

# MEMORANDUM

**TO:** Kerry Neil – Wastewater Permits Bureau Chief, State Office  
Tressa Nicholas – Wastewater Analyst, State Office  
Aaron Scheff – Regional Administrator, Boise Regional Office (BRO)  
Valerie Greear – Engineering Manager, BRO  
Adam Bussan – Reuse Coordinator, BRO

**FROM:** Mike Anderson

**DATE:** March 7, 2024

**SUBJECT:** M-269-01 City of Kuna, Staff Analysis supporting reuse permit issuance.

---

## Executive Summary

The City of Kuna will own and operate a new municipal wastewater treatment facility in support of light industrial infrastructure being constructed east of the city. The Class 1 treatment facility will receive domestic wastewater from employee buildings at a data center for storing and maintaining digital infrastructure. The facility will initially treat up to 0.5 MG/month of municipal wastewater but is sized and designed for increased future flows. Treatment will be through three facultative lagoons and chlorine disinfection. The treatment process will produce Class C recycled water to be supplemented with irrigation groundwater and applied to 30 acres of reuse fields for growing alfalfa and silage corn in the growing season and held in two storage lagoons during the non-growing season.

Construction of the light industrial facility and the municipal wastewater treatment and reuse facilities are expected to be completed in 2024 and begin operation shortly thereafter. DEQ staff recommends that the draft permit be issued for a period of nine years with an expiration in 2033.

## 1. Introduction

This memorandum satisfies the requirements of the “Recycled Water Rules” (IDAPA 58.01.17.400) for issuing reuse permits. The principal facts and significant questions considered in preparing the draft permit and a summary of the basis for the draft permit conditions are provided.

- Permit application was received on April 25, 2022 and determined incomplete on June 1, 2023.
- Revised permit application submittal was received on January 9, 2023. On February 14, 2023 applicant withdrew the permit application and informed DEQ that a new permit application would be submitted.

- Revised permit application was received on October 10, 2023 and determined complete on November 7, 2023.
- The effective date of application is November 7, 2023.
- DEQ's Preliminary Decision letter to applicant issued December 6, 2023.

## 2. Site Location and Ownership

The municipal wastewater treatment facility and proposed spray irrigation land application site is located southeast of the City of Kuna on land near the intersection of South Curtis Road and Barker Road, E ½ of S7 T1N R2E (Figure 1).

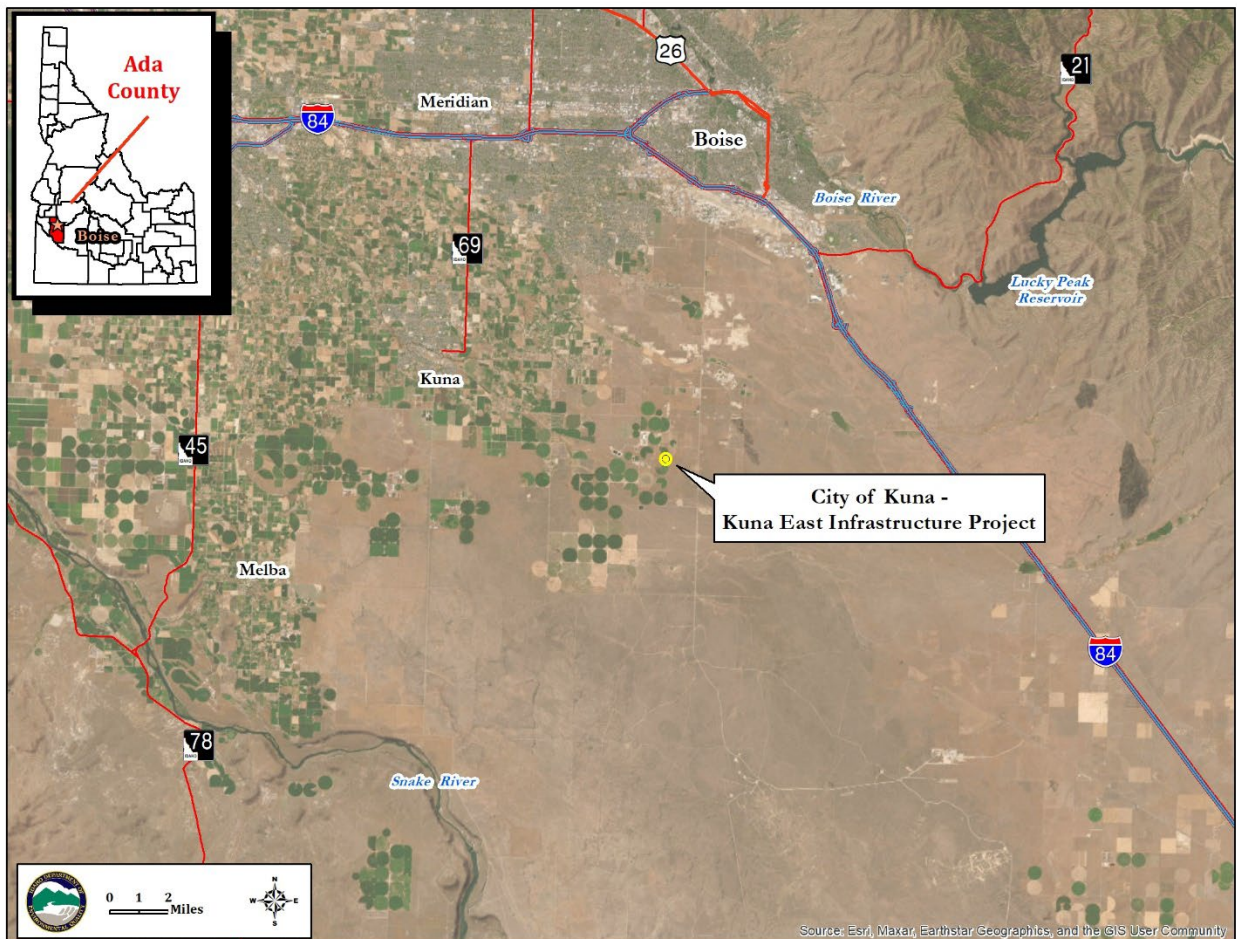


**Figure 1. Vicinity map.**

The portion of the development property that includes the treatment and land application site is approximately 163.4 acres in size and is zoned for general industrial use. The site and surrounding land primarily consist of agricultural fields and vacant grasslands with some areas zoned as limited and general industrial, and most areas zoned as rural preservation.

