January 22, 2014

M E M O R A N D U M

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FROM: Jen Cole
Scientist II, Technical Services

THROUGH: Matt Plaisted, P.E.
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SUBJECT: Staff Analysis for Draft Reuse Permit M-217-02 (Municipal Recycled Water)
Silverwood Inc.

1. PURPOSE

The purpose of this memorandum is to satisfy the requirements of the *Idaho Recycled Water Rules*, IDAPA 58.01.17.400.05, for issuing reuse permits. This memorandum addresses draft Reuse Permit M-217-02, for Silverwood Inc.'s treatment and reuse system that is currently permitted under the terms of Reuse Permit LA-000217-01.

2. SUMMARY OF EVENTS

The initial permit for this site was issued as Reuse Permit LA-000217-01 on June 6, 2008. On April 1, 2010, Reuse Permit LA-000217-01 was officially modified to add an additional hydraulic management unit (MU-0217-03) to the facility and extend the irrigation season from April 1 through October 31 each year to allow the Silverwood Theme Park to operate through October. On January 22, 2013, DEQ received an application for renewal of Reuse Permit LA-000217-01 which expired on June 8, 2013.

3. PROCESS AND SITE DESCRIPTIONS

For additional discussion of the wastewater treatment system, refer to the Staff Analysis for the draft version of Reuse Permit LA-000217-01, dated June 6, 2008. A description of changes to the facility and an interpretation of the first 4 years of operation can be found in the sections below. Please see Section 11 of the permit for site maps that depict the physical features discussed in this section of the Staff Analysis.

3.1. Process

The wastewater collection, treatment and disposal systems owned and operated by Silverwood Inc. serve the Silverwood Theme Park located about three (3) miles south of Athol, Idaho in Kootenai County on the west side of Hwy 95. Almost all of the flow to the plant is generated during the time the theme park is open, from May through October. Some off-season flow does originate from employees working during the remainder of the year (Mountain Waterworks, 2013). The treatment process consists of a four-lagoon system, coagulation, sand filtration and disinfection. The lagoon system consists of a primary aerated lagoon followed by two smaller aerated lagoons, and a storage lagoon. The lagoons were seepage tested in 2011 and 2012 and three (3) of the four (4) had seepage rates less than the maximum allowable seepage rate as specified in the *Idaho Wastewater Rules* (0.125 inches per day). The seepage rate for the fourth lagoon (see Lagoon LG-0217-02 on Site Map 4.6.1) exceeded the maximum allowable rate. A schedule will need to be negotiated with DEQ to comply with

Section 493.04 of the *Wastewater Rules*. The 19.1 acre irrigation site is located to the north of the treatment plant (see Figure 4.6.1). Silverwood has requested that the municipal recycled water system be classified as a Class C system.

3.2. Site

This section describes changes in the reuse site since the inception of Reuse Permit LA-000217-01 in 2008. Changes to hydraulic management units (HMU), personnel, permitted loading rates and cropping plans are discussed below.

3.2.1. Site Realignment

Reuse Permit LA-000217-01 originally included two HMUs: MU-217-01 (10 acres), the "Primary Area, and MU-217-02, the Boulder Beach area. On May 27, 2010, DEQ granted a permit modification to the facility allowing irrigation of treated wastewater onto Primary Area 2 which was designated as MU-217-03 (9.1 acres). The facility has requested that MU-217-02 be removed from the permit since the permittee does not plan to use the site in the future (Mountain Waterworks 2013). Follow-up monitoring at the site will not be required, because MU-217-02 is not connected to the reuse system and wastewater has never been applied to the site. It is proposed that MU-217-02 be removed from the new permit and that the serial numbers for the remaining two HMUs not be changed to maintain record-keeping continuity.

3.2.2. Site Management

Silverwood, Inc. owns all treatment facilities and irrigated acreage at the site. The General Manager of the Silverwood, Inc. Theme Park is Mr. Chris Wyatt. The maintenance manager for Silverwood, Inc. Theme Park is Mr. Jeff Sheets. Mr. Sheets is responsible for maintenance of the treatment facility. The responsible charge operator for the facility is Mr. Jason Wereley of E-3 Consulting, LLC. Mr. Wereley holds the following licenses and certifications (Mountain Waterworks, 2013):

- WWC2 – 11758
- WWT3 – 13344
- WWTLA-13932

Leslie Abrams of Waterworks Management is the backup operator for the site and holds the following licenses and certifications (Mountain Waterworks, 2013):

- WWC2 – 15339
- WWT2 – 15338
- WWTLA – 14792.

3.2.3. Hydraulic Loading

In Reuse Permit LA-000217-01 hydraulic loading was limited as follows:

> *"Annual application shall not exceed 22.0 inches. Weekly application shall not exceed a total of 2.0 inches applied at no more than 1.0 inch per application at 72-hour intervals. Weekly amounts shall be reduced for precipitation in excess of ¼-inch during any 12-hour period as measured and recorded by an on-site rain gauge."*

Both HMUs were seeded with alfalfa hay during 2011 and 2012. A cover crop of timothy grass hay is planned to be grown on both management units for the 2013 growing season. The facility expects that a 50/50 alfalfa/timothy grass mixture will be cultivated for the 10-year permit period (Mountain Waterworks, 2013a).

The calculation of the irrigation water requirement (IWR) for the proposed crop provides an estimate of the supplemental water, in excess of precipitation, required to optimize crop production and nutrient uptake. Irrigation water, through a combination of recycled water and potentially supplemental irrigation water, should be applied at the crop's IWR. Irrigation rates below the crop's IWR may inhibit growth and result in lower nutrient uptake by the crop. Conversely, irrigating above the crop's IWR can lead to over application of water potentially causing adverse impacts to groundwater through leaching of the excess water. IWR is defined and calculated as follows:

IWR consists of any combination of wastewater and supplemental irrigation water applied at rates commensurate to the moisture requirements of the crop, and calculated monthly during the growing season (GS).

