

MEMORANDUM

TO: Chas Ariss, P.E., Wastewater Program Manager, SO
David Anderson, Regional Administrator, TFRO
Michael Brown, Regional Engineering Manager, TFRO

FROM: Jerimiah Fenton, E.I., Reuse Coordinator, TFRO *J.F.*

DATE: January 9, 2014

SUBJECT: City of Albion Municipal Reuse Permit M-077-04, Staff Analysis Supporting Reuse Permit Issuance

Executive Summary

The City of Albion owns and operates a municipal wastewater treatment and Class D reuse facility located approximately one mile east of Albion, Idaho. The facility consists of two facultative lagoons, a chlorine disinfection system, and a 13-acre field used for the land application of wastewater during the growing season. The City is permitted to land apply wastewater under municipal reuse permit, LA-000077-03. Over the last five growing seasons (2009-2013) the City has applied an average of 5.48 million gallons (MG) of wastewater and 4.73 MG of supplemental irrigation water to the reuse site.

Prior to the current permit, the facility struggled to meet Class D disinfection standards. The chlorine contact chamber had been completely bypassed and sodium hypochlorite was being injected directly into the wastewater effluent line. In 2010, the City repaired the disinfection system and returned it to the original approved design. The repairs to the disinfection system appear to have improved the City's ability to consistently meet Class D disinfection standards. In 2012, the City repaired the leaking lagoon transfer structure in order to meet the seepage test requirements specified in the current permit. In 2013, the City obtained an irrigation water right for Marsh Creek to consistently provide supplemental irrigation water to the reuse site.

Annual reports and inspections during the current permit cycle indicate that the facility has been operating within substantial compliance of permit conditions, with the exception of exceedances of the total coliform limit for the land applied wastewater and the failure to complete the permit required compliance activities. The City failed to submit an updated Plan of Operation (PO) or Buffer Zone Management Plan. The Quality Assurance Project Plan (QAPP) submitted by the City's wastewater operator was incomplete and was not approved by DEQ. The City has stated that a consultant will be hired to complete the required compliance activities proposed for the draft permit.

Staff recommends reissuance of the City of Albion reuse permit for a 10-year term.

1 Introduction

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400 for issuing Wastewater Reuse permits. It briefly states the principal facts and significant questions considered in preparing the draft permit, and it provides a summary of the basis for the draft permit conditions.

A permit renewal application for the City of Albion wastewater treatment and reuse facility was submitted to DEQ by Susan Burnham, P.E. of Keller Associates, Inc. to facilitate the renewal of the current reuse permit, LA-000077-03, which expires February 17, 2015. A history of the permit renewal process is as follows:

- The current permit, LA-000077-03 was issued to the City of Albion on February 17, 2010 for a 5-year term.
- On March 7, 2014, a pre-application workshop between the City and DEQ was held to discuss the requirements for the renewal of the City's reuse permit and to discuss any possible changes to the permit.
- On August 28, 2014, a permit renewal package was submitted to DEQ by Susan Burnham, P.E. of Keller Associates, Inc. on behalf of the City. The submittal included a completed Recycled Water Reuse Permit Application Form and a Preliminary Technical Report to support the renewal of the permit.
- On October 29, 2014, a completeness determination letter was sent to the City deeming the submitted permit renewal package complete.

2 Site Location and Ownership

The City of Albion wastewater treatment and reuse facility is located approximately one mile east of Albion, Idaho in the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 5, Township 12 S, Range 25 E. The single 13-acre management unit permitted for the land application of wastewater is located south and adjacent to the City's two wastewater lagoons. Privately owned agricultural land borders the facility on all sides. A facility and vicinity map showing the location of the wastewater treatment and reuse facility are shown in Figures A-1 and A-3 in Appendix A of this report. Both the wastewater treatment facility and reuse site are owned and operated by the City of Albion (Albion, 2014b).

The City has an agreement with a local farmer to manage all the farming activities for the reuse site. According to the agreement, the farmer prepares, plants, and harvests the crop, controls weeds, irrigates the crop, and maintains the irrigation system. The agreement between the City and the contract farmer is discussed in detail in section 8 of this report.

3 Process Description

The City of Albion, Idaho is a small town located in Cassia County with a population of approximately 267 (2011). The City's wastewater is composed almost entirely of municipal waste. There are currently no sources of industrial wastewater. A single lift station pumps the collected municipal wastewater to the lagoons. The average daily wastewater flow to the lagoons is approximately 64,400 gallons per day (gpd). The peak month maximum daily flow average is 82,900 gpd. The permit application states that infiltration and inflow adds a significant amount of flow to the wastewater collection system (Albion, 2014b).

The City's wastewater treatment facility consists of two facultative lagoons that are used for both the treatment of the wastewater and nongrowing season storage. The lagoons were originally constructed in 1974 with bentonite clay liners. The maximum operating volumes for Lagoon 1 and Lagoon 2 are 5.1 million gallons (MG) and 3.9 MG, respectively. Table 1 lists the physical properties of each lagoon (Albion, 2014b).

Table 1: Lagoon Properties (Albion, 2014b)

Physical Property	Lagoon 1	Lagoon 2
Maximum Operating Depth	6.0 feet	6.0 feet
Maximum Operating Volume	5.1 MG	3.9 MG
Surface Area	2.63 acres	2.00 acres

The lift station pumps collected wastewater to Lagoon 1. Wastewater flows from Lagoon 1 to Lagoon 2 via the lagoon transfer structure that consists of an adjustable weir. Lagoon 2 is generally used as a polishing pond. The transfer structure between the two lagoons was constructed in 2012. When conducting the permit required seepage testing of the two lagoons, the City discovered that the original transfer structure was leaking. While the measured seepage rate for Lagoon 2 of 0.221 inches per day was less than the regulatory seepage rate limit of 0.25 inches per day, the seepage rate of Lagoon 1 exceeded the regulatory limit because it was apparently leaking through the transfer structure into Lagoon 2 (Albion, 2011b). After the construction of the new transfer structure, the measured seepage rate for Lagoon 1 was 0.216 inches per day, which is less than the 0.25 inches per day regulatory seepage rate limit (Albion, 2012b).

