



MEMORANDUM

September 6, 2012

TO: Bruce Olenick, Regional Administrator
Tom Hepworth, Engineering Manager, Pocatello Regional Office

FROM: Scott MacDonald, EIT, MBA, Associate Engineer 

SUBJECT: **Staff Analysis for Draft Municipal Wastewater Reuse Permit for the City of Rockland, Idaho - Permit WRU M-0233-01**

1 Purpose

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.05, "Recycled Water Rules," for issuing wastewater reuse permits. This memorandum addresses draft permit WRU M-0233-01, for the municipal wastewater treatment and new reuse system owned and operated by the City of Rockland, Idaho. The city's treatment and reuse system is not currently permitted under the terms of a wastewater reuse permit, but they do discharge under the terms of an NPDES permit to Rock Creek. Staff recommends the issuance of WRU M-0233-01 as attached.

2 Process Description

The City of Rockland is located on Highway 37 approximately 15 miles south of the City of American Falls in Power County. It is a community of 295 residents as of 2010, which is a decrease from from a population of 316 in 2000. The city has operated their evaporative and facultative sewage lagoon system since the 1970's when the city's treatment system was initially constructed. The treatment facility is designed to treat municipal effluent through the biological removal of a majority of the organic waste and other contaminants. The City has submitted an application for a wastewater reuse permit from DEQ to apply effluent to a permitted hydraulic management unit. The city chose the land application option as a preferable alternative to the proposed EPA fines for violations of the city's NPDES permit. Upgrades to the city's current system will provide treated water suitable for sprinkle irrigated land application.

Facility upgrades include construction of a new pump station at the lagoon site that will transport treated wastewater to a new winter storage lagoon. The city will maintain their existing three-

cell treatment system, and will construct an additional fourth cell for winter storage. A new chlorinator and irrigation pump system will be installed at the winter storage lagoon. The chlorinator will inject dosed chlorine into a contact chamber for mixing prior to land application. The facility planning study and permit application estimate average annual effluent flows to the treatment lagoons at approximately 30,000 gallons per day (gpd) or 101.7 gallons per day per capita. The flow study also found that during four months of the year, inflow and infiltration (I&I) constituted nearly 85,000 gallons per day. High groundwater and frequent irrigation of area farmland contribute to this additional inflow. Projected flows are estimated between 64,640 gpd after 30 years, to 69,230 gpd after 50 years.