The equation used to calculate the IWR is:

$$IWR = Pdef / Ei$$

Pdef is the precipitation deficit and is synonymous with the net irrigation water requirement of the crop. The Pdef for the Coeur d'Alene 1 E NWS (Station Identifier: 101956) can be found at the following website: http://data.kimberly.uidaho.edu/ETIdaho/stninfo.py?station=101956

Ei is the irrigation system efficiency.

Figure 1 compares the estimated irrigation water requirements (IWR) for alfalfa and grass hay based on mean precipitation deficit data from the ETIdaho Coeur d'Alene Station (University of Idaho, 2013). A 75% irrigation efficiency for hand line sprinklers was used in the calculations for Figure 1. As shown in Figure 1, both crops have similar IWRs throughout the growing season. Alfalfa's (with less frequent cuttings) mean IWR from April 1 to October 31 is estimated to be 18.24 million gallons (MG) and grass hay's mean IWR from April 1 to October 31 is estimated to be 18.89 MG for the 19.1 acre irrigation site. Between 2008-2012, the highest volume irrigated occurred in 2010 at 8.7 MG. Silverwood has indicated in the permit renewal application that an increase in the permitted hydraulic loading rate will not be required during the next permit period.

Figure 1. Irrigation Water Requirement (IWR) for Alfalfa and Grass Hay

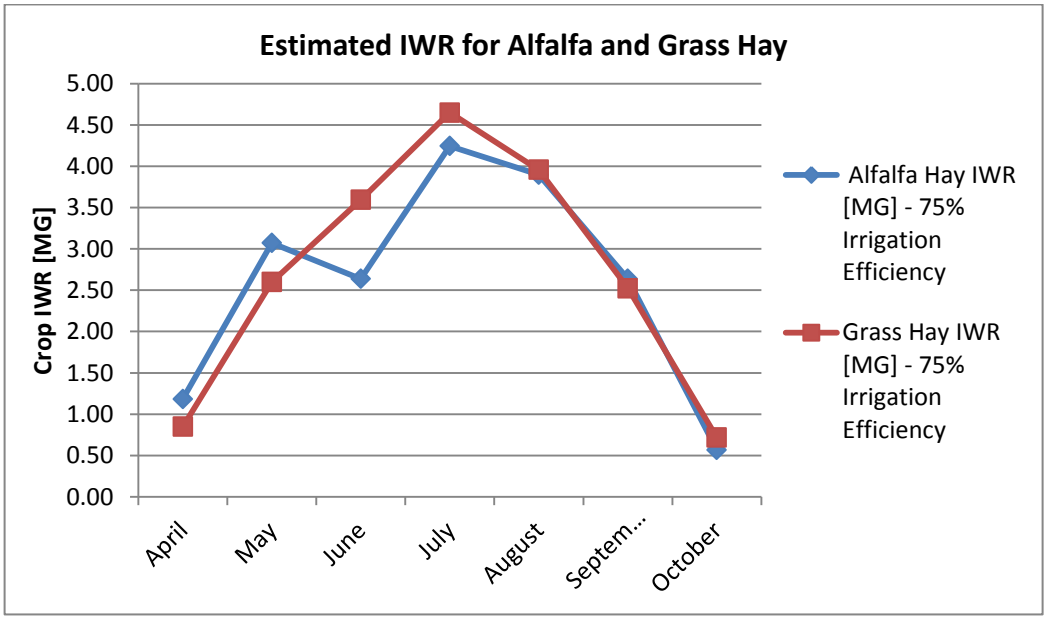
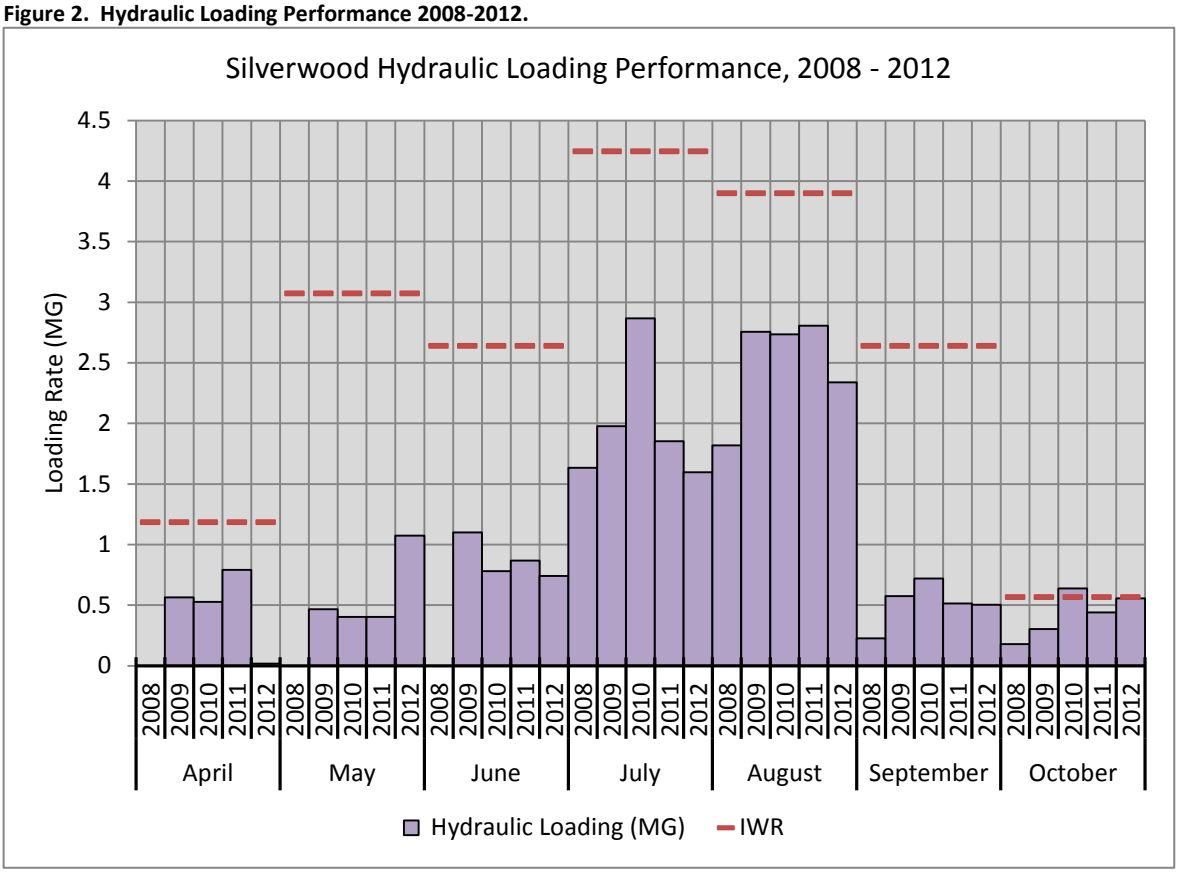