The disinfection system and pump used for the land application of wastewater are located in the pump house near the southwest corner of Lagoon 2. Wastewater gravity flows through the Lagoon 2 outlet pipe into the chlorine contact chamber. Sodium hypochlorite is injected into the wastewater in the Lagoon 2 outlet pipe prior to the contact chamber. From the contact chamber, the wastewater flows into a sump for the centrifugal pump which pressurizes the main line used to irrigate the 13-acre field. The wastewater is then land applied using two hand lines that are moved across the field (Albion, 2014b).

The City does not currently have a waste solids management plan for the disposal of the accumulated sludge in the lagoons. During the construction of the lagoon transfer structure, approximately four "dump truck loads" of solids were removed from the two lagoons and

disposed of at the Milner Butte Landfill. The City does expect sludge accumulation in the lagoons to be an issue in the near future (Albion, 2014b).

4 Site Characteristics

4.1 Site Management History

The City of Albion’s wastewater lagoons were constructed in 1974. Treated wastewater has been applied to the reuse site for over thirty years. Prior to 2009, when the current permit was issued, the City did not keep records on crop yields or uptake. The City reportedly only grew hay during that time. Since 2009, the crop planted on the reuse site has varied between alfalfa and oats. In 2012 the City applied more wastewater than usual to lower the water level in the lagoons during construction of the lagoon transfer structure. As a result, the City had plenty of available lagoon storage capacity during the 2013 growing season and did not land apply any wastewater (Albion, 2014b).

4.2 Climatic Characteristics

The climatic characteristics provided in the permit renewal application referenced data obtained from the Oakley NWS (106542) weather station. This is the closest weather station to Albion with a similar climate. The Oakley NWS weather station is located at latitude 42° 15’ North, longitude 113° 53’ West at an elevation of 4,600 feet. The climatic data referenced in the application is shown in Table 2 (Albion, 2014b).

Table 2: Climatic Data (Albion, 2014b)

Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (in)	0.82	0.64	1.09	1.11	1.71	1.19	0.78	0.73	0.96	0.80	0.79	0.70	11.32
Avg. Max. Temp. (°F)	36.6	42.6	50.5	58.7	66.6	76.0	83.1	83.1	73.8	62.4	46.0	37.4	59.7
Avg. Min. Temp. (°F)	19.1	23.2	28.2	32.9	40.1	47.5	54.1	53.5	44.7	35.8	26.6	19.4	35.4
Evaporation (in)	0.2	0.6	1.6	3.2	5.6	6.0	6.8	6.4	4.0	2.4	2.0	1.2	40.0

The estimated average annual precipitation for the reuse site is 11.32 inches per year. 7.28 inches of the average annual precipitation occurs during the growing season (April 1st through October 31st), while 4.04 inches occurs during the nongrowing season (November 1st through March 31st). The annual average maximum temperature is 59.7 °F and annual average minimum temperature is 35.4 °F. The wind direction in this area is predominantly from the west to southwest and the annual average wind speed is 5-7 mph (WRCC, 2013).

Crop evapotranspiration data for the Oakley NWS weather station can be obtained from the ET_{Idaho} website (Allen, 2012). The total growing season precipitation deficit (Pdef) and irrigation water requirement (IWR) values for the alfalfa and oats normally grown on the reuse site are shown in Table 3. The IWR of the crops is calculated by dividing the precipitation deficit values by the irrigation efficiency (E_i). The City of Albion uses an irrigation efficiency of 70% (0.70) for the hand lines used to irrigate the reuse site.

Table 3: Irrigation Water Requirements (Allen, 2012)

Crop	Precipitation Deficit (Pdef), Inches	Irrigation Water Requirement (IWR), Inches
Alfalfa – Frequent Cuttings	34.6	49.4
Spring Grain (oats)	22.7	32.4

4.3 Soils

The soil types present at the reuse site are discussed in section IV.C of the permit application (Albion, 2014b). The predominant soil types are deep, silt loams, suitable for agricultural production. Approximately 84% of the site consists of Ririe silt loam with 1-3 percent slopes. The remaining 16% of the site is composed of Downata silt loam with 0-2 percent slopes. The available water holding capacity of the soil ranges from 11.2 to 12.0 inches for the upper 5 feet of soil. Additional soil information for the site can be found in the NRCS soil survey for Cassia County (USDA, 2013).

4.4 Surface Water

Land Creek is located approximately 0.36 of a mile west of the reuse site and Marsh Creek is located approximately 0.55 of a mile northwest of the reuse site. The beneficial uses of these two streams include agriculture, industrial, wildlife habitat, and aesthetics. According to the permit application, the lagoons and the reuse site are located outside of the 100-year and 500-year flood plains. There are also old irrigation laterals within a quarter (0.25) of a mile of the site but they are no longer used (Albion, 2014b).

4.5 Ground Water/Hydrogeology

There is a shallow aquifer local to the Albion basin. Beneath the shallow perched aquifer are several local confined aquifers. Water levels in the uppermost aquifer seasonally vary between 5 to 45 feet below the ground surface. Ground water flow direction of the upper aquifer is generally to the north to northwest, following the natural topography of the basin (Albion, 2014b).

The City does not currently have a ground water monitoring network for the reuse facility. There are no domestic wells located within a quarter (0.25) mile of the reuse site. The closest well to the reuse site is an irrigation well located a quarter (0.25) mile to the south. This well was drilled in 2007 and was reported to have a static water level of 25 feet. This well is used solely for irrigation and is located upgradient of the reuse site. The nearest public water supply well is the City of Albion’s Well # 1 located approximately one mile northwest of the reuse site in the City park. The City’s public water supply well is generally located side gradient of the reuse site and should not be impacted by reuse operations.

4.6 Wastewater Characterization and Loading Rates

4.6.1 Wastewater Characterization

The average wastewater constituent concentrations reported in the City's annual reports from 2009 to 2013 are shown in Table 4. No wastewater was land applied in 2013. It should be noted that the City has been monitoring some constituents that aren't required by the current permit, including, chemical oxygen demand (COD), total dissolved solids (TDS), and volatile dissolved solids (VDS). The quality of the land applied wastewater appears to fairly consistent.