The proposed management unit (MU) is a 30-acre center pivot located on the southern half of the site,  $\frac{1}{4}$  of a mile or more from any dwellings and areas of public access. Barker Road borders the northern property line and North Indian Creek passes through the southern section of the property, which are both more than  $\frac{1}{4}$  mile from the MU (Figure 2).

The site is located on land owned by a developer, who is currently constructing the treatment facility and land application site. An easement agreement exists between the developer and the City of Kuna for construction and long-term use of the wastewater treatment and land application facilities. Upon completion of construction, all infrastructure, including headworks, lift stations, operations center, treatment lagoons, storage ponds, irrigation wells, and center pivots will be transferred to the City of Kuna. Once transferred, the City of Kuna will become the owner and operator of the wastewater treatment and reuse infrastructure and will also be responsible for all associated permits (Parametrix 2023).

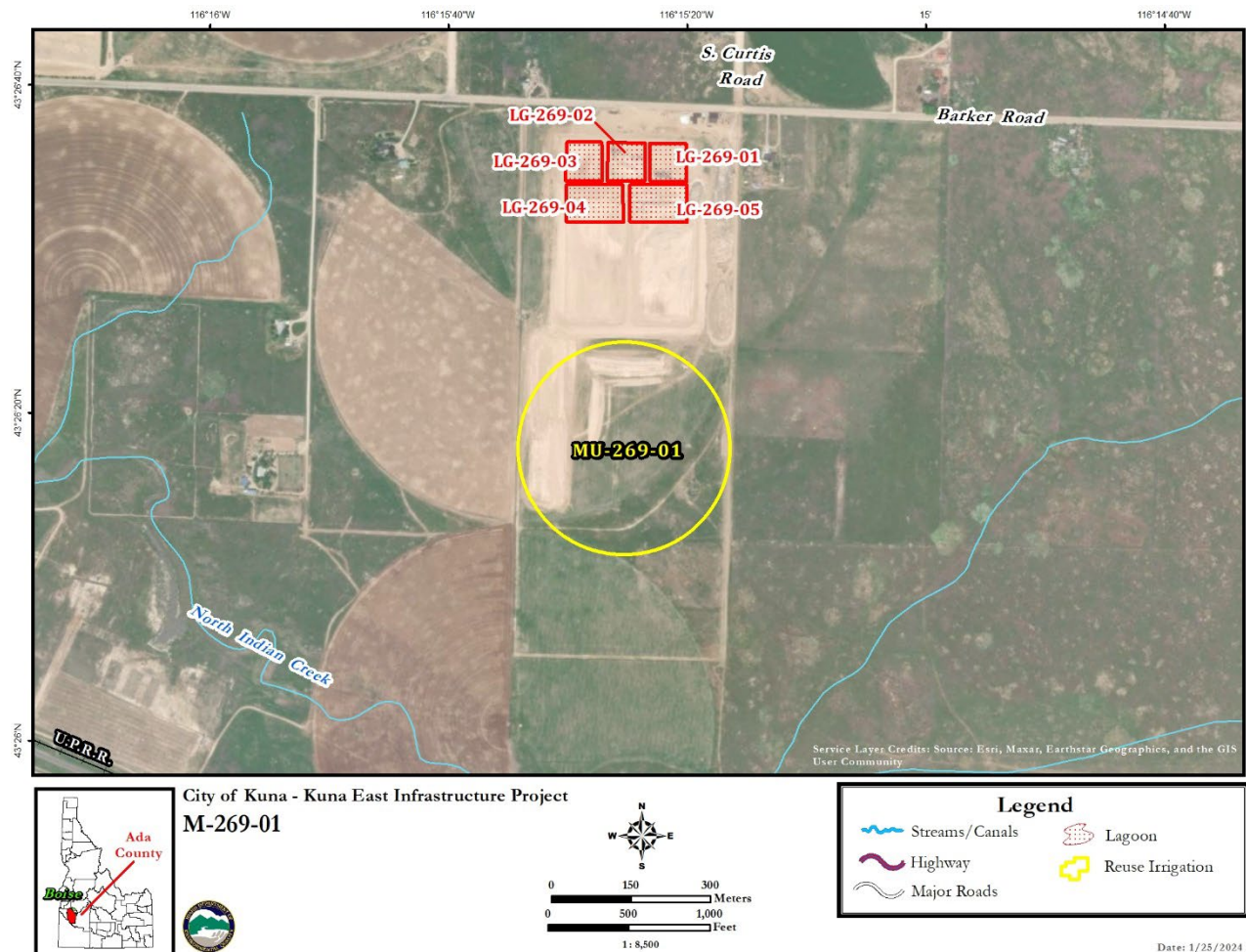


Figure 2. Facility layout.

### 3. Process Description

The source of the wastewater will be from a new industrial facility currently under construction north of the treatment and land application property. The industrial facility will generate year-round municipal wastewater from bathrooms, kitchens, drinking fountains, and showers and periodically will generate wastewater from washing down of industrial cooling fans. The amount of flow when the facility reaches full employee capacity is estimated to be approximately 0.5 MG/month, or 6.0 MG/year (Parametrix 2023). The washdown water from the cooling fans is estimated to be less than 5% of the total wastewater flow (Parametrix 2023).

The wastewater treatment facility under construction is a Class 1 facility that will produce Class C recycled water. The treatment facility will have a total design capacity of 12 MG/year and is sized for an additional 6 MG/year from a second phase of the industrial facility. Land is also available for additional treatment ponds for future industrial businesses in the area.

Untreated municipal wastewater will flow into a lift station near the industrial facility. The lift station will initially be equipped with two, 270-gpm, 40-hp pumps, with space for additional future pumps. Wastewater will be pumped from the lift station through pressure conveyance pipes to the treatment facility.

The treatment process consists of a headworks building for screening and grit removal followed by three facultative lagoons for the primary treatment process. A lift station will pump flow from the treatment lagoons into two storage lagoons. During the growing season (GS), recycled water will be injected with chlorine before entering a contact chamber for disinfection to Class C recycled water standards. After the contact chamber the flow will enter an effluent lift station. The lift station will also receive supplemental irrigation water from a new groundwater irrigation well. The two flows will be mixed in the lift station and pumped to a center pivot for irrigation onto 30-acres of silage corn or alfalfa during the growing season. Recycled water application is not allowed during the non-growing season (NGS) per the draft permit. A general process flow diagram is depicted in Figure 3 (Parametrix 2023).