Figure 2 shows the hydraulic loading at the Silverwood site through the duration of their current permit (2008-2012). The IWR values shown in Figures 1 and 2 are estimated using mean data from the ETIdaho Coeur d'Alene Station for alfalfa and grass hay. While the crop water usage data used by Silverwood to schedule irrigation is currently taken on a daily basis from the Rathdrum Prairie AgriMet station, the estimated IWRs from ETIdaho are shown in Figures 1 and 2 demonstrate that Silverwood has historically irrigated at rates near or less than the average IWRs. Figure 2 shows that Silverwood generally irrigates well below the IWR for most of the season and substantially at the IWR during the month of October. Irrigation should be at or near the IWR in order to grow a healthy crop and maximize nutrient uptake. As discussed further in Sections 3.2.4 and 3.2.5 below, historical alfalfa crop production is generally lower than the county average, and nutrient loading has been in excess of 150% of typical crop uptake based on plant tissue analysis data reported by the facility (see Table 1). The reuse system final design report states that the irrigation sites have a water supply to supplement irrigation needs (Coleman, 2007). It may be necessary for Silverwood to supplement irrigation with ground water in order to irrigate closer to the IWR and maximize crop yield and nutrient uptake.

Figure 2. Hydraulic Loading Performance 2008-2012.



Daily irrigation requirements are currently determined by Silverwood operators using crop water use data available from the U.S. Bureau of Reclamation (USBR) AgriMet weather station located on the Rathdrum Prairie (website: http://www.usbr.gov/pn/agrimet/chart/rthich.txt) about 10 miles southwest from Silverwood. This station gives daily estimated crop water needs for specific crops including alfalfa. Daily crop water use for alfalfa is reported as either "peak," or maximum daily use for a mature, uncut, alfalfa crop and "mean" values representing average daily use accounting for water usage based on growth and seasonal cuttings. The facility proposes to use a cover crop of timothy grass for one (1) year and plant the following year with an alfalfa/timothy grass mix. The USBR staff who operate the AgriMet stations has recommended to the Silverwood operator that using the alfalfa crop water usage estimates will be accurate for the timothy grass and alfalfa/timothy grass crops. Use of the AgriMet data is believed to be more accurate than using the 30-year average precipitation deficit data from the ETIdaho website because the AgriMet crop water usage data is calculated daily and can be used to schedule irrigation. The data from the station is used by the operators to prevent irrigating in excess of the estimated crop water usage. As discussed above, there can be months when the facility irrigates is less than the IWR or crop water usage estimate and this can result in a reduced yield.

The typical end date for alfalfa water usage in North Idaho is estimated to be September 30 of each year because most of the alfalfa has been cut by then. After September 30, there still is some evapotranspiration by the crop as long as the crop does not go dormant due to low temperature. For alfalfa, 25°F is the temperature below which alfalfa goes dormant (Hamel, 2013). If the crop does go dormant, irrigated water will still evaporate from the plant surface and soil surface and that evaporation rate can be estimated using the AgriMet weather station data. As the water evaporates, the nutrients in the wastewater will remain in the soil. October 2012 had a total of 2.6 inches of evapotranspiration for alfalfa and the facility irrigated a maximum of 1.63 inches and the minimum temperature was 25°F on October 7.

Based on the October 2012 nutrient and hydraulic loading data, a maximum of about 12 lbs. N/acre was applied in October.

The USBR has agreed to continue running the Rathdrum Prairie AgriMet Station until October 31 which historically has been the last day the facility has irrigated. In past growing seasons, the alfalfa/grass crop has been cut and removed from the fields after the irrigation has ended.

The facility has requested that the irrigation season be from April 1 to October 31 and the Rathdrum Prairie AgriMet Station data be used to schedule irrigation. Based on the past Annual Report reviews and discussions with the facility manager, Jeff Sheets, it appears that facility is able to successfully schedule irrigation in this fashion.