Table 4: Wastewater Quality (mg/L)

Year	COD	Total Phosphorous	NO ₂ +NO ₃ - Nitrogen	TKN	Total Nitrogen	TDS	VDS
2009	138.0	2.4	0.6	8.3	8.9	418	125
2010	125.5	2.8	1.1	13.8	14.9	675	210
2011	74.7	2.7	2.0	9.4	11.4	540	213
2012	144.0	1.9	0.7	6.3	7.0	523	145
2013	No wastewater application						
Mean	120.5	2.5	1.1	9.4	10.6	538.8	173.3
Flow Rated Average	110.2	2.2	1.0	8.2	9.2	499.1	152.9

4.6.2 Hydraulic Loading Rates

The City only applies wastewater to the reuse site during the growing season. The growing season wastewater loading is not usually sufficient to meet the irrigation water requirement (IWR) of the crop, so supplemental irrigation water is required. The total volumes of wastewater and supplemental irrigation water applied to the site from 2009 to 2013 are shown in Table 5. Note that a larger volume of wastewater was applied in the 2012 growing season in order to lower the lagoon water levels for the repair of the lagoon transfer structure. The City did not land apply any wastewater in 2013 due to low lagoon water levels.

Table 5: Hydraulic Loading Rates (MG)

Year	Recycled Water	Supplemental Irrigation Water	Total Hydraulic Loading
2009	6.47	1.87	8.34
2010	5.78	3.50	9.28
2011	4.77	6.11	10.88
2012	10.36	1.59	11.95
2013	0	10.58	10.58
Average	5.48	4.73	10.21

The City tracks the wastewater and supplemental irrigation water hydraulic loadings to the reuse site using two propeller flow meters. The supplemental irrigation water flowmeter is located at the southwest corner of the field. The recycled water flow meter is located inside the effluent pump house. The contract farmer determines the irrigation schedule for the reuse site based on crop needs. Two hand lines with 5/32 inch nozzles are used to irrigate the 13-acre field. The farmer usually waters the crop using 24-hour sets. Table 6 shows the design monthly hydraulic loading rates for the alfalfa and oats that are normally grown on the reuse site based on the IWR of the crops.

Table 6: Design Monthly Hydraulic Loading Rates

Month	Alfalfa - frequent cuts		Spring Grain (Oats)	
	MG	inches	MG	inches
April	1.69	4.79	0.76	2.16
May	2.84	8.04	1.93	5.46
June	2.85	8.07	4.05	11.47
July	3.32	9.42	3.99	11.32
August	2.96	8.39	0.70	1.99
September	2.35	6.66	0.00	0.00
October	1.45	4.10	0.00	0.00
Growing Season Total	17.5	49.5	11.4	32.4

4.6.3 Constituent Loading Rates

Table 7 displays the growing season constituent loading rates for the reuse site based on annual report data for the years 2009 through 2012. Note that no wastewater was applied in 2013. The current permit required the permittee to report nitrogen and phosphorous fertilizer application rates but no fertilizer application has been reported.

Table 7: Growing Season Constituent Loading Rates, 2009-2012

Growing Season	Nitrogen (lbs/ac)	Phosphorous (lbs/ac)	COD (lbs/ac/day)	NVDS (lbs/ac)
2009	32	9	2.47	1300
2010	49	9	1.97	1575
2011	25	6	1.02	1025
2012	49	16	4.37	2074
Average	38.8	10.0	2.46	1494

The nitrogen and phosphorous loading rate limits specified in the current permit are both 150% of the typical crop uptake. Alfalfa was grown on the site from 2009 to 2012. Oats were also grown following the alfalfa harvest in 2011 and 2012. From 2010 to 2012, the three year median

for the alfalfa nitrogen and phosphorous crop uptake were 165 lbs/acre and 12.9 lbs/acre, respectively. For the alfalfa grown in 2012, this would result in a nitrogen loading limit of 247.5 lbs/acre and a phosphorous loading limit of 19.35 lbs/acre. In 2012 the City applied a greater than normal volume of recycled water to the site due to the lagoon transfer structure construction. The resulting nitrogen and phosphorous loadings in 2012 were 49 lbs/acre and 16 lbs/acre, respectively. These loading rates are still well below the 2012 loading limits (Albion, 2014b).

5 Site Management

5.1 Buffer Zones

The wastewater treatment and reuse site is surrounded on all four sides by privately owned farm land. A barb wire fence surrounds the entire site and the site is not accessible to the public. Signs are posted around the perimeter of the facility reading, “CAUTION: Waste Water Land Application Area.” The current reuse permit specifies the required buffer distances listed in Table 8. These required buffer distances are consistent with those recommended for Class D reuse facilities in the DEQ Guidance (DEQ, 2007).

Table 8: Permit Required Buffer Distances (LA-000077-03)

Object	Buffer Distance (feet)
Inhabited Dwellings	500
Areas Accessible to the Public	300
Permanent and Intermittent Surface Water	100
Irrigation Ditches and Canals	50
Private Water Supply Wells	500
Public Water Supply Wells	1000

The reuse site currently meets all of the required buffer distances. The reuse site is located approximately one mile east of the closet City of Albion public water supply well (Well #1). The closest well to the reuse site is an irrigation well located a quarter (0.25) of a mile south and upgradient of the site. The nearest surface water is Land Creek located approximately 0.36 of a mile from the northwest corner of the site. There are some nearby irrigation laterals within a quarter (0.25) mile of the site, but they are no longer used.

5.2 Runoff

The City’s current permit does not allow any runoff from the reuse facility. A retention berm was constructed around the west border of the reuse site to prevent any runoff from leaving the site. The reuse site slopes (< 2%) slightly from the southeast corner to the northwest corner of the site. Any runoff should flow towards the retention berm at the western edge of the site. In addition to the construction of the berm, the City mitigates any runoff by applying wastewater to the site at agronomic rates. No wastewater is applied during storm events (Albion, 2014b).

5.3 Seepage Rate Testing

Compliance activities CA-077-03 and CA-077-04 of the current permit required the City to seepage test each of the wastewater lagoons. CA-077-03 required Lagoon 2 (LG-0077-02) to be tested by November 2011 and CA-077-04 required Lagoon 1 (LG-0077-01) to be tested by November 2012. The required regulatory seepage rate for each of the lagoons constructed prior to April 15, 2007 is 0.25 inches per day (IDAPA 58.01.16.493.03).