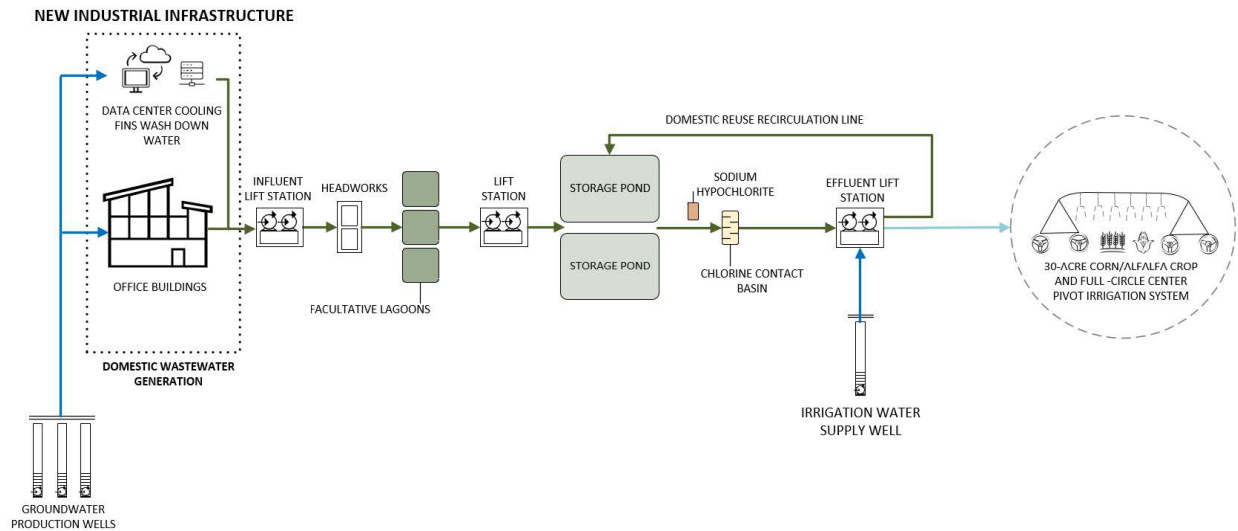


**Figure 3. Process flow diagram.**

## 4. Site Characteristics

### 4.1 Site Management History

The wastewater treatment facility and recycled water land application site are being constructed on land that has most recently been used to grow silage corn with center pivot irrigation systems. This previous irrigation use has been through private irrigation wells. The treatment facility and MU under construction will be the first time the site will be irrigated with recycled water mixed with groundwater.

### 4.2 Climatic Characteristics

The facility is located at an elevation of approximately 2,900 feet above sea level. The following climatic data was obtained from the Bureau of Reclamation website (BOR 2024) using the Nampa AgriMet weather station (Station ID: NMPI):

- Average annual precipitation (PPT): 8.7 inches
- Average maximum temperature: 63 °F
- Average minimum temperature: 40.7 °F

Crop evapotranspiration for this location was taken from the ETIdaho website (UI 2017) using data from the Nampa AgriMet Weather Station (Station ID: NMPI).

Crop evapotranspiration, the process where soil water is lost to the atmosphere from surface evaporation and plant transpiration, greatly influences the amount of irrigation water required during the growing season. Therefore, DEQ recommends that the MU be irrigated substantially at the irrigation water requirement (IWR; DEQ 2007 section 4.1.1.2, p. 4-7). The IWR is defined by Equation 1 below. Where  $P_{def}$  is the precipitation deficit and  $E_i$  is the irrigation efficiency of

the irrigation system.

$$Eq\ 1: IWR = \frac{P_{def}}{E_i}$$

The new facility will primarily grow alfalfa and silage corn on the MU but on occasion may include other crops (triticale or cover crops). Precipitation deficit and IWR values for alfalfa (frequent cuttings) and silage corn are presented in Table 1.

**Table 1. Precipitation deficit (Pdef) and irrigation water requirement (IWR) values for primary crops at the reuse facility during the growing season.**

| Month     | Alfalfa – Frequent Cuttings   |                  |                              |                          | Silage Corn                   |                  |                              |                          |
|-----------|-------------------------------|------------------|------------------------------|--------------------------|-------------------------------|------------------|------------------------------|--------------------------|
|           | Pdef <sup>a</sup><br>(mm/day) | Pdef<br>(inches) | IWR <sup>b</sup><br>(inches) | IWR <sup>b</sup><br>(MG) | Pdef <sup>a</sup><br>(mm/day) | Pdef<br>(inches) | IWR <sup>b</sup><br>(inches) | IWR <sup>b</sup><br>(MG) |
| March     | 1.02                          | 1.24             | 1.56                         | 1.27                     |                               |                  |                              |                          |
| April     | 3.81                          | 4.50             | 5.63                         | 4.58                     |                               |                  |                              |                          |
| May       | 4.47                          | 5.46             | 6.82                         | 5.56                     | 0.53                          | 0.65             | 0.81                         | 0.99                     |
| June      | 5.57                          | 6.58             | 8.22                         | 6.70                     | 3.88                          | 4.58             | 5.73                         | 4.67                     |
| July      | 6.14                          | 7.49             | 9.37                         | 7.63                     | 7.69                          | 9.39             | 11.73                        | 9.56                     |
| August    | 5.28                          | 6.44             | 8.06                         | 6.56                     | 5.14                          | 6.27             | 7.84                         | 6.39                     |
| September | 3.71                          | 4.38             | 5.48                         | 4.46                     | 0.45                          | 0.53             | 0.66                         | 0.54                     |
| October   | 1.99                          | 2.43             | 3.04                         | 2.47                     |                               |                  |                              |                          |
| Total     |                               | 38.5             |                              | 39.2                     |                               | 21.4             |                              | 21.8                     |

a. These data were obtained from the University of Idaho's ET<sub>Idaho</sub> 2017 website, using the Nampa AgriMet station (UI 2017).

b. IWR was calculated using Equation 1, assuming an E<sub>i</sub> of 0.80 for a center pivot irrigation system (DEQ 2007).

### 4.3 Soils

The Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) shows the presence of three different soil descriptions within the total area of the MU (NRCS 2023).

1. Kunaton silty clay loam, 0 to 2 percent slopes, approximately 66% of the MU area.
2. Elijah silt loam, bedrock substratum, 2 to 4 percent slopes, approximately 33% of the MU area.
3. Elijah silt loam, 2 to 4 percent slopes, less than 1% of the MU area.

The Kunaton silty clay loam is listed as not prime farmland with a depth to a restrictive duripan feature of 10 to 20 inches and a bedrock feature at 20 to 40 inches. The unit is also listed as well drained and is primarily located in the western two thirds of the MU.