Irrigation in the month of October will be challenging because the weather may be either too wet or cold to allow for irrigation at rates the facility requires to lower the lagoons for storage during the non-growing season. The following are three (3) options for the facility in October:

1. Irrigate in accordance with the evapotranspiration rates of the crop as estimated by the AgriMet Station.
2. If the minimum temperature drops below 25°F, the alfalfa plant goes dormant and evapotranspiration will cease for the season. Irrigation could then be at a rate equivalent to the daily estimated evaporation from the plant surface and soil. For this method to work, frequent and light hydraulic loading rates will be required. As discussed above, the nitrogen loading rates will be minimal under these conditions.
3. Do not irrigate. If the weather does not permit Silverwood to irrigate enough to lower lagoon levels for non-growing season storage, it will likely mean that truck hauling to an approved wastewater treatment plant would be required or additional lagoon volume would need to be constructed.

The updated Plan of Operation will need to provide details on handling the wastewater generated in October, and discuss the options available if the weather does not allow. The facility will need to develop a relationship that is included in the updated Plan of Operation (O&M Manual) that correlates the AgriMet data to estimate the daily evaporation for the scenario when alfalfa goes dormant due to temperatures below 25°F.

It is recommended that the facility continue using the Rathdrum Prairie AgriMet Station data for alfalfa to schedule irrigation and control the hydraulic loading rates. The growing season for the alfalfa/grass crop will be April 1 to October 31 which is the same period of time the AgriMet Station will be seasonally operated by the USBR. The revised Plan of Operation will need to include a detailed description of how the AgriMet Station data is used to schedule irrigation for the fields.

3.2.4. Constituent Loading

Reuse Permit LA-000217-01 did not contain loading limits for nitrogen or phosphorus. Nutrient loading data submitted by the facility consultant for 2010 – 2012 is summarized in Tables 1 and 2. The facility may have been loading nitrogen in excess of the typical DEQ loading limit of 150% of crop uptake based on plant tissue analysis data for at least the past three growing seasons. During 2012, phosphorus was also loaded in excess of 150% of crop uptake. Low crop yields may have prevented the uptake of sufficient nutrients. Determining the cause of low crop yields and correcting it in the future will be important for Silverwood as low nutrient removal may limit the site to the amount of recycled water that can be irrigated, requiring either further nutrient reduction prior to application or more acreage to be irrigated.

Table 1. Historical nitrogen loading rates.

Year	N Applied [lbs/acre-year]	N Crop Uptake [lbs/acre-year]	N Loading as a % of Crop Uptake
2010	147	69	213.04%
2011	129	70	184.29%
2012	214	*69.5* [1]	307.91%

[1] 2012 crop uptake data not reported. Value based on average of previous years' uptake data.

Table 2. Historical phosphorus loading rates.

Year	P Applied [lbs/acre-year]	P Crop Uptake [lbs/acre-year]	P Loading as a % of Crop Uptake
2012	13.6	7	194.29%

Nitrogen loading limits will be included in the draft permit and will be limited to 150% of typical crop uptake as is typical in other reuse permits. Because of the ability of alfalfa to fix atmospheric nitrogen in addition to its ability to take up plant available nitrogen from the soil, nitrogen fixation must be accounted for when determining typical crop uptake. Section 4.2.2.4 of the DEQ "Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater" (Reuse Guidance) suggests determining nitrogen-loading requirements accounting for nitrogen fixation by using the following equation: (note that $N_{filtration}$ should actually read $N_{fixation}$):

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

Where:

$N_{fixation}$ is the proportion of nitrogen fixed by alfalfa. Typical values range from 10 to 25%.

N_{crop} is the nitrogen estimated from crop tissue analyses

e_f is the crop uptake efficiency factor. Typically estimated at 0.75 for perennial crops such as alfalfa.

No limit on phosphorus loading is proposed at this time since the nearest surface water is Lake Pend Oreille, 8.0 miles away and has little chance of being impacted from water reuse activities. Phosphorus monitoring of crop tissue and soil will be required in the draft permit to provide better data to Silverwood for farming practices at the irrigation site.

In October of 2013, the permittee sampled treated effluent for non-volatile dissolved solids (NVDS) at the request of DEQ. NVDS is estimated to be salinity in wastewater and if over-applied can inhibit crop production, adversely impact soil characteristics, and potentially leach into groundwater. The results from the samples taken from Silverwood's treated effluent were 282 mg/L and 332 mg/L. Using these results and past hydraulic loading values, the NVDS loading could range from 480 lbs/ac-yr to 1261 lbs/ac-yr.

Crop salt uptake is typically measured as ash in crop tissue analyses. Ash content in alfalfa is typically around 9.9% and 1.16% for timothy grass (ECN 2013). Using the data submitted to DEQ in Silverwood's 2012 annual report (yield = 1.8 tons/acre, average moisture = 14.7%) and the typical ash content of

alfalfa of 9.9%, the estimated crop salt uptake would be approximately 304 lbs/acre-yr. When compared with the NVDS loading range above, NVDS loading may be in excess of 160% - 400% of typical crop uptake.

To better determine actual NVDS loading and uptake rates, the draft permit includes NVDS monitoring of the finished recycled water as well monitoring the ash content of plant tissue samples. Similar to phosphorus, NVDS will not have loading limits, however the permittee will be required to report NVDS loading and crop uptake. Due to the laboratory testing methods, NVDS itself is not sampled directly but is determined by subtracting the volatile portion of the dissolved solids (VDS) from the total dissolved solids (TDS). Therefore: NVDS = TDS – VDS.