The seepage testing results for both lagoons were submitted to DEQ on November 1, 2011 by Mark Holtzen, P.E. of JUB Engineers, Inc. The seepage rate of Lagoon 1 exceeded the regulatory seepage rate of 0.25 inches/day, while Lagoon 2 was in compliance with the regulatory seepage rate. With the use of dye, the City discovered a leak around the lagoon transfer structure located between the two lagoons. The City believed this leak to be the cause of the high seepage rate measured for Lagoon 1 (Albion, 2011b).

The City replaced the lagoon transfer structure during the spring of 2012. Following the completion of the transfer structure construction, Lagoon 1 was seepage tested again. The test results submitted to DEQ on September 7, 2012 showed that the replacement of the transfer structure reduced the seepage rate of Lagoon 1. Lagoon 1 was determined to be in compliance with the regulatory seepage rate (Albion, 2012b).

Table 9 lists the complete details of the approved seepage rate tests for each of the lagoons. The two municipal wastewater lagoons are required to be tested every ten years or if there is a change of conditions to the liner (IDAPA 58.01.16.493.02). Lagoon 1 must be seepage tested again by September 2022 and Lagoon 2 must be seepage tested by November 2021.

Table 9: Lagoon Seepage Rate Test Details (Albion, 2011b; Albion, 2012b)

Lagoon	Serial No.	Date of Seepage Test Report Submittal	DEQ Approval Date of Test Results	Reported Seepage Rate, inches/day	Regulatory Rate, inches/day	Due Date For Next Seepage Rate Test
1	LG-007701	9/7/2012	12/10/2012	0.216	0.25	9/7/2022
2	LG-007702	11/1/2011	4/11/2012	0.221	0.25	11/1/2021

5.4 Waste Solids, Biosolids, Sludge, and Solid Waste

According to the permit application, sludge depth measurements were performed in 2012 at several locations across each lagoon. Approximately 6 to 8 inches of sludge had accumulated since the lagoons were put into service. When the transfer structure between the lagoons was replaced, approximately four “dump truck loads of sludge” were removed and taken to the Milner Butte Landfill. Waste solids from the lagoons are not land applied and are not likely to be an issue in the near future (Albion, 2014b).

5.5 Nuisance Odors

The City does not currently have an approved nuisance odor management plan. However, nuisance odors have generally not been an issue. Neither the City nor DEQ have received any odor complaints during the term of the current permit. The wastewater treatment and reuse facility are located in a remote area surrounded by farm land. The land applied wastewater is also relatively low strength.

5.6 Cropping Plan

A Crop Management Plan was submitted to DEQ on May 24, 2010 as a requirement of compliance activity CA-077-05 listed in the current permit. The plan was never officially reviewed by DEQ; however, it did not contain sufficient information about the cropping of the reuse site. The plans states that the contract farmer selects and plants the crop on the reuse site, which usually varies between oats and alfalfa.

The permit renewal application states that alfalfa was grown on the reuse site in 2009 and 2010. Three cuts of alfalfa were harvested each growing season. In 2011 and 2012, both oats and alfalfa were grown. Two cuttings of alfalfa were harvested in addition to the oat harvest. In 2013 and 2014, only oats were grown on the site (Albion, 2014b).

5.7 Grazing

The City does not currently allow any grazing on the reuse site and does not plan to in the future. The entire site is surrounded by a barb wire fence, which should help prevent any livestock grazing on the surrounding fields from entering the reuse site.

5.8 Salts

The current reuse permit does not require the City to monitor the wastewater effluent for nonvolatile dissolved solids (NVDS). However, the City has continued to monitor the wastewater for total dissolved solids (TDS) and volatile dissolved solids (VDS). NVDS concentrations can be calculated by subtracting VDS concentrations from TDS concentrations. The average NVDS loading rate to the reuse site from 2009 to 2012 is approximately 1500 lbs/acre. Salt loadings to the reuse site are significant; however, as discussed in section 6.2 of this report, the soil does not appear to be impacted by the NVDS loading. An NVDS management plan does not appear to be necessary at this time.

While salts do not currently appear to be impacting the site, staff recommends that the permittee continues to monitor wastewater NVDS loading rates. The NVDS loading to the reuse site could potentially impact site soils in the future. Proposed NVDS monitoring for the draft permit is discussed in section 9.4.1 of this report.

6 Monitoring

6.1 Wastewater Monitoring

The City of Albion wastewater treatment and reuse facility is classified as a Class D reuse facility; therefore, the City is required to sample the wastewater effluent monthly for total coliform when land applying. The median number of total coliform organisms must not exceed 230 total coliform organisms/100 mL, as determined from the bacteriological results of the last 3 days for which analyses have been completed. No sample shall exceed 2,300 total coliform organisms/100 mL in any confirmed sample.

The current reuse permit, LA-000077-03, also requires the City to sample for wastewater chemistry monthly when land applying. The wastewater is required to be monitored for pH, nitrate + nitrite nitrogen, total Kjeldahl nitrogen (TKN), total phosphorous, and electrical conductivity (EC). The City has failed to sample the land applied wastewater for EC during the term of the current permit. This was pointed out to the City in multiple annual report reviews. The City has also been sampling for total dissolved solids (TDS), volatile dissolved solids (VDS), and chemical oxygen demand (COD) which are not required by the current permit.

The City's wastewater treatment operator collects all wastewater samples from a spigot on the effluent pump line located inside the pump hose. The operator collects the wastewater sample in a clean bottle and transports the sample in a cooler to a commercial lab for analysis. The City currently uses Magic Valley Labs in Twin Falls, Idaho to complete all wastewater analysis.

6.2 Soil Monitoring

The current permit, LA-000077-03, required only one soil sampling event to be completed in May 2014. The City was required to analyze the soil for nitrate + nitrite nitrogen, electrical conductivity (EC), ammonia nitrogen, and plant available phosphorous. Stukenholtz Laboratory in Twin Falls collects and analyses the soil samples. The last two soil samples for the reuse site were taken April 29, 2009 and April 21, 2014. The results of the two sampling events are shown in Table 10.