The Elijah silt loam units are listed as prime farmland if irrigated with a depth of 20 to 40 inches to a restrictive duripan feature. The units are listed as well drained and are primarily within the eastern third of the MU.

The available water capacity (AWC) for the soils 60-inch root zone ranges from 11.4 inches to 12.6 inches.

At ten locations within the MU, soil samples were collected at 0 to 12-inch depth and at 12 to 24-inch depth. Composites were created of the two stratum and tested for various constituent concentrations. Table 2 lists the constituent concentration results for these composite samples.

**Table 2. Soil characterization results.**

| Parameter       | Soil Sample Depth |              |
|-----------------|-------------------|--------------|
|                 | 0-12 inches       | 12-24 inches |
| pH              | 7.7               | 7.9          |
| EC (mmhos/cm)   | 2.8               | 5.1          |
| Nitrate-N, ppm  | 10                | 8            |
| Phosphorus, ppm | 10                | 9            |
| SAR             | 5.93              | 8.63         |

*Data Source:* Parametrix 2023

*Note:* SAR = Sodium absorption ratio, EC = Electrical Conductivity, N = Nitrogen

Table 3 provides soil interpretation data which shows the 0 – 12 inch layer consists of normal soils while the 12 – 24 inch layer is a saline soil. The results show that soil salinity is in the tolerance range for crops to be grown and should have minimal impact on yield (DEQ 2007).

**Table 3. Soil interpretation data.**

| Guideline Rates for Crop Production         |      |        |       |           |
|---------------------------------------------|------|--------|-------|-----------|
| Constituent                                 | Low  | Medium | High  | Excessive |
| Conductivity (EC, soluble salts) (mmhos/cm) | <1.0 | 1-2    | 2-4   | >4        |
| Nitrate-N (mg/kg)                           | <10  | 10-20  | 21-30 | >30       |
| P, Olsen (mg/kg)                            | <10  | 10-25  | 25-50 | >50       |
| Saline and Sodic Soil Interpretation        |      |        |       |           |
| Salt-affected soil classification           | EC   | SAR    | ESP   | pH        |
| Normal Soil                                 | <4.0 | <13    | <15   | <8.3      |
| Saline Soil                                 | >4.0 | <13    | <15   | <8.3      |
| Saline-Sodic Soil                           | >4.0 | >13    | >15   | <8.3      |
| Sodic Soil                                  | <4.0 | >13    | >15   | >8.3      |

*Data Source:* Oregon State University Extension Service (OSUES 2011).

*Note:* SAR = Sodium absorption ratio, EC = Electrical Conductivity, ESP = exchangeable sodium percent, N = Nitrogen, P = Phosphorus

## 4.4 Surface Water

There are no surface waters in near proximity to the facility. Natural perennial waters include the Snake River (14 miles southwest) and Boise River (12 miles northeast). The Mora Canal is located 4 miles northwest of the MU. Remnants of Indian Creek run approximately 1,300 feet south of the MU; however, this creek is dry as sections have been cultivated and no longer flows. The treatment facility and MU are not located within the 100-year floodplain (Parametrix 2023).

## **4.5 Groundwater/Hydrogeology**

### **4.5.1 Groundwater/Hydrogeology**

Two aquifers are located underneath the MU, the Treasure Valley Aquifer and the Western Snake River Plain Aquifer. The geology consists of Quaternary-age basalt extending approximately 200 feet bgs. Below the basalt is the Treasure Valley Aquifer in the Pleocene-age sediments of the Idaho Group that are up to 700 feet thick with a southerly gradient of approximately 5 feet per mile (0.1%). Well logs in the vicinity indicate that depth to first water is expected at 300 to 325 feet bgs (Parametrix 2023). The Treasure Valley Aquifer is most likely interconnected with the much larger Western Snake River Plain Aquifer which consists of Miocene-age volcanic rocks.

Section 7.6.3 in the permit application technical report includes test pumping data from local wells that suggests the confined portion of the Treasure Valley Aquifer has a hydraulic conductivity of 334 feet per day and a horizontal velocity of approximately 400 feet per year. For the upper unconfined portion of the Treasure Valley Aquifer the report estimates a hydraulic conductivity of 53 feet per day and a horizontal velocity of approximately 67 feet per year (Parametrix 2023). DEQ has determined that since the depth to groundwater is more than 300 feet and the nearest potential surface water interaction is greater than 10 miles away, the reuse permit is expected to be protective of groundwater and surface water.

### **4.5.2 Groundwater Characterization**

Groundwater quality data are discussed in detail in section 7.6.5 of the reuse permit application technical report. Table 4 shows the various constituent concentrations from nearby monitoring wells (MW), which include three irrigation wells for the new industrial facility, four monitoring wells owned by Tyson Fresh Meats, and two industrial supply wells owned by CS Beef Packers. The plant and irrigation wells all draw from well below the water table and draw water from all directions and so could have lower concentrations than would be found in the upper zones of saturation, where future monitoring wells would be located.

All constituents with Ground Water Quality Rule (IDAPA 58.01.11) standards measured in samples taken from these wells were below their respective standard. Proper management of land application activities in compliance with the draft permit requirements are expected to prevent degradation of groundwater quality.