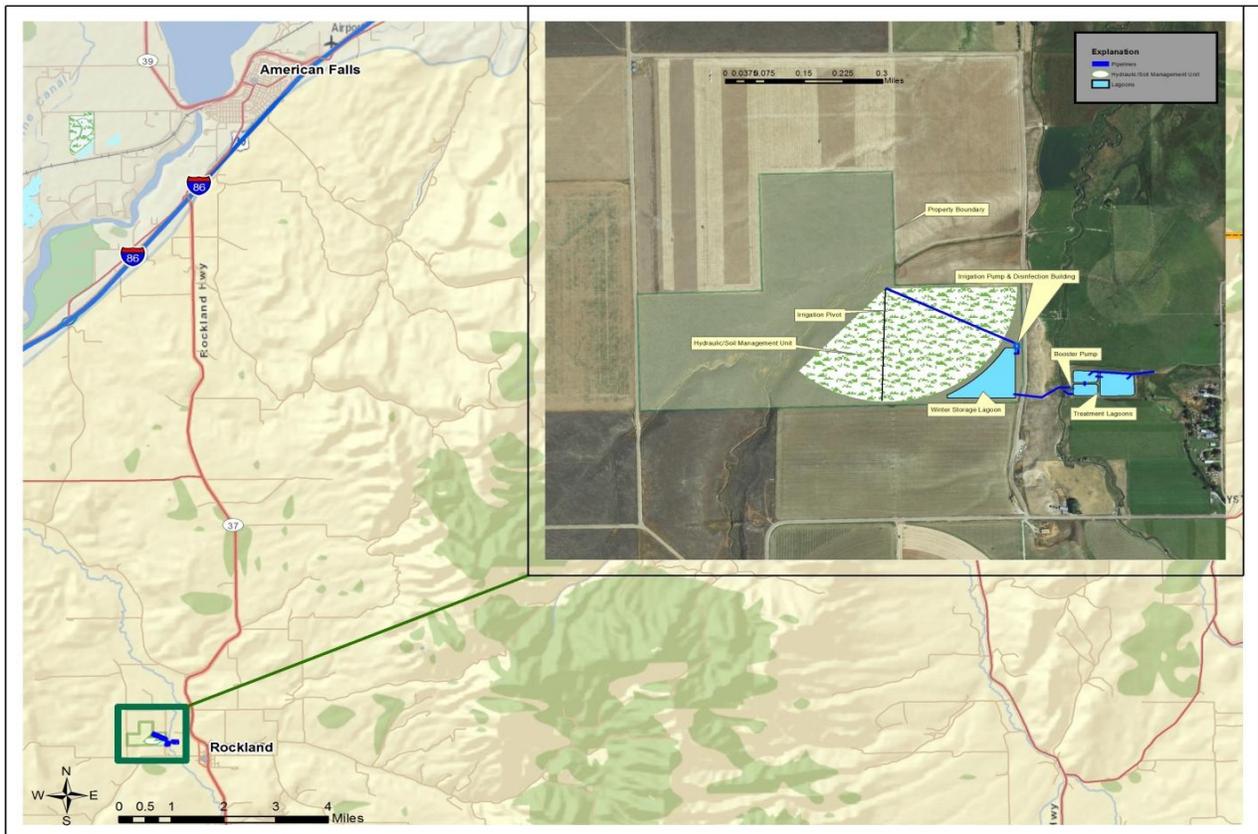


Figure 1. Vicinity map of Rockland treatment system

For conservative design purposes, the 50 year design considerations were used for site loading estimates. This design flow rate assumes a population increase from 295 residents currently, to 400 in 2061. Figure 1 shows the Rockland treatment system, inset into the vicinity map.

The wastewater collection system utilizes gravity flow to collect and direct wastewater to the first of the three treatment lagoons. The lagoons are operated in series with no aeration. Wastewater flows sequentially through the first two cells, into cell 3. Effluent will be pumped from cell 3 to the 11 million gallon winter storage lagoon, where it will be treated to Class D disinfection standards prior to being land applied. Wastewater will not be land applied directly from cell 3 since it must be treated to Class D standards prior to land application.

The existing facility pump building at the treatment lagoon site will house the pump used to transport the effluent to the winter storage lagoon. A new pump building at the land application site, adjacent to the winter storage lagoon will include the filter, the chlorinator, and electrical control panels. The flow proportioning chlorinator injects a mixed liquid sodium hypochlorite chlorine solution to the wastewater, using a chemical metering pump calibrated to the pump flow rate.

The city will chlorinate the effluent from the winter storage lagoon to a Class-D wastewater disinfection goal of <230 CFU/100 mL. A contact chamber will provide chlorine contact time as the effluent is pumped from the winter storage lagoon, prior to being pumped to the pivot. A recording flow meter in the pump house measures effluent volume to the land application site.

The City of Rockland entered a lease to own agreement for their new land application site in November 2011, as a permanent management unit for municipal wastewater application. The majority of the management unit is suitable for land application; some acreage is not suitable for wastewater application due to steeper slopes and less suitable, alkaline soils. There are otherwise no features of concern such as public water supply wells, domestic wells, or surface water features that would further reduce the useable acreage within the property acquired by the city.