Table 10: Soil Monitoring Results (Albion, 2014b)

Parameter	April 29, 2009			April 21, 2014		
	0"-12"	12"-24"	24"-36"	0"-12"	12"-24"	24"-36"
Salts (mmhos/cm)	1.7	2.7	2.6	1.1	1.2	1.2
CEC (meq/100g)	-	-	-	14.3	15.1	14.9
Nitrate-N (ppm)	7	3	3	9	7	4
Ammonia-N (ppm)	5.1	3.2	2.7	5.5	2.6	1.6
Organic N (lbs/ac)	65	50	35	40	30	25
pH (s.u.)	8.5	8.7	8.5	8.3	8.4	8.7
Phosphorous (ppm)	19	15	6	14	4	5

The results of the two soil samples shown in Table 10 reflect the relatively low loading rates applied to the reuse site. Over the last five years there has not been any significant change in the soil chemistry. There was a slight increase in nitrate levels, but ammonia, salt, and phosphorous soil levels appear to have generally decreased since 2009.

In 2009 the salt concentration in the second foot of soil was 2.7 mmhos/cm. This level of salt in the soil is bordering on potentially impacting the yield of the alfalfa crop. At 3.4 mmhos/cm, the yield of alfalfa could potentially be reduced by up to ten percent (Cardon, 2014). The results of the 2014 soil sample show that salt concentrations have significantly decreased since 2009.

Currently, a soil sample frequency of every five years appears to be adequate for this facility. However, if wastewater loading rates or fertilizer application rates significantly increase in the future, more frequent soil sampling may be required. If the City ever desires to apply supplemental fertilizer to the reuse site, a soil sample should be collected to determine the recommended fertilizer application rate for the field.

6.3 Ground Water Monitoring

The City does not currently have a groundwater monitoring network for the reuse site. Due to the relatively low loading rates to the reuse site, there is not likely to be much, if any, impact to the local groundwater quality. The lagoons are a more likely source of groundwater contamination.

There aren't any domestic or public drinking water wells near the facility. The nearest well is located a quarter (0.25) of a mile upgradient of the site and it is used solely for irrigation. The nearest public water supply well is a City of Albion Public Water Supply (Well #1) located in the city park approximately one mile northwest of the reuse site.

Staff does not recommend requiring the installation of a ground water monitoring network at this time. The low loading rates to the reuse site and the soil sample results do not justify the need for groundwater monitoring.

6.4 Supplemental Irrigation Water Monitoring

The source of the supplemental irrigation water applied to the reuse site is Marsh Creek. In 2013 the City obtained an irrigation water right for the reuse site, so that there could be a more consistent supply of supplemental irrigation water for the site. Prior to obtaining the water right, the City received supplemental irrigation water from a neighboring farmer. In 2013, the City also installed a new flow meter to record the daily supplemental irrigation water volume applied to the reuse site.

The current permit, LA-000077-03, requires the City to monitor the volume of supplemental irrigation water but does not require any analysis of supplemental irrigation water chemistry. Due to the low loading rates applied to the site, staff does not recommend requiring the City to monitor supplemental irrigation water chemistry.

6.5 Crop Yield and Tissue Monitoring

Crop yields are reported to the City by the contract farmer. Crop tissue samples are taken at each harvest by the City's wastewater operator. The samples are taken to Stukenholtz Laboratory in Twin Falls, Idaho for analysis. The City has been analyzing the samples for moisture content, nitrogen content, and phosphorous, as well as other components that are used to determine the feed value of the crop. The current permit is not specific about the requirements for crop tissue analysis. The permit just requires the City to report nitrogen and phosphorous uptake using either crop tissue analysis or standard tables.

As discussed during the pre-application workshop, the draft permit, M-077-04, will require crop tissue analysis. The use of standard crop uptake tables will no longer be an option.

6.6 Calculation Methodologies

This section summarizes agreed upon methods of calculation the City and DEQ will use to determine permit compliance. The City does not currently have an approved updated Plan of Operation for the reuse site. The items discussed in this section should be specified in the updated Plan of Operation that will be required to be submitted by the new permit, M-077-04.

The hydraulic loading rate to the reuse site is measured using two propeller flow meters. The volume of wastewater effluent applied to the site is measured using the flow meter downstream of the effluent pump. This flow meter is located inside the pump house. The volume of supplemental irrigation water applied to the site is measured using the new flow meter on the irrigation line located at the southwest corner of the site. Data from each of the flow meters shall be recorded daily and compiled monthly.

To determine the IWR values for the crops grown on the reuse site, the City has selected to use meteorological data provided by the Oakley NWS weather station. This is the closest weather station to Albion with a similar climate. The data for this weather station will be accessed through the ET_{Idaho} website (Allen, 2012). Two movable hand lines are used to water the entire 13-acre reuse site. The City has been using a 70% irrigation efficiency to calculate the IWR of the crop. This irrigation efficiency is acceptable for the method of irrigation used.

Constituent loadings shall be calculated monthly using the monthly hydraulic loading rates and the monthly wastewater chemistry monitoring results. The total growing season constituent loading to the reuse site should be calculated by summing the monthly constituent loading rates. Constituent loading rate calculations shall be provided in pounds per acre (lbs/acre).

Crop tissue analysis shall be conducted for each harvest. If alfalfa is grown on the site, the City should collect crop tissue samples for each cut of alfalfa. Crop nutrient uptake should be calculated for each harvest and for the total growing season. Crop uptake calculations shall be provided in pounds per acre (lbs/acre).

7 Quality Assurance Project Plan

Compliance Activity CA-077-02 of the current permit, LA-000077-03, required the City to submit a Quality Assurance Project Plan (QAPP) for all required monitoring. The City wastewater operator wrote a QAPP that was submitted to DEQ in February 2013. While a complete review of the QAPP was not completed by DEQ, the QAPP was lacking in detail and was not approved.

During the pre-application workshop, DEQ and the City discussed the required contents of the QAPP. The City stated that they would hire a consultant to help them write a QAPP for the new permit, M-077-04. The requirement to submit an updated QAPP will be listed as a compliance activity in the draft permit.