**Table 4. Groundwater quality data from local wells.**

|                                                            | Irrigation Wells |          |          | Tyson Fresh Meats |         |         |         | CS Beef Packers |              |
|------------------------------------------------------------|------------------|----------|----------|-------------------|---------|---------|---------|-----------------|--------------|
|                                                            | KM East          | KM South | KM North | MW-1              | MW-2    | MW-3    | MW-4    | Plant Well 1    | Plant Well 2 |
| pH (standard units)                                        | 7.5              | 7.9      | 7.6      |                   |         |         |         | 7.2             | 7.5          |
| Sodium, Na (mg/L)                                          | 48.4             | 54       | 51.6     |                   |         |         |         | 35.3            | 37.7         |
| Potassium, K (mg/L)                                        | 1.5              | 1        | 1.5      |                   |         |         |         | 2.4             | 2.3          |
| Magnesium, Mg (mg/L)                                       | 2.42             | < 0.5    | 1.65     |                   |         |         |         | 3               | 3.33         |
| Calcium, Ca (mg/L)                                         | 24.4             | 9.53     | 13.9     |                   |         |         |         | 14.2            | 15           |
| Sulfate, SO <sub>4</sub> (mg/L)                            | 36               | 1        | 27       |                   |         |         |         | 4               | 5            |
| Chloride, Cl (mg/L)                                        | 18               | 6        | 11       | 32                | 18      | 19      | 19      | 6               | 7            |
| Bicarbonate, HCO <sub>3</sub> (mg/L as CaCO <sub>3</sub> ) | 106              | 124      | 105      |                   |         |         |         |                 |              |
| Nitrate (as N), NO <sub>3</sub> (mg/L)                     | 1.4              | < 0.2    | 1.1      | 2.4               | 2.0     | 1.5     | 1.8     | < 0.2           | 0.3          |
| Ammonia (as N), NH <sub>3</sub> (mg/L)                     | < 0.04           | < 0.04   | < 0.04   |                   |         |         |         | < 0.04          | < 0.04       |
| Iron, Fe (mg/L)                                            | < 0.05           | < 0.05   | < 0.05   | < 0.05            | < 0.05  | < 0.05  | < 0.05  | < 0.05          | < 0.05       |
| Manganese, Mn (mg/L)                                       | < 0.005          | 0.038    | < 0.005  | < 0.005           | < 0.005 | < 0.005 | < 0.005 | < 0.005         | < 0.005      |
| Total Phosphate (as P), PO <sub>4</sub> (mg/L)             | < 0.05           | < 0.05   | < 0.05   |                   |         |         |         |                 |              |
| Total Dissolved Solids, TDS (mg/L)                         | 222              | 183      | 213      | 282               | 172     | 222     | 196     | 168             | 148          |
| Total Coliform, TC (cfu/100mL)                             | 3                | 1        | 1        | < 1               | < 1     | < 1     | < 1     |                 |              |

*Data Source:* Parametrix 2023.

#### 4.5.3 Groundwater Monitoring Well Network

The Facility will be required to propose and install a monitoring well network per compliance activity CA-269-04 in the draft permit. The network is needed because shallow soils and fractured basalt make it necessary to ensure that the farm management is being protective. And to discern any impacts attributable to them, or upgradient of them, from the impacts from nearby reuse facilities.

DEQ recommends a minimum of three monitoring wells (one up hydraulic gradient of the reuse facility and two downgradient). Groundwater monitoring requirements for the monitoring wells are discussed in Section 6.3.

The proposed wells should be screened at the groundwater interface and ensure year-round collection of groundwater samples. DEQ staff recommends adding a groundwater monitoring well network compliance activity to the draft permit to address design and installation details for the network.

## 4.6 Recycled Water Characterization and Loading Rates

### 4.6.1 Recycled Water Characterization

Future recycled water flow from the industrial facility is estimated to average 0.50 MG/month, or 6 MG/year when it reaches full capacity. More than 95% of the flow will be of typical domestic quality from sinks, showers, and toilets. It's estimated that less than 5% of the flow will be generated from using water spraying equipment to periodically wash down industrial cooling fans. The washdown water quality is expected to contain dust and debris (e.g. bird droppings), a small amount of metal debris, and biodegradable detergents that have an EPA Safer Choice label (Parametrix 2023). The concentrations of constituents reported for similar washdown waters were determined to be below levels of regulatory concern by DEQ.

After recycled water is treated and disinfected, it will be blended with irrigation groundwater before being land applied during the growing season or stored in the treatment facility storage ponds during the non-growing season.

The quality of the recycled water that will be land applied during the growing season is estimated based on the engineered design of the treatment facility. The facility design and expected treatment parameters were submitted and reviewed and approved by DEQ in 2023. Table 5 shows the estimated quality of the recycled water effluent from the treatment facility.

**Table 5. Estimated recycled water constituent concentrations (mg/L).**

| <b>Total N<sup>a</sup></b> | <b>Total P<sup>b</sup></b> | <b>BOD<sub>5</sub><sup>b</sup></b> | <b>COD<sup>b</sup></b> | <b>TSS<sup>b</sup></b> | <b>TDS<sup>b</sup></b> |
|----------------------------|----------------------------|------------------------------------|------------------------|------------------------|------------------------|
| <25                        | <6                         | <30                                | <150                   | <45                    | 225                    |

a. DEQ staff estimate based on similar facilities.

b. Data Source: Parametrix 2023.

*Note:* N=Nitrogen, P=Phosphorus, BOD<sub>5</sub>=Biological Oxygen Demand, COD=Chemical Oxygen Demand, TSS=Total Suspended Solids, TDS=Total Dissolved Solids

### 4.6.2 Hydraulic Loading Rates

The IWR values in Table 1 indicate the facility is not hydraulically limited and will require supplemental irrigation water to make up the deficit. The facility requested the permit allow for NGS land application for flexibility in operations. Land application during the NGS is not typically

allowed unless the facility is unable to store all their recycled water during the NGS. This facility will have excess storage capacity for the expected NGS flow rates and land application during the NGS is not necessary. DEQ staff recommends including the month of March to the GS, but restricting land application in the month of March to only crops that have a positive  $P_{def}$  as indicated by  $ET_{Idaho}$  (UI 2017). DEQ staff recommends that land application of recycled water not be permitted during the NGS (November – February).

#### 4.6.3 Constituent Loading Rates

The draft permit requires monitoring of constituent loading rates in both the recycled water as well as the supplemental irrigation water for nitrogen, phosphorus, COD, and Non-Volatile Dissolved Solids (NVDS). Constituent monitoring of loading rates is discussed further in Section 6.1. Using the estimated constituent concentrations in Tables 4 and 5, estimated constituent loading rates for nitrogen, phosphorus, NVDS (or TDS), and COD, from recycled water and supplemental irrigation water sources are shown in Table 6.

**Table 6: Total estimated constituent loading rates to the MU at full buildout of 12 MG/year.**

| Year        | Total-N<br>(lb/acre) | Total-P<br>(lb/acre) | Total<br>NVDS<br>(lb/acre) | COD<br>(lb/acre-<br>day) |
|-------------|----------------------|----------------------|----------------------------|--------------------------|
| Alfalfa     | 101                  | 20                   | 2463                       | 2                        |
| Silage Corn | 90                   | 20                   | 1369                       | 3.3                      |

*Note:* N=Nitrogen, P=phosphorus, NVDS=non-volatile dissolved solids, COD=chemical oxygen demand

The draft reuse permit specifies that the N load limit is 150% of the calculated N uptake rate for each crop. This value is typical of most DEQ reuse permits and allows for a 50% loss of N through various pathways including volatilization, denitrification, microbial/biomass fixation, and leaching (DEQ 2007).