3.2.5 Crop Production

As discussed in Section 3.2.3 of this document, a 50/50 mixture of alfalfa and timothy grass hay is planned for cultivation on both HMUs for the duration of Reuse Permit M-217-02. The facility planted alfalfa in 2011 originally but due to frost its yield was low during the year. Alfalfa was replanted in 2012 and a timothy grass hay crop is planned to be seeded along with alfalfa in 2013. A 50/50 mixture of the two crops is expected to result. The average yield for alfalfa in Kootenai County for the duration of the permit was 2.7 tons per acre (NASS, 2013). Historical yields for the site have generally been below the county average and range from 1.8 to 2.5 tons per acre (Mountain Waterworks, 2013a).
The draft permit will require crop harvest results be reported to DEQ in the facility's annual report. Data reported should include dates of each harvest, yields (ton/acre) per management unit per harvest, and nutrient removal estimates based on crop yields and crop tissue analyses.

3.3. Surface Water

There is no surface water body or conduit in the immediate vicinity of the wastewater reuse site acreage (Mountain Waterworks, 2013). The closest surface water to the site is Lake Pend Oreille which is 8.0 miles away.

3.4. Soils

Soils have not changed from those listed in the Staff Analysis for Reuse Permit LA-000217-01. Soils across the reuse site consist of Avonville and Bonner gravelly silt loams (Mountain Waterworks, 2013). No soil monitoring was required by Permit LA-000217-01 since ground water monitoring was expected to reveal potential ground water impacts. As discussed in Section 3.5, groundwater monitoring currently conducted at the site may be inadequate to determine groundwater impacts. The draft permit contains requirements for soil monitoring annually prior to irrigation to better determine any impacts to the site from irrigation. Constituents to be monitored include plant available nitrate, plant available ammonium, plant available phosphorus, and electrical conductivity. Soil monitoring results will provide more data on nutrient loading and crop uptake efficiencies, and help better determine a nutrient mass balance at the irrigation site. The measurement of electrical conductivity in the soils will help determine any impacts to the soil salinity due to NVDS loading.

3.5. Ground Water

The irrigation site lies within the recharge boundaries of the Rathdrum Prairie Aquifer (Aquifer), but not directly over the Aquifer itself. The Aquifer boundary lies approximately one mile to the west of the irrigation site. The irrigation site is believed to overlie a narrow channel that eventually joins the Ramsey Channel of the Rathdrum Prairie Aquifer. Ground water is believed to flow from northeast to southwest across the property. It should be

noted that there is conflicting information regarding the direction of flow of ground water at this site.

Reuse Permit LA-000217-01 required quarterly ground water sampling for nitrate-N, total coliform, and TDS. There are three (3) ground water monitoring wells at the site; one up-gradient and two down-gradient. The up-gradient well also serves as the Silverwood drinking water well. The two down-gradient wells were drilled as monitoring wells for the irrigation site. The depth to ground water in each of the wells is approximately 300 feet below ground surface. Correspondence between DEQ and the reuse system design engineer, Jim Coleman, P.E., indicate that there was some uncertainty as to the proper screen placement in the monitoring wells.

Monitoring data collected from 2010 to 2012 indicate that the up-gradient well nitrate-N concentrations ranged from non-detect to 0.61 mg/L and the down-gradient well nitrate-N concentrations ranged from non-detect to 0.57 mg/L. All historical ground water samples have resulted in non-detect levels for total coliform. TDS levels were consistently low during the first few years' of sampling events. As a result, DEQ waived the TDS monitoring requirement for ground water in the first iteration of the permit (Mountain Waterworks, 2013). Ground water monitoring results have not demonstrated any impacts to ground water by the irrigation activities.

A ground water-monitoring plan for the Silverwood irrigation site was prepared by Jim Coleman, P.E. in April of 2008. The plan concluded that ground water monitoring at the site would not be practical for determining impacts to ground water by irrigation practices. This conclusion was reached by the engineer's estimate that nutrient transport in the soil would take 25-30 years before reaching the ground water. The plan also concluded that soil sampling should be conducted at the site in addition to ground water monitoring.

Because of the uncertainty of the ground water monitoring wells, ground water flow direction, and the recommendation by the ground water-monitoring plan, ground water monitoring requirements will be eliminated in the draft permit. Soil monitoring will be included in the draft permit in lieu of ground water monitoring to better account for the nutrients being applied to the site and subsequently removed by plant uptake.

4. PERMITTING DISCUSSION

The following sections outline changes made to the terms of the draft renewal permit, based on changes requested by the permittee, evaluations of past performance with previous permit requirements, and/or updates required by changes to the *Idaho Recycled Water Rules* or any other applicable regulatory standards. Terms and conditions that are unchanged from the previous permit and remain applicable to the facility are not addressed in this document. Changes made to update language and regulatory references are also not addressed in this document.

4.1. Facility Information

Facility contact information has been updated to reflect personnel changes.

4.2. Compliance Schedule for Required Activities

As shown in Table 3, all compliance activities contained in Reuse Permit LA-000217-01 have either been fulfilled or cancelled. Table 4 contains a summary of proposed compliance activities for draft Reuse Permit M-217-02.

Proposed compliance activity CA-217-01 in Table 4 requires an update of all management plans to reflect current operating, monitoring, and data recording procedures. CA-217-02 requires the permittee to prepare and submit a Quality Assurance Project Plan (QAPP) as recommended by DEQ guidance (DEQ, 2007). The QAPP is meant to serve as a guide for facility staff to follow with regard to monitoring, recording, and reporting data as required by the permit. CA-217-03 requires seepage testing of the lagoons. See Section 4.5.6 below for more

information regarding the lagoons. CA-217-04 requires that the permittee submit an application for permit renewal six months before Reuse Permit M-217-02 expires as required by *Idaho Recycled Water Rules* (IDAPA 58.01.17.400.01).

Table 3. Status of compliance activities in LA-000217-01.