8 Site Operation and Maintenance

The City of Albion has a "Sewer Maintenance Agreement" with the contract farmer who manages the reuse site. A copy of this agreement can be viewed in Appendix A of the permit renewal application technical report. This agreement specifies the inspection and maintenance services that the contact farmer has agreed to perform, as well as the services that will be performed by the City (Albion, 2014b).

The responsibilities of the contract farmer mostly involve the maintenance and oversight of all farming activities for the reuse site. The farmer has agreed to control weeds, maintain the sprinkler system, and perform all crop maintenance (including preparation, planting, and harvesting). The farmer must apply recycled water to the site to regulate the level of wastewater in the lagoons. The farmer is only allowed to apply effluent during the growing season in accordance with the reuse permit. The farmer has also agreed to notify the City of any visible issues with the lagoons, pump station, or posted signage (Albion, 2014b).

The City has agreed to provide all maintenance, repair, inspections, and operation of the wastewater treatment facility, including the lagoons and collection system. The City is also responsible for maintaining and repairing the recycled water pump station. The barbwire fence around the facility is maintained by the City. The City also provides the required signage posted around the perimeter of the wastewater treatment and reuse facility (Albion, 2014b).

The City is required to have a certified operator for the sewer collection system, the wastewater treatment facility, and the land application site. Both the City's sewer collection system and wastewater treatment facility are classified as Class I systems. Mr. Shawn Burton is currently employed as the Responsible Charge Operator for the sewer collection system, the wastewater treatment facility, and the land application site. Mr. Burton has acquired the following wastewater operator certifications: Class I Collection (WWC1 - 18452), Wastewater Treatment - Lagoon (WWTL - 19068) and Land Application (WWTLA - 19067). Mr. Burton does not currently have the necessary Class I wastewater treatment operator license to operate the City's wastewater treatment facility. Mr. Burton should obtain a Class I wastewater treatment operator license as soon as possible, or the City must appoint an operator that is properly licensed to operate the facility. The certified wastewater treatment operators for the City of Paul have agreed to be the backup operators for the City of Albion. The City of Paul has a Class I wastewater treatment facility and a land application site.

9 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 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.

9.1 Status of Compliance Activities in Current Permit (LA-000077-03)

The status of each compliance activity required by the current permit is listed below:

1. CA-077-01: The updated Plan of Operation (PO) was required to be submitted twelve (12) months after the issuance of the current permit. An updated PO was never submitted to DEQ.
2. CA-077-02: The Quality Assurance Project Plan (QAPP) for all permit required monitoring was submitted to DEQ in February 2013. As discussed with the City during the pre-application workshop, the submitted QAPP was incomplete.
3. CA-077-03: The results of the Lagoon 2 seepage rate test were submitted to DEQ on November 1, 2011. The reported seepage rate for Lagoon 2 was 0.221 inches/day, which is less than the regulatory limit of 0.25 inches/day. The seepage rate test results for Lagoon 2 were approved by DEQ on April 11, 2012. According to IDAPA 58.01.16.493, Lagoon 2 is required to be seepage tested every 10 years or if there is a

change of condition to the liner that may affect its permeability. Lagoon 2 must be seepage tested again by November 2021.

4. CA-077-04: The results of the Lagoon 1 seepage rate test were submitted to DEQ on November 1, 2011. The reported seepage rate for Lagoon 1 was 0.34 inches/day, which is greater than the regulatory limit of 0.25 inches/day. Upon discovering that Lagoon 1 failed to meet regulatory requirements, the City investigated leaks in the lagoon using dye. The City determined that Lagoon 1 was leaking into Lagoon 2 through the lagoon transfer structure. The transfer structure was replaced and Lagoon 1 was seepage tested again. The results for the second test were submitted to DEQ on September 7, 2012. The reported seepage rate for the second test was 0.216 inches/day, which is less than the regulatory requirement. The submitted seepage rate test results for Lagoon 1 were approved by DEQ on December 10, 2012. According to IDAPA 58.01.16.493, Lagoon 1 is required to be seepage tested every 10 years or if there is a change of condition to the liner that may affect its permeability. Lagoon 1 must be seepage tested again by September 2022.
5. CA-077-05: The crop management plan was submitted to DEQ on May 24, 2010. The plan was never officially reviewed by DEQ. However, the plan was reviewed as part of the permit renewal process. This document was lacking in detail and did not fulfill the purpose of the crop management plan. The plan just stated that alfalfa was usually grow on the site, and described the methods of irrigation.
6. CA-077-06: The chlorine disinfection system components had been altered from the original design of the system. The chlorine contact chamber was completely bypassed and the sodium hypochlorite was being injected directly into the effluent pipe downstream of the effluent pump. On May 24, 2010, DEQ received a letter stating that the City had reinstalled the chlorination system components to their original design. In 2013, the City replaced the baffles in the chlorine contact chamber. The City still has issues with high total coliform levels when the lagoons are drawn too low, but the disinfection system appears to be operating adequately to meet Class D disinfection requirements.
7. CA-077-07: An updated buffer zone management plan was never submitted to DEQ.

9.2 Compliance Activities Required in Draft Permit (M-077-04) – Section 3

The following Compliance Activities are specified in the draft permit, M-077-04:

1. The permittee shall submit an updated Plan of Operation (PO) that incorporates the requirements of the new permit. The facility's PO is out of date and does not reflect current operations or permitting requirements. The updated PO shall be submitted within twelve (12) months of permit issuance.

2. The permittee shall submit an updated Quality Assurance Project Plan (QAPP) for all permit required monitoring. The QAPP shall be submitted within twelve (12) months of permit issuance.
3. Since the permit is being issued for a 10-year term, the permit will require the completion of the seepage testing of the two lagoons. Lagoon 1 shall be seepage tested by September 2022 and Lagoon 2 shall be seepage tested by November 2021.
4. The permittee shall meet with DEQ one year prior to the expiration of the permit to discuss permit renewal requirements.
5. The permittee shall submit a permit renewal application at least six months prior to the expiration of the permit.

9.3 Permit Limits and Conditions – Section 4

9.3.1 Monitoring Unit Serial Numbers

Please note that the general format of the monitoring unit serial numbers has been slightly altered. For example, the management unit serial number has been changed from MU-007701 to MU-077-01.