The amount of N that is taken up by each crop on the proposed MU can be estimated based on expected crop yields and crop uptake rates from various historical data sources. Minimum crop yield estimations in the Technical Report are 4.5 tons per acre for frequent cuttings of alfalfa and 11.7 tons per acre for silage corn (Parametrix 2023). DEQ recommends using yield values of 4.3 and 29 tons per acre for alfalfa and silage corn respectively, which are the median crop yields from 2021 – 2023 for Idaho (USDA 2024). Permitted reuse sites in Idaho typically exceed these yields but for the purpose of the current analysis, the more conservative values will be used.

Using a yield value of 4.3 tons per acre for alfalfa, and an alfalfa N uptake rate of 52 pounds per ton from Table 7-30 of the Guidance Manual (DEQ 2007), it can be estimated that a well-managed alfalfa crop on the proposed MU would have an expected N uptake value of 224 pounds per acre. Nitrogen, therefore, is not a limiting constituent for the proposed permit and the site would likely use fertilizer to increase N loading to produce necessary yields.

In the same manner as N uptake values were estimated for alfalfa, silage corn uptake value estimates can also be made. Using an estimated yield value of 29 tons per acre (USDA 2024) for silage corn and a conservative N uptake rate of 7.2 pound per ton (DEQ 2007), a N uptake value of 208 pounds per acre can be expected. This value also is well above the projected N loading to the MU and is therefore not a limiting constituent.

Observed alfalfa and silage corn crop phosphorus content from other reuse facilities in southern Idaho range from 0.2% to 0.35% on a dry basis. Using the same median crop yields, this would equal an uptake range of 14.6 – 25.5 pounds per acre and 34.8 – 60.9 pounds per acre for alfalfa and silage corn, respectively. Phosphorus content of 0.24% or higher would produce uptake rates that exceed the projected phosphorus loading rates. Phosphorus is not expected to be a limiting constituent. Regular rotations of silage corn should address phosphorus buildup in the soil. DEQ staff does not recommended a phosphorus loading rate limit at this time.

When warranted, DEQ has assigned NVDS and COD loading rate limits of 4,500 lbs/acre-year and 50 lb/acre-day, respectively. The projected loading rates are well below these limits; therefore, DEQ staff does not recommend NVDS or COD loading rate limits at this time.

## 5 Site Management

### 5.1 Buffer Zones

Buffer zones for protection of surface water, groundwater, drinking water supplies, and the public are required by IDAPA 58.01.17.604. The DEQ Reuse Guidance Manual (DEQ 2007) provides recommended buffer distances for various reuse scenarios. For this permit, the following scenario was used in determining buffer distances: Rural location, sprinkler application. A summary of buffer zones is shown in Table 7.

**Table 7. Buffer zones from MU**

|                                   | <b>From MU Perimeter<br/>(approximate distance)</b> | <b>Guidance Buffer Zone<br/>Requirements<sup>f</sup></b>                             |
|-----------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------|
| Nearest Inhabited Residence       | 1,350 feet                                          | 300                                                                                  |
| Nearest Public Water System       | 1.2 miles <sup>a</sup>                              | 1,000                                                                                |
| Nearest Private Water Supply      | 1,300 feet <sup>b</sup>                             | 500                                                                                  |
| Areas Accessible to the Public    | 1,500 feet <sup>c</sup>                             | 0                                                                                    |
| Nearest Surface Water             | 14 miles <sup>d</sup>                               | 100                                                                                  |
| Nearest Irrigation Ditches/Canals | 3 miles <sup>e</sup>                                | 50                                                                                   |
| Fencing                           |                                                     | High security, lagoons only                                                          |
| Posting                           |                                                     | Every 500 feet and each corner of the outer perimeter of the buffer zone of the site |

- a. Proposed public water supply well for new industrial facility.
- b. Bill Stringer private well.
- c. Barker Road to the north.
- d. Snake River, nearest downgradient surface water.
- e. Ten Mile Creek.

- f. Table 6-4 in the DEQ Reuse Guidance Manual provides recommended buffer distances for various reuse scenarios. For this permit, the following scenario was used for determining buffer distances: Rural location, sprinkler application.

The Recycled Water Rules (IDAPA 58.01.17.603) revised on April 6, 2023, no longer require fencing for Class C recycled water. With the rural location of the new reuse facility, DEQ staff recommends fencing not be required. However, the Wastewater Rules (IDAPA 58.01.16.493.09.c.i) do require fencing enclosing the treatment and storage lagoons. The Guidance buffer zones requirements are specified in Section 4.4 of the draft permit.

The Stringer well was the only private domestic well located within a quarter mile of the reuse facility, the typical maximum distance DEQ requires for a well to need a well location acceptability analysis. This well was determined to be acceptable because it is located upgradient of the reuse site and that with typical domestic flow rates, the well's capture zone would not extend near to the reuse site. The acceptability of this well should be reconsidered if increased knowledge of local ground water makes any of these assumptions invalid.

### **5.1.1 Runoff**

A runoff management plan is a required component of the Plan of Operation (PO) compliance activity CA-269-01 in the draft permit (see Section 9.1). The runoff management plan should address details on preventing runoff from the MU, including storm events, except in the event of a 25-year, 24-hour storm event or greater, using the Western Regional Climate Center (WRCC) Precipitation Frequency Map for Idaho, Figure 28, 'Isopluvials of 25-Yr, 24-Hr Precipitation' (WRCC 1973).

## **5.2 Seepage Rate Testing**

The treatment facility will consist of three treatment and two storage lagoons, which are currently under construction. These lagoons will be tested before the facility is brought online to ensure they are not leaking more than the allowed limit of 0.125 inches per day (IDAPA 58.01.16.493.03).

The draft permit requires seepage testing every 10 years for each treatment and storage lagoon under compliance activity CA-269-03 in accordance with the Wastewater Rules (58.01.16.493.02).

## **5.3 Waste Solids, Biosolids, Sludge, and Solid Waste**

Waste solids will be removed through the primary screening and grit removal at the headworks of the treatment facility. Sludge will accumulate during the treatment process in the three treatment lagoons and settle. Sludge accumulation, monitoring, and decision points for planning for sludge removal from the lagoons needs to be addressed. A waste solids management plan is required as needed in the draft permit as compliance activity CA-269-01 as part of the PO.

## **5.4 Nuisance Odors**

The primary cause of nuisance odors at the treatment facility may be from screening and grit removal of raw wastewater at the headworks building. The treatment lagoons, storage ponds, and the slow rate sprinkler irrigation system may also produce some odors. Although the treatment and reuse facility are in a rural location and surrounding land is used primarily for agriculture and light industrial purposes, there are residences on three sides of the facility and other industrial reuse facilities in the area that receive odor complaints. DEQ believes that odor complaints are probable, whether the odor is generated by this treatment facility or other nearby facilities. As a result, the draft reuse permit requires a nuisance and odor management plan as part of the PO.