Activity Number	Description	Due Date	Status
CA-217-01	Plan of Operation	9/1/2008	Approved: February 17, 2009
CA-217-02	Proof of Ownership	9/1/2008	Satisfied: August 29, 2008
CA-217-03	Pilot Testing Plan for Class B	9/1/2008	Approved: August 29, 2012
CA-217-04	Pilot Test Summary Report	11/1/2009	Submitted: March 30, 2009
CA-217-05	Boulder Beach Reuse System: Plan and Specifications	6/1/2009	Eliminated: March 30, 2009
CA-217-06	Cropping and Reuse Irrigation Plan Implementation Report	9/1/2008	Completed: March 30, 2009
CA-217-07	Notice of Abandonment of Subsurface Systems	9/1/2008	Completed: March 30, 2009
CA-217-08	Operator Licensure Verification	9/1/2008	Completed: March 30, 2009
CA-217-09	Wastewater System Record Drawings	9/1/2008	Completed: March 30, 2009

Table 4. Proposed compliance activities for inclusion in M-217-02.

Activity Number	Description	Due Date
CA-217-01	Updated Plan of Operation (PO)	6 Months after Permit Issuance
CA-217-02	Quality Assurance Project Plan (QAPP)	8 Months after Permit Issuance
CA-217-03	Lagoon Seepage Testing	2021 and 2022
CA-217-04	Pre-Application Workshop	12 Months before Permit Expiration
CA-217-05	Submit Application for Permit Renewal	6 Months before Permit Expiration

4.3. Permit Limits and Conditions

Because the plan to develop the Class B irrigation site within the park was abandoned, Silverwood has requested to have treated effluent classified as Class C effluent only in the new Reuse Permit M-217-02. As a result of the Class C only designation, some of the permit limits that appeared in Reuse Permit LA-000217-01 have been changed or removed to reflect the wastewater classification.

It is proposed that the numerical hydraulic loading rate (HLR) limit in Reuse Permit LA-000217-01 be replaced with the requirement that the HLR permit limit be substantially at the crop water usage rates estimated from the Rathdrum Prairie AgriMet Weather Station data as described in Section 3.2.3. In addition to the proposed change in the permitted HLR, the addition of a nitrogen-loading limit of 150% of crop uptake is proposed for the reasons discussed in Section 3.2.4.

Limits that have been eliminated from the draft permit include turbidity and total chlorine concentration.

4.4. Monitoring Requirements

As a result of the Class C only designation, some of the monitoring requirements that appeared in Reuse Permit LA-000217-01 have been changed or removed to reflect the wastewater classification. Reuse Permit LA-000217-01 contained two sets of requirements, one for Class B wastewater and one for Class C wastewater. This section discusses proposed changes to monitoring requirements. All monitoring parameters not explicitly discussed in this section have not changed from those listed in Reuse Permit LA-000217-01.

4.4.1 Turbidity Monitoring

Class C recycled water monitoring requirements do not include turbidity limits, therefore turbidity monitoring will be eliminated from the permit.

4.4.2 Microbial and Constituent Monitoring

It is proposed that wastewater effluent be sampled monthly for TKN, nitrate+nitrite nitrogen as N, and total phosphorus. These monitoring requirements are consistent with the Reuse Guidance and other domestic reuse permits in the region.

Class C wastewater systems require less frequent total coliform sampling than Class B, therefore total coliform monitoring is proposed to be reduced from daily to weekly in M-217-02. In addition, chlorine monitoring is not required for Class C recycled water, therefore continuous chlorine monitoring will also be eliminated from the draft permit.

4.4.3 Ground Water Monitoring

Because of the uncertainty surrounding the adequacy of the groundwater monitoring program at Silverwood, it is proposed that ground water monitoring requirements be eliminated from the permit. Section 3.5 further discusses the justification for this proposal.

4.4.4 Crop Sampling

For the duration of Reuse Permit LA-000217-01, the facility sampled crop tissue for nitrogen and phosphorus content even though the permit did not require the sampling. The crop tissue sampling data was used by the facility to calculate crop uptake of nutrients. It is recommended that this practice continue throughout the duration of draft Reuse Permit M-217-02. It is recommended that crop tissue sampling for moisture content, total nitrogen, total phosphorus, and ash be included as a permit condition in draft Reuse Permit M-0217-02.

4.4.5 Soil Monitoring

The draft permit will include soil monitoring requirements for each irrigation site. Soil monitoring will be required annually, prior to irrigation, for the following constituents: Plant available nitrate-nitrogen, plant available ammonium nitrogen, and plant available phosphorus. Soil monitoring results will be used to help demonstrate a nutrient balance at the reuse site.

4.5. Proposed Environmental Monitoring Serial Numbers for Permit

4.5.1 Hydraulic Management Units

Serial Number	Description	Acres
MU-217-01	Primary Area (West Field)	10
MU-217-03	Primary Area 2 (East Field)	9.1