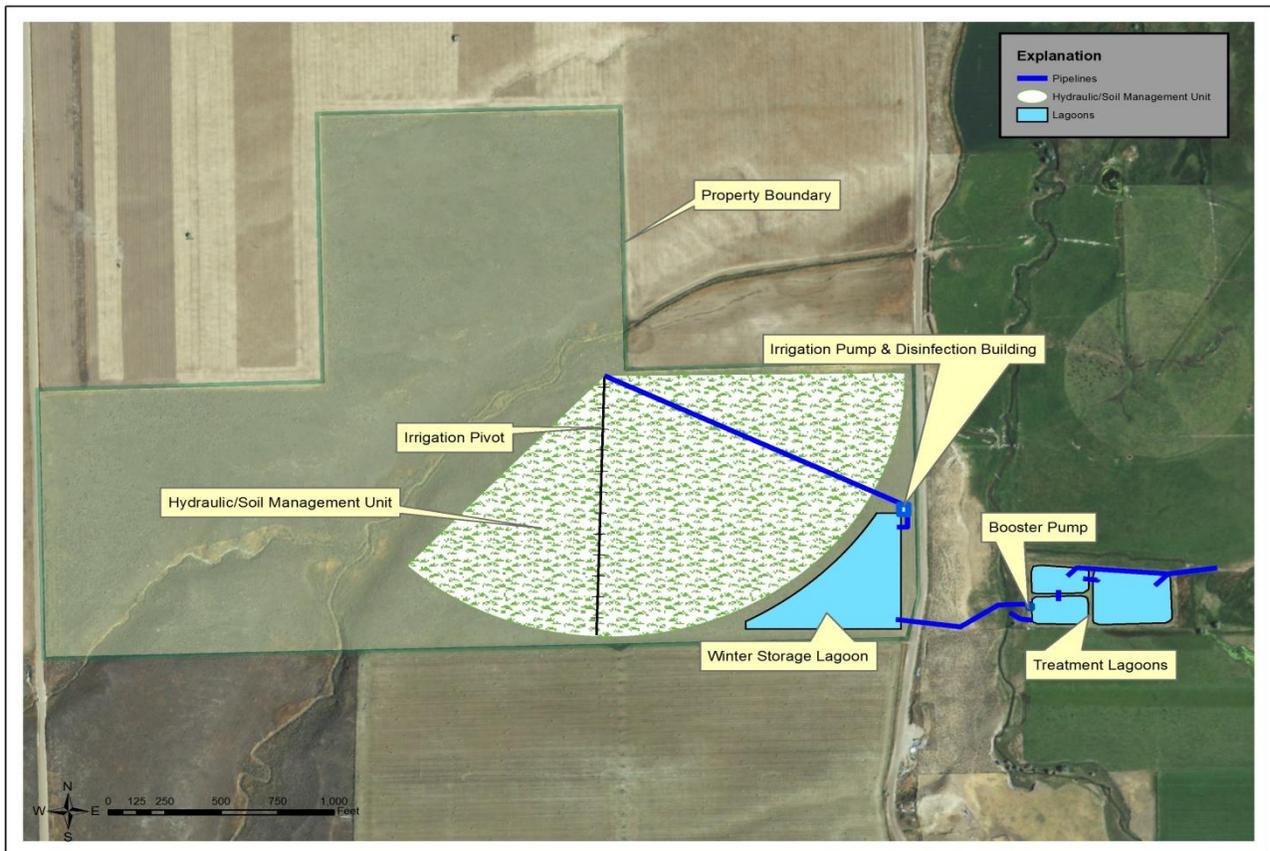


Figure 2. City of Rockland site property boundary, pivot outline, treatment lagoons, and winter storage lagoon

The land application site is managed primarily as a wastewater treatment site for the uptake of wastewater nutrients through crop production. Municipal wastewater will be applied initially to 27 acres of the 42 acre pivot circle which is permitted as a single 42 acre management unit.

The facility is permitted to land apply municipal effluent consisting of the sources described in the permit application including effluent from homes and businesses. The permit prohibits land application of any industrial sources of wastewater or other waste streams not specifically permitted or identified in the permit or permit application. Effluent will be land applied only during the growing season which is April 1 through October 31.

The land application site shown in Figure 2 above is owned by the city, but a farmer is contracted to cut and bale the alfalfa grass. The city has discussed water rights which could be diverted potentially from Rock Creek for supplemental irrigation water. The initial plan for crop management will be similar to the adjacent dry-farm fields, with effluent application only during vary dry periods. If supplemental irrigation water is applied, the source will be sampled for required constituents and quantity as a monitoring point listed in the permit section 5.1.

3 Summary of Events

The permit history, inspection findings, annual report review information, and relevant permit information is presented in this section.