## **5.5 Cropping Plan**

DEQ does not recommend requiring a crop management plan or an irrigation management and scheduling plan in the draft permit. This decision is based on the facts that expected hydraulic and nitrogen loads to the MU from recycled water are well below the IWR and N uptake rates of the proposed crops to be grown.

## **5.6 Grazing**

No grazing is planned to occur on the land application sites. A DEQ-approved grazing management plan is required prior to any grazing activities on a permitted reuse site.

# **6 Monitoring**

The proposed monitoring requirements for the draft permit are described in detail in the following subsections. All monitoring will be conducted in accordance with the facility's Quality Assurance Project Plan (QAPP). See section 7 for requirements regarding the QAPP.

## **6.1 Recycled Water/Supplemental Irrigation Water Monitoring**

Table 8 shows the requirements for monitoring of recycled water and irrigation water at the facility. The requirements are also listed in the draft permit under Section 5.

Recycled water constituents will be monitored downstream of the storage lagoons and the chlorine contact chamber. Samples will be collected from a sample tap in the effluent pipeline before discharging into the effluent lift station.

Monitoring of supplemental irrigation water will occur at a sample tap near the irrigation wellhead. In this way both flows are sampled before they mix in the effluent lift station that pumps the mixed flow to the MU.

**Table 8. Recycled water and supplemental irrigation water monitoring requirements.**

| <b>Monitoring Point<br/>Serial Number and<br/>Location</b>                                                                       | <b>Sample<br/>Description</b>                    | <b>Sample Type and<br/>Frequency</b>                                              | <b>Constituents<br/>(Units in mg/L unless<br/>otherwise specified)</b>                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WW-269-01<br>Recycled water from<br>storage lagoon(s) after<br>chlorine contact<br>chamber and prior to<br>effluent lift station | Recycled<br>water to<br>MU-269-01                | Weekly (during periods<br>of use)<br><br>Grab/monthly, (during<br>periods of use) | Total Coliform<br>Free Chlorine Residual<br><br>Total nitrogen<br>Total phosphorus<br>pH (standard units)<br>Electrical conductivity<br>(mmhos/cm)<br>TDS<br>VDS<br>NVDS (calculated)<br>COD<br>Chloride |
| SW-269-01<br>Supplemental Irrigation<br>water from sample tap<br>at the irrigation well                                          | Supplemental<br>irrigation water<br>to MU-269-01 | Semi-Annual<br>(May and August)                                                   | Total nitrogen<br>Total Phosphorus<br>pH (standard units)<br>Electrical conductivity<br>(mmhos/cm)<br>TDS<br>VDS<br>NVDS (calculated)<br>Chloride                                                        |

## 6.2 Soil Monitoring

Soil monitoring objectives are discussed in section 7.4.1 of the guidance manual (DEQ 2007). Although reuse permits do not specify limits for soil parameters, the data provides information necessary to manage reuse operations.

Soil monitoring is required once a year in the early spring (March) in the draft reuse permit, prior to the application of fertilizer for the growing season. The monitoring serial number for soil monitoring is SU-269-01 (MU-269-01). The required monitoring parameters are shown in Table 9. Monitoring of the exchangeable sodium percentage (ESP), cation exchange capacity, iron, manganese, and percent organic matter are only required in the first and fifth year of the reuse permit cycle to characterize the soil (first year) and to determine if land application of recycled water may have impacted the soil (fifth year).

**Table 9. Soil monitoring requirements.**

| Monitoring Point<br>Serial Number | Sample Type                       | Sample Frequency                                                                              | Constituents<br>(Units in mg/Kg soil unless<br>otherwise specified)                                                                                         |
|-----------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SU-269-01                         | Composite<br>samples <sup>a</sup> | Annually: March (before<br>application of fertilizer)                                         | Electrical conductivity<br>(mmhos/cm in saturated paste<br>extract)<br>Nitrate, as N<br>Ammonium, as N<br>Plant available phosphorus<br>pH (standard units) |
|                                   |                                   | Annually: March of first<br>and fifth year of permit<br>(before application of<br>fertilizer) | Cation exchange capacity<br>(meq/100g)<br>SAR (%) or ESP (%)<br>Organic matter (%)<br>Iron (DTPA extractable)<br>Manganese (DTPA extractable)               |

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

### 6.3 Groundwater Monitoring

Section 7.2 of the DEQ Guidance describes the elements of a groundwater monitoring plan for a reuse site. Groundwater monitoring may be used to evaluate a facility's impact on groundwater quality and also serves to assess compliance with the reuse permit and the Ground Water Quality Rule, IDAPA 58.01.11. Groundwater monitoring is necessary at the proposed reuse site to define ambient conditions and establish a water quality baseline for the facility.

As discussed in Section 4.5.2, construction of monitoring wells is required by the draft permit as compliance activity CA-269-04. Groundwater monitoring protocols must be as specified in the QAPP (see Section 7).

Monitoring of groundwater quality is required quarterly in January, April, July, and October for the first three full reporting years of the permit and then semi-annually, in April and October for the remaining years of the permit.

Monitoring of additional salt constituents is also required once upon completion of the three monitoring wells and in April of the last year of reporting for the permit.

The required groundwater monitoring frequency and parameters are shown in Table 10.

**Table 10. Groundwater monitoring requirements.**

| Monitoring Point<br>Serial Number | Sample<br>Description           | Sample Type and<br>Frequency                                                                                                                                                       | Constituents<br>(Units in mg/L unless<br>otherwise specified)                                                                                                                                                  |
|-----------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GW-269-01 through<br>GW-269-03    | Groundwater<br>monitoring wells | Unfiltered grab<br>sample/twice annually:<br>April and October                                                                                                                     | Water table elevation (feet)<br>Water table depth (feet)<br>Specific conductance/electrical<br>conductivity (µmhos/cm)<br>pH (Standard Units)<br>Nitrate-nitrogen, as N<br>TDS<br>Chloride                     |
|                                   |                                 | Unfiltered grab<br>sample/quarterly (starting<br>upon installation for 3 full<br>reporting years after<br>monitoring wells are<br>installed): January, April,<br>July, and October | Water table elevation (feet)<br>Water table depth (feet)<br>Specific conductance/electrical<br>conductivity (µmhos/cm)<br>pH (Standard Units)<br>Nitrate-nitrogen, as N<br>TDS<br>Chloride                     |
|                                   |                                 | Unfiltered grab sample/first<br>reporting year after all<br>monitoring wells have<br>been installed and last<br>reporting year of the<br>permit: April                             | Chloride (meq/L)<br>Sulfate, as S (meq/L)<br>Sodium (meq/L)<br>Potassium (meq/L)<br>Calcium (meq/L)<br>Magnesium (meq/L)<br>Alkalinity as CaCO <sub>3</sub> (meq/L)<br>Bicarbonate as HCO <sub>3</sub> (meq/L) |

## 6.4 Crop Yield and Tissue Monitoring

To determine the crop nutrient uptake rate for each land application site, several crop harvesting parameters and crop tissue monitoring parameters must be monitored.