9.3.2 Irrigation Efficiency

The irrigation efficiency (E_i) for the selected method of irrigation for the reuse site is now listed in section 4.1 of the draft permit. The agreed upon irrigation efficiency for the hand lines used to irrigate the reuse site is 70% (0.70). This irrigation efficiency shall be used to calculate the IWR values for the crops grown.

9.3.3 Phosphorus Loading Limit

The current permit lists a phosphorus loading limit of 150% of crop uptake. However, the phosphorus loading rate to the reuse site has been relatively low during term of the current permit (10.0 lbs/acre). The soil monitoring results from the 2009 and 2014 sampling events also show low phosphorus levels in the soils. The recycled water phosphorus loading does not appear to be causing any significant impacts to the site. There also aren't any nearby surface waters that would be impacted by the phosphorus loading to the site.

Staff recommends removing the phosphorus loading limit from the draft permit.

9.3.4 Posting

Posting requirements have been updated to reflect changes to the Recycled Water Rules (IDAPA 58.01.17.603.01). Section 4.5 of the draft permit lists the following posting requirements:

Signs shall read “Warning: Recycled Water—Do Not Enter,” or equivalent signage both in English and Spanish. Signs to be posted every 500 feet and at each corner of the outer

perimeter of the irrigated site. Signs are required where management unit border areas are accessible to the public.

9.4 Monitoring Requirements – Section 5

9.4.1 Recycled Water Monitoring

At approximately 1500 lbs/acre, the average reuse site NVDS (salt) loading rate is significant. High salt soil levels can impact the yield and health of the crop. As discussed in Section 6.2 of this report, the 2009 soil sample results showed that salt concentrations in the second foot of soil could have potentially impacted the yield of the alfalfa crop.

The current permit does not require the City to report NVDS loading rates; however, the City has been monitoring the recycled water for TDS and VDS anyway. While salt loading rates do not currently appear to be impacting the site, there is still a significant amount of salt being applied. Monitoring the recycled water for NVDS will help determine if there is a need for the management of salt loading to the site.

Staff recommends adding TDS, VDS, and NVDS as required recycled water monitoring parameters for the growing seasons coinciding with the permit required soil sampling events, 2019 and 2024. Section 5.1.1 of the draft permit lists the constituents that are required to be analyzed in the recycled water samples.

9.4.2 Soil Monitoring

Staff recommends adding pH to the list of required soil monitoring parameters. Soil pH is a good indication of the availability of crop nutrients as well as the agricultural productivity value of the soil. In addition, the City monitored for pH in the last two required soil sampling events (2009 and 2014). Section 5.3.2 of the draft permit lists the constituents that are required to be analyzed in the soil samples.

9.4.3 Crop Monitoring

In the current permit, LA-000077-03, either crop tissue monitoring or standard tables are allowed to be used to calculate crop uptake values. The option to use standard tables has been removed from the draft permit. Section 5.4 of the draft permit specifies the crop monitoring requirements. Section 5.4.1 specifies the data that should be collected at the time of harvest. An as-harvested yield and as-harvested moisture content should be recorded at the time of harvest to determine the dry yield of the crop in pounds. The dry yield of the crop will be used to determine crop nutrient uptake. Section 5.4.2 of the draft permit specifies the requirements for crop tissue analysis. This includes lab moisture content, TKN, nitrate nitrogen, phosphorus, and ash.

10 Recommendations

Staff recommends that draft wastewater reuse permit M-077-04 be issued. The permit specifies hydraulic and constituent loading limits and establishes monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance.

11 References

- Albion (City of Albion). 2010a. *City of Albion Crop Management Plan*. MC Environmental LLC, Heyburn, ID.
- Albion (City of Albion). 2010b. *City of Albion 2009 Annual Wastewater Reuse Site Performance Report*. MC Environmental LLC, Heyburn, ID.
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- DEQ (Idaho Department of Environmental Quality). 2012a. *Response to the City of Albion Lagoon Seepage Testing Report*. CA-077-03. CA-077-04.

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WRCC (Western Regional Climate Center). 2013. *Idaho Climate Summaries*. <<http://www.wrcc.dri.edu/summary/climsmid.html>> (December 3, 2014).

Appendix A: City of Albion Reuse Facility Maps

- Figure A-1: Vicinity Map
- Figure A-2: Surrounding Features Map
- Figure A-3: Site Map



Figure A-1: Vicinity Map (Albion, 2014b)

