labor dispute of any kind involving Owner, Operator, other Operators or suppliers shall excuse the non-performance of any duty of Operator set forth herein. In the event of a strike, picketing or labor dispute of any kind which, in Owner's judgment, has resulted from Operator's presence on the Project, said actions shall constitute a default if not cured immediately upon notice thereof and Owner thereafter shall be entitled to exercise any remedies as provided herein or otherwise. If any of the Work to be performed by Operator is regulated by jurisdictional agreement, it is understood that this Agreement includes that Operator will perform at the Contract Sum all Work required to be performed by the trade(s) whose jurisdictional agreements regulate Operator's Work unless otherwise specifically stated herein.

19. Assignment. Operator shall not transfer, assign or subcontract this Agreement, or any part thereof or interest therein, nor any of the payments to become due hereunder, except upon the written permission of Owner prior to execution hereof.

20. Accounting Records. Owner's duly authorized representatives shall have, during the term of this Agreement and for three years thereafter, access at all reasonable times to all of Operators' and its sub-operators' accounts and records of all description, including but not limited to computer files, pertaining to the Agreement to verify or review the quantity, quality, and progress of the Work, reimbursable costs, amounts claimed by the Operator, compliance with regulations, and estimates of cost for fixed rates, including those applicable to proposed changes. Where time and materials work (unit price, hourly or fixed rates, etc) is performed, Owner's above-described accounting records access shall extend to all of Operator's records pertaining to all contracts for assurance that the Work is properly charged and billed by Operator. Operator's and its sub-operators' accounts shall be kept in accordance with generally accepted accounting principles. Operator shall include the necessary provisions in its subcontracts to ensure that its sub-operators comply with this provision.

21. Sub-operators and Materialmen. Owner may require Operator to identify all sub-operators and materialmen to be employed in the performance of this Agreement. Owner may reject the Operator's use of any subOperator or materialmen hereunder, in Owner's sole and absolute discretion.

22. Miscellaneous Provisions.

22.1 Non-Waiver. If Owner does not insist, in any instance, upon strict compliance with any of the provisions of this Agreement, or to exercise any options provided, this shall not be construed as a waiver of its right to thereafter require such compliance or to exercise such option.

22.2 Entire Agreement. This Agreement comprises the entire agreement between the parties relating to the Work covered hereby and no other agreement, representation or understanding concerning the same has been made and no oral statement, understandings or agreement shall affect the terms hereof. This Agreement shall supersede and replace any previous agreements, understandings, discussions or proposals between the parties hereto whether written or oral. All representations and warranties, if any, made by any agent or representative of Owner which are material to this Agreement, or which have acted as an inducement to Operator to enter into this Agreement are fully set forth herein. Operator agrees that any such representation or warranty not fully set forth in this Agreement is not binding on Owner.

22.3 Conflicting Terms. In the event of a conflict between the terms and conditions of this Agreement and the provisions of any of the Contract Documents other than this Agreement, the terms and conditions of this Agreement shall prevail and shall control the rights, obligations and duties of the parties hereto.

22.4 Conflict with Law. To the best knowledge and belief of the parties, this Agreement contains no provision that is contrary to federal or state law, ruling or regulation. However, if any provision of this Agreement shall conflict with any such law, ruling or regulation, then such provision shall continue in effect only to the extent permissible. In the event any provision is thus inoperative, the remaining provisions shall, nevertheless, remain in full force and effect.

22.5 Governing Law. This Agreement shall be construed and governed by the laws of Idaho.

22.6 Paragraph Headings. The headings contained in this Agreement are for reference purposes only and shall not in any way affect the meaning or interpretation hereof.

23. Non-Disclosure. The Operator specifically agrees not to disclose either any original or Change Order unit or total price to any person, except with the written approval of the Owner. The Operator shall not negotiate for extra or additional work with any party other than Owner, either before or after completion of this Agreement with respect to any other work on the jobsite, it being understood that any negotiation for extra or additional work, whether or not part of this Agreement, shall only take place through the Owner. The Operator shall not execute any modifications, changes or alterations at the request of any person, unless such modification change or alteration shall be authorized in writing by the Owner.

24. Authority; Successors and Assigns. The person signing this Agreement on behalf of the Operator hereby represents to the Owner that he or she has the power and authority to execute this Agreement on behalf of the Operator. This Agreement shall inure to the benefit of and be binding upon all of the heirs, executors and administrators, successors, and assigns of each of the parties hereto.

25. Attorneys' Fees and Payment or Advancement or Costs. In addition to any other remedies provided by law or equity or in this Agreement, should Operator fail to pay any obligations hereunder, Owner shall have the right to pay and discharge such charges or obligations and recover the cost thereof from Operator with interest at the rate of eighteen percent (18%) from date of advance until repaid. Any such advances made by Owner hereunder shall be due and payable on demand together with any costs of collection and including reasonable attorneys' fees. In the event of an arbitration pursuant to this Agreement, or if either party to this Agreement brings a legal action or proceeding against the other party to enforce the provisions of the Agreement, or on account of a claim or dispute arising out of this Agreement, then the prevailing party in such arbitration or legal action or proceeding shall be entitled to reimbursement by the other party for the legal fees and costs, including reasonable attorneys' fee, incurred by the prevailing party in connection with the arbitration or legal action or proceeding.

26. Arbitration. All claims, disputes and other matters in question between the Operator and the Owner arising out of or relating to this Agreement, the Contract Documents or the breach thereof shall be decided by binding arbitration in Boise, Idaho in accordance with the Construction Industry Rules of the American Arbitration Association then obtaining. The foregoing agreement of the Owner and Operator to arbitrate shall be specifically enforceable under the Idaho Uniform Arbitration Laws; the award rendered by the arbitrators shall be subject to review only as provided in said Act, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. The Operator shall carry on the Work and maintain its progress during any dispute or arbitration or litigation proceedings.

27. Relationship of Parties. For all purposes relating to this Agreement and the Work, Operator is an independent Operator, and not an employee or otherwise associated with Owner.

28. Legal Consequences; Integration. THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES. CONSULTATION WITH AN ATTORNEY PRIOR TO EXECUTION IS ENCOURAGED. OPERATOR IN SIGNING THIS AGREEMENT SPECIFICALLY AGREES THAT HE HAS READ AND UNDERSTANDS THIS AGREEMENT IN ITS ENTIRETY, INCLUDING ALL ITEMIZED ATTACHMENTS AND ALL CONTRACT DOCUMENTS REFERRED TO HEREIN, AND THAT THIS REPRESENTS THE FULL, COMPLETE AND SOLE AGREEMENT BETWEEN OWNER AND OPERATOR, AND THAT THIS AGREEMENT REPLACES AND SUPERSEDES ALL PRIOR AGREEMENTS, REPRESENTATIONS OR UNDERSTANDINGS, WHETHER WRITTEN OR ORAL. NO MODIFICATION OF THIS AGREEMENT IS VALID UNLESS IN WRITING AND SIGNED BY THE PARTIES. AS TO THE OWNER, NO MODIFICATION IS VALID OR ENFORCEABLE UNLESS SIGNED BY AN OFFICER OF OWNER.

OPERATOR: OMCS, LLC., an Idaho limited liability company

By _____ Date: 1-31-08
Its member

This Agreement shall not be valid until accepted by Owner Idaho, Inc. and signed as provided below.

OWNER:

AVIMOR WATER RECLAMATION COMPANY, an Idaho corporation

By _____ Date: 2/1/08
Its President