3.1 Permit History

The City of Rockland has not operated under any reuse permit in the past. Rockland has discharged effluent only under their NPDES permit, which they plan to renew and maintain. The new wastewater reuse permit is the first reuse permit for this municipality. The municipal effluent treatment facilities are located within the City of Rockland, with the land application site located to the west of the city's lagoon area. The purpose of the draft permit is to issue a new permit under the permit numbering format WRU M-0233-01.

- May 21, 2012 – The Department received a formal permit application including a preliminary technical report.
- June 21, 2012 – The Department issued a completeness determination
- August 31, 2012– The Department issued a draft permit for review and comment.

A new permit application from the City of Rockland was received on May 21, 2012, and largely serves as the basis for the terms and conditions contained in the draft permit. As required by the *Reuse Rules*, the draft permit will be presented for a public comment period. After the comment period has closed, DEQ will provide written responses to all relevant comments and prepare a final permit for the City of Rockland wastewater reuse facilities.

3.2 Inspection and Annual Report Review Findings

The proposed wastewater reuse permit is the first for this facility. There have been no inspections or annual reports submitted for the proposed land application management unit. The city of Rockland previously discharged only to Rock Creek.

4 Discussion

This section presents relevant issues concerning site conditions, data, and proposed management practices that are used as the basis for determining permit conditions. Discussion items include; operations, hydraulic management unit configuration, site soils, groundwater, surface water, proposed site loading, wastewater quality and quantity, storage structures, site management, and compliance activities.

4.1 Plan of Operation

The facility plan of operation is required to be submitted within 12 months following issuance of the new permit, and must be updated or modified as operations and regulatory requirements change. The facility will complete an updated plan of operation which will detail the operations of the chlorine system, and flow measurement equipment, along with detailed operating practices and agricultural management activities at the land application site. The plan should clearly explain system operations as well as standard permit reporting requirements. The permittee may submit management plans required in CA-233-01 as individual documents or as sub-parts incorporated into a comprehensive, system-wide plan of operation.

4.2 Hydraulic Management Unit Configuration

The city entered a lease agreement to purchase a 160 acre parcel for land application of municipal effluent, and for construction of a new winter storage lagoon at the new site. Site ownership will be completed when funding is finalized. The city will initially develop 42 acres for their land application site approximately 500 feet west of the treatment lagoons. Flow estimates indicate that only 27 acres of the initial 42 acres will be needed for the first few years of the permit. The permit application indicates that the initial 42 acre site will meet the city's effluent treatment needs for many years to come.

The city will install a pivot to irrigate the site. The outline of the proposed pivot path is shown in Figure 2. The new pivot will be 1,400 feet in length, covering about 1/3 of a full pivot circle. The system is designed for 7.5 gpm, per acre at 80% efficiency. Sprinkler system efficiency is designated as E_i in the permit, reflecting permit application materials.

Land application management unit elevations range from approximately 4635 feet to 4670 feet, with the treatment lagoons established at an elevation of 4615 feet. The hydraulic management unit has been managed as a dry farm in the past, but has been in the Conservation Reserve Program (CRP) for the last 20 years. The site will serve as an effective land application site for final wastewater treatment by growing crops for wastewater nutrient removal. The city plans to grow alfalfa or an alfalfa hay mix. The proposed crop is grown in the area producing effective yields.

A compliance activity in the new permit will require submittal of a runoff management plan within 12 months of permit issuance for the land application site. The plan will be submitted to DEQ for review and approval. The plan should show that the management unit is designed for control and mitigation of site run off. Wastewater will be applied in the summer months during the growing season when infiltration is highest, and chances for effluent runoff from spring thaws are minimal. Application during the growing season will allow for a significant period following effluent application when no effluent is applied to the crops so that winter precipitation or spring thaws will minimize effluent runoff.

4.3 Site Soils

Site soils are generally well suited for the sprinkle application of wastewater. Figure 3 shows the configuration of soil types as determined by NRCS soil mapping unit designations. The 160 acre site includes a drainageway that runs through the site, with lighter colored soils as shown in Figure 3. This area of the site is less suitable for irrigated farming due to the slope and poor soil quality so this area will not be irrigated or farmed.