The draft reuse permit requires monitoring of the following parameters for each crop harvest for each crop at the MU:

**Table 11. Crop harvest monitoring requirements.**

| Associated<br>Management Units | Sample Type                     | Sample Frequency                | Parameters <sup>a</sup>                                                                                                                                                                                     |
|--------------------------------|---------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MU-269-01                      | Harvested<br>portion, each crop | Harvested portion,<br>each crop | Crop type<br>Harvest date<br>Sample collection date<br>Harvested acreage (acres)<br>As-harvested ('wet') yield in<br>customary harvested units<br>(tons, bushels, cwt, etc.)<br>Dry yield (lb) <sup>b</sup> |

- a. Documentation of reported yields shall be provided for each harvest.
- b. The field moisture must be monitored at the time the harvest crop is weighed.

The draft reuse permit also requires monitoring of the following crop tissue parameters for each harvest of each crop at the MU:

**Table 12. Plant tissue monitoring requirements.**

| Associated Management Units | Sample Type                  | Sample Frequency | Parameters <sup>a,b</sup>                                                      |
|-----------------------------|------------------------------|------------------|--------------------------------------------------------------------------------|
| MU-269-01                   | Harvested portion, each crop | Each harvest     | Lab moisture content (%),<br>Total nitrogen (%)<br>Phosphorus (ppm)<br>Ash (%) |

a. Documentation of reported yields shall be provided for each harvest.

b. The field moisture must be monitored at the time the harvest crop is weighed.

Crop yield and crop tissue monitoring protocols must be as specified in the QAPP (see Section 7).

## 6.5 Meteorological Monitoring

The HLR limits for MU-269-01 will be based on the crop IWR. The IWR must be determined using meteorological monitoring data obtained from the Nampa Idaho AgriMet weather station (Station ID: NMPI). The crop IWR will be calculated as described in Section 4 using the ET<sub>Idaho</sub> website (UI 2017).

## 6.6 Calculation Methodologies

Calculation methodologies for determining permit compliance with the hydraulic loading rates and constituent loading rates must be approved by DEQ in the PO, which is covered in Compliance Activity CA-269-01 in the draft permit.

## 7 Quality Assurance Project Plan

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

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

The QAPP is a permit requirement and must be submitted to DEQ as a 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. DEQ does not approve QAPPs because the responsibility for validating of the facility's sampling data lies with the permittee's quality assurance officer and not with DEQ.

The format of the QAPP should adhere to the recommendations and references in the Assurance and Data Processing sections of the guidance manual (DEQ 2007) and EPA QAPP guidance documents <https://www.epa.gov/sites/production/files/2015-06/documents/g5-final.pdf>. Submission of a QAPP is a required compliance activity (CA-269-02) listed in the draft permit.

## 8 Compliance Activities

DEQ staff recommends the following compliance activities be included in the draft permit:

1. Compliance activity CA-269-01 requiring the city prepare and submit a PO to DEQ for review and approval. A wastewater operator with a land application license must be under contract and included in the PO in order to meet the requirement of DEQ's most recent PO Checklist (Section 1.a). A Well location acceptability analysis (WLAA) must be performed within 60 days of obtaining knowledge of any new domestic or public water source, not addressed already during the permit application process (see Section 5.1), that is located within a quarter mile of the reuse site. WLAA should be completed using DEQ guidance.
2. Compliance activity CA-269-02 requiring the city prepare and submit a QAPP to DEQ for review.
3. Compliance activity CA-269-03 requiring the city prepare and submit to DEQ for review and approval, a seepage testing plan and complete seepage testing prior to use of lagoons LG-269-01 through LG-269-05, as discussed in Sections 5.3.
4. Compliance activity CA-269-04 requiring the city prepare and submit to DEQ for review and approval, a groundwater monitoring plan, as discussed in Section 4.5.2.
5. Compliance activity CA-269-05 requiring the city to schedule a pre-application workshop one year prior to permit expiration to discuss the reuse permit renewal application.
6. Compliance activity CA-269-06 requiring the city submit a reuse permit renewal application six months prior to permit expiration.

## 9 Recommendations

DEQ staff recommends that the draft permit be issued for a period of nine years incorporating the conditions discussed in this staff analysis and specified in the draft permit. This will allow the city to collect seven years of operational data for the new facility, prepare and submit a reuse permit renewal application, and allow DEQ time to address any additional needs for the site. The draft permit specifies hydraulic and constituent loading limits and establishes monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance.

## 10 References

- Parametrix. 2023. *Recycled Water Reuse Permit Application and Technical Report for the City of Kuna*. (Parametrix 2023).
- U.S. Bureau of Reclamation 2023. "AgriMet Historical Archive Weather Data Access." Accessed January 2024. (BOR 2024). <https://www.usbr.gov/pn/agrimet/webarcread.html>
- University of Idaho (UI). 2017. "Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho." Kimberly Research and Extension Center. Accessed December 2023. (UI 2017). <http://data.kimberly.uidaho.edu/ETIdaho/stninfo.py?station=168>
- The Department of Environmental Quality (DEQ). 2007. *Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater*. (DEQ 2007).
- Natural Resources Conservation Service (NRCS). 2023. "Custom Soil Resource Report for Ada County Area, Idaho". Accessed December 2023. (NRCS 2023). <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.html>
- Oregon State University Extension Service (OSUES). July 2011. "Soil Interpretation Guide". (OSUES 2011).
- Western Regional Climate Center (WRCC). 1973. "Isopluvials of 25-YR 24-HR Precipitation in Tenths of an Inch". 1973. Accessed January 2024. (WRCC 1973). <http://www.wrcc.dri.edu/pcpnfreq/id25y24.gif>
- U.S. Department of Agriculture (USDA). 2023. "National Agricultural Statistics Service - Quick Stats." Accessed January 2024. (USDA 2024). <https://quickstats.nass.usda.gov/>