4.5.2 Microbial and Constituent Monitoring Points

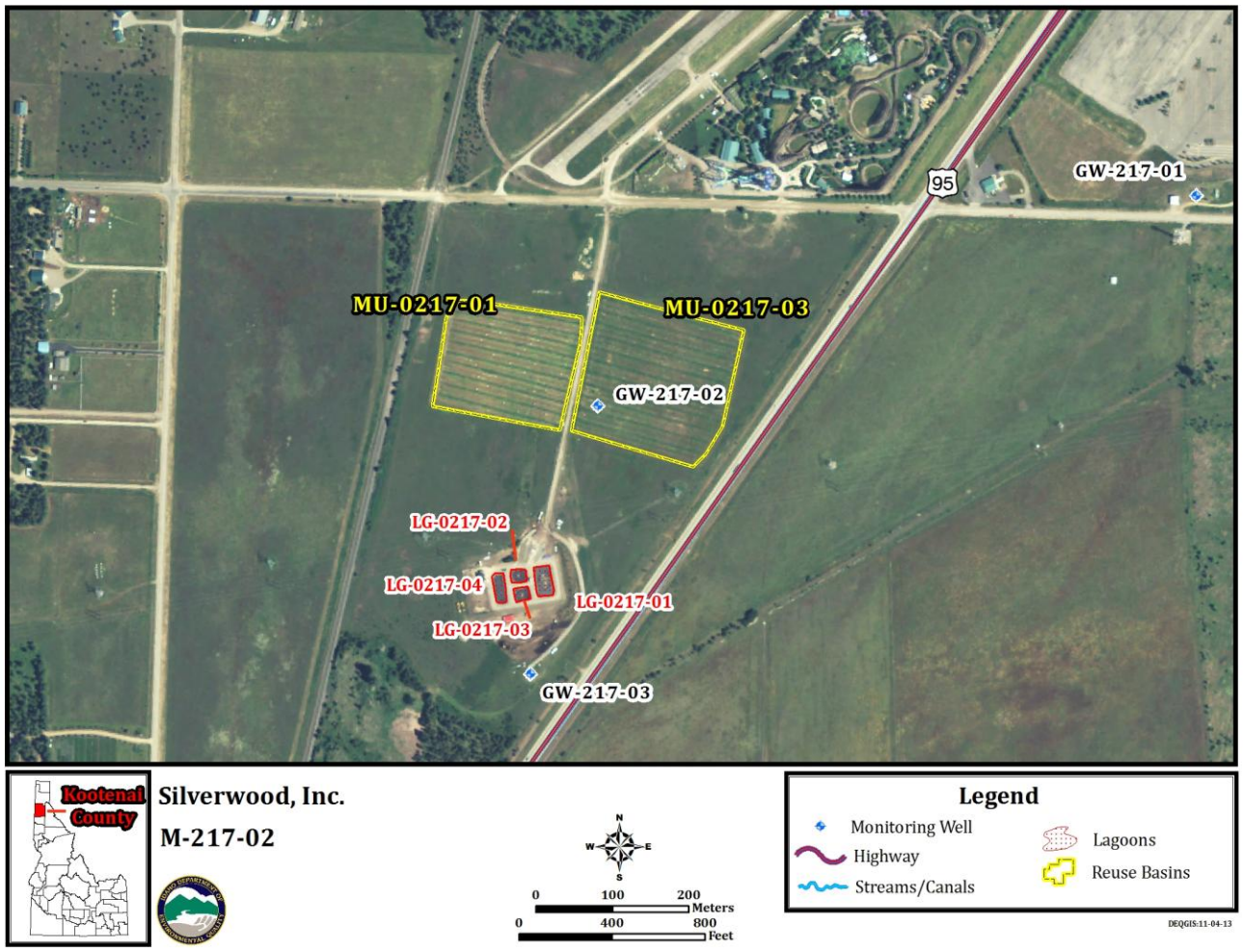
Serial Number	Monitoring Point Description
WW-217-01	Sample tap located after up-flow filters and before disinfection
WW-217-02	Sample tap located after 24” disinfection chlorine contact pipeline

4.5.3 Lagoons

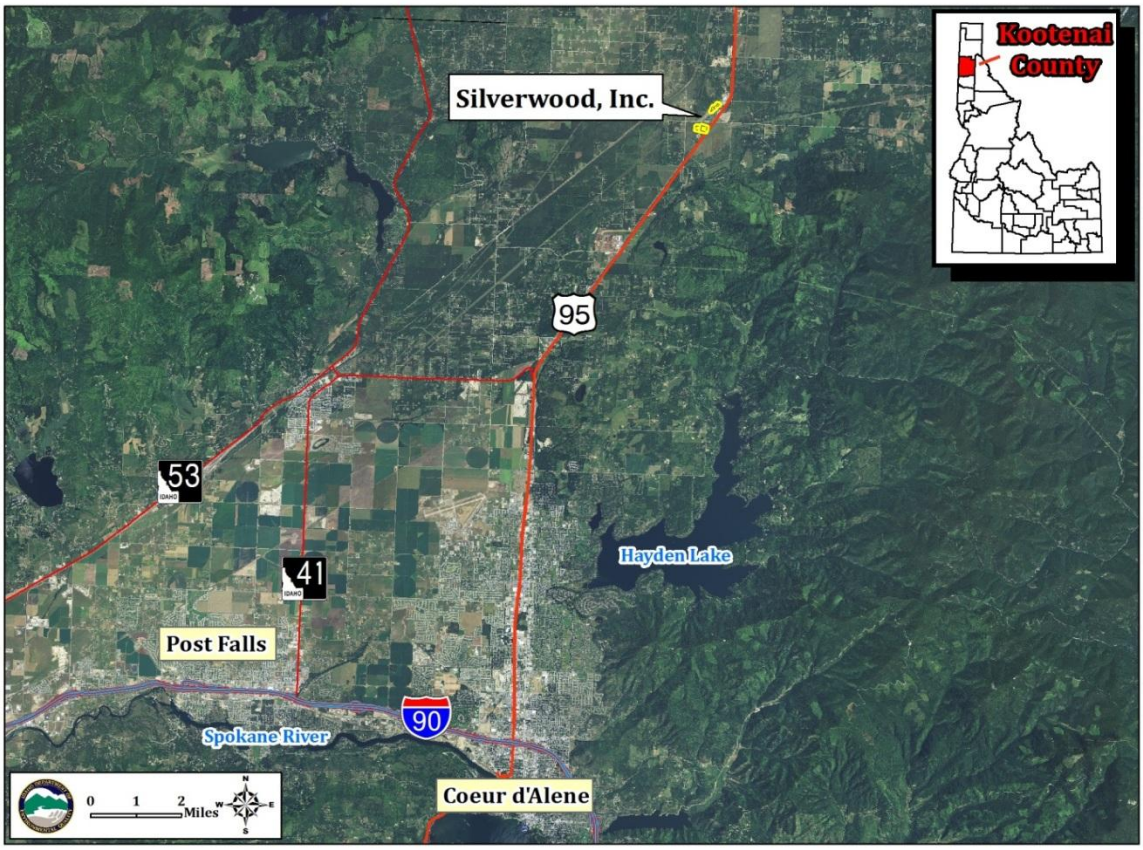
Serial Number	Description
LG-217-01	Aerated Lagoon Cell 1
LG-217-02	Aerated Lagoon Cell 2 (North)
LG-217-03	Aerated Lagoon Cell 3 (South)
LG-217-04	Non-Aerated Storage Lagoon Cell 4