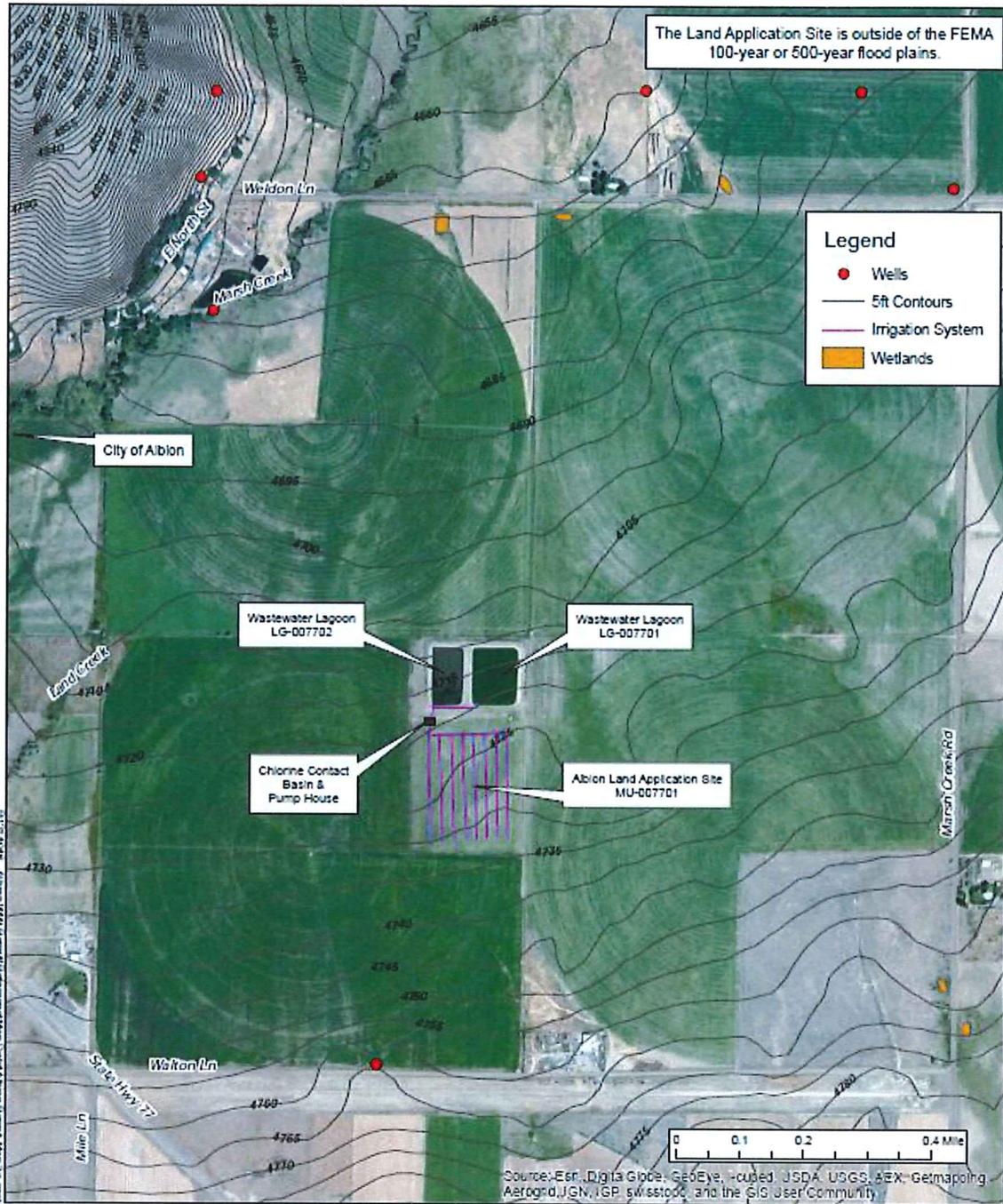


Figure A-2: Surrounding Features Map (Albion, 2014b)

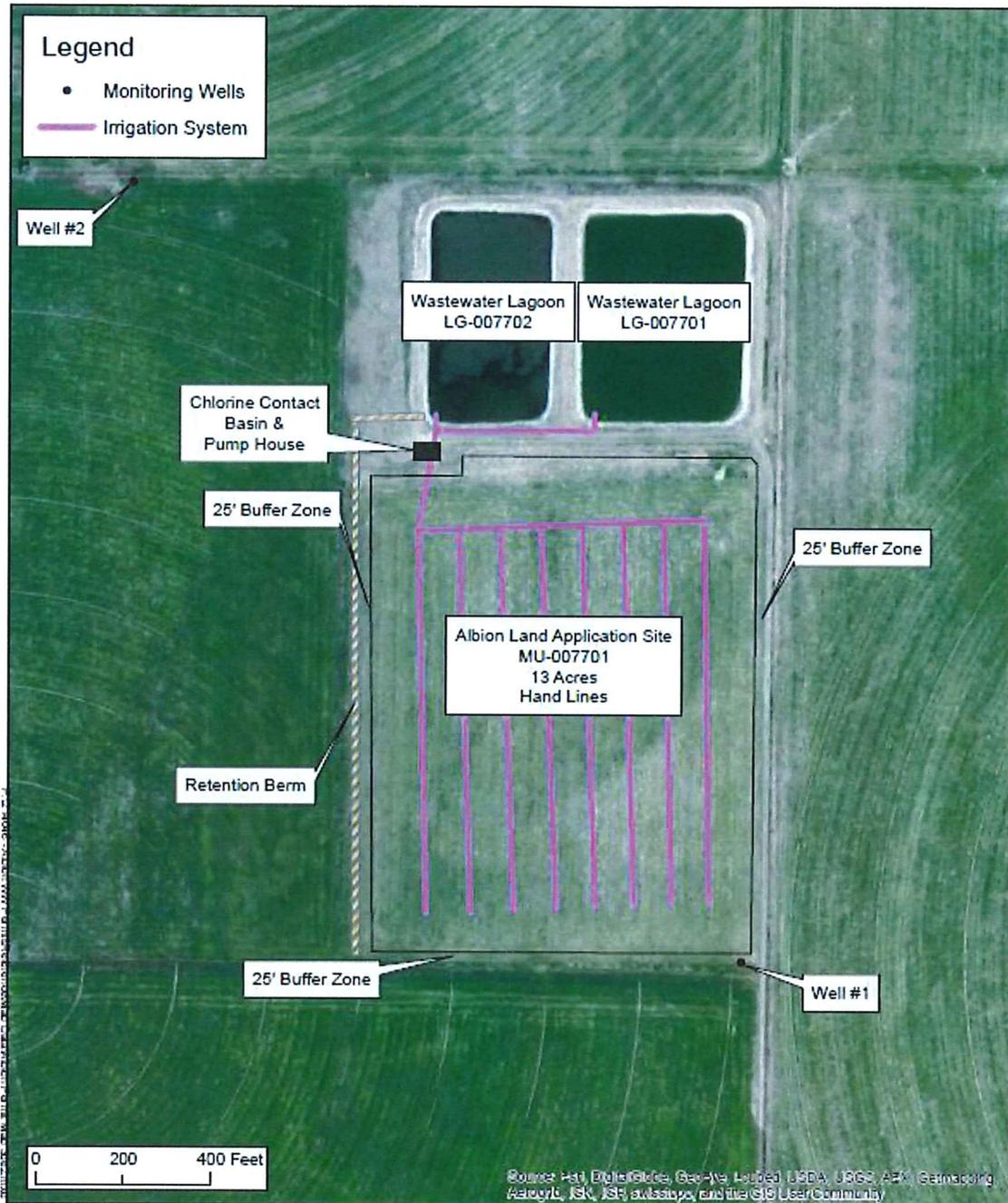


Figure A-3: Site Map (Albion, 2014b)