4.6. Site Maps

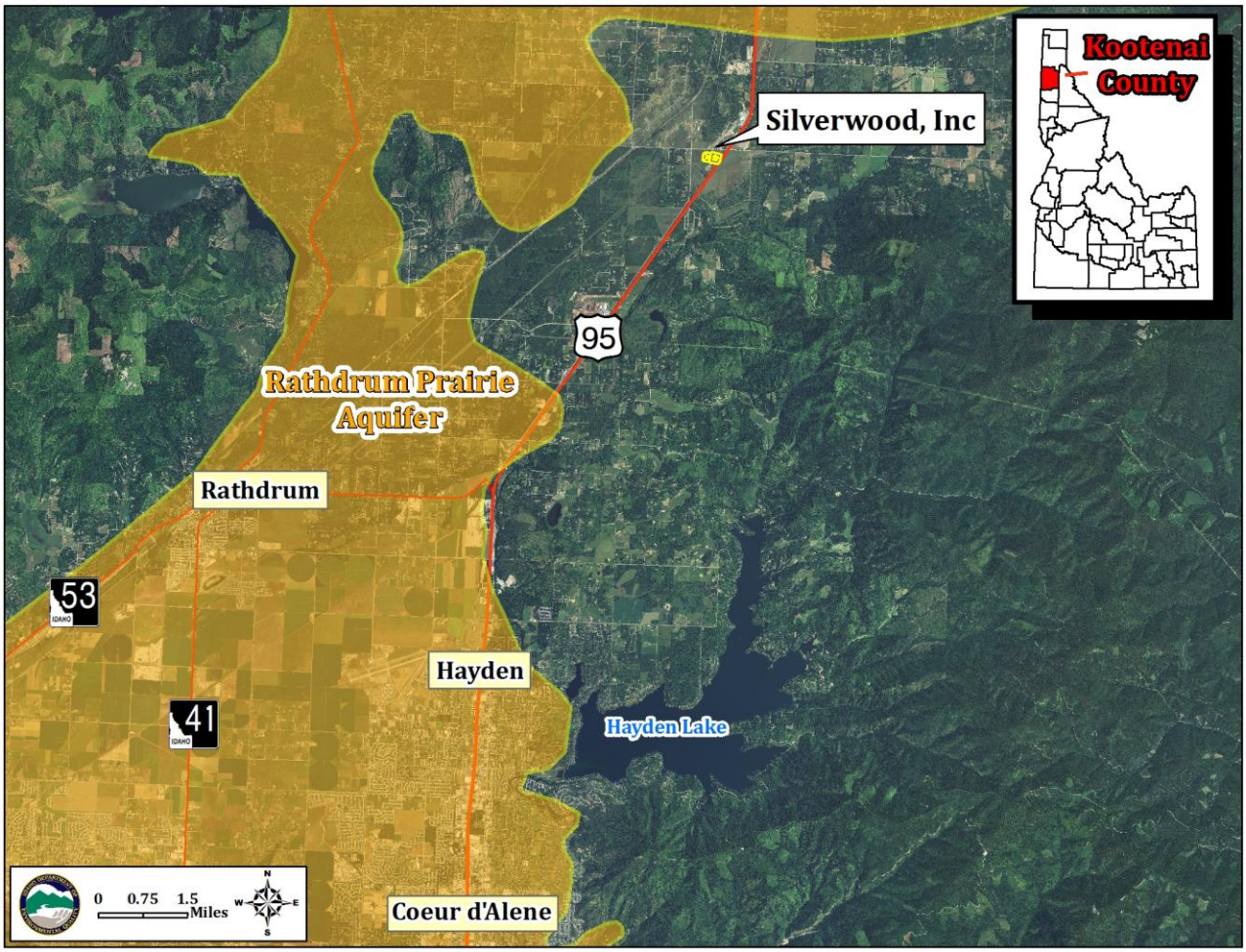
4.6.1 Silverwood Inc. Site Map of Reuse Site Facilities and Acreage



4.6.2 Silverwood Inc. Vicinity Map



4.6.3 Proximity of Silverwood Reuse Site to Rathdrum Prairie Aquifer



5. RECOMMENDATIONS

Based on review of applicable state rules, staff recommends that DEQ issue draft reuse permit M-217-02 for a public review and comment period. The draft permit contains effluent quality requirements for the recycled water treatment system, as well as terms and conditions required for operation of the reuse system in Section 4. Monitoring requirements to evaluate system performance and to determine permit compliance have been specified in Sections 5. Reporting requirements are included in Section 6 and compliance activities have been incorporated into Section 3 of the permit.

6. REFERENCES

(Mountain Waterworks, 2013*) "Technical Report: Silverwood, Inc. Wastewater Reuse Permit LA-000217-01 Renewal"*, Stuart Hurley, P.E. - Mountain Waterworks, January 8, 2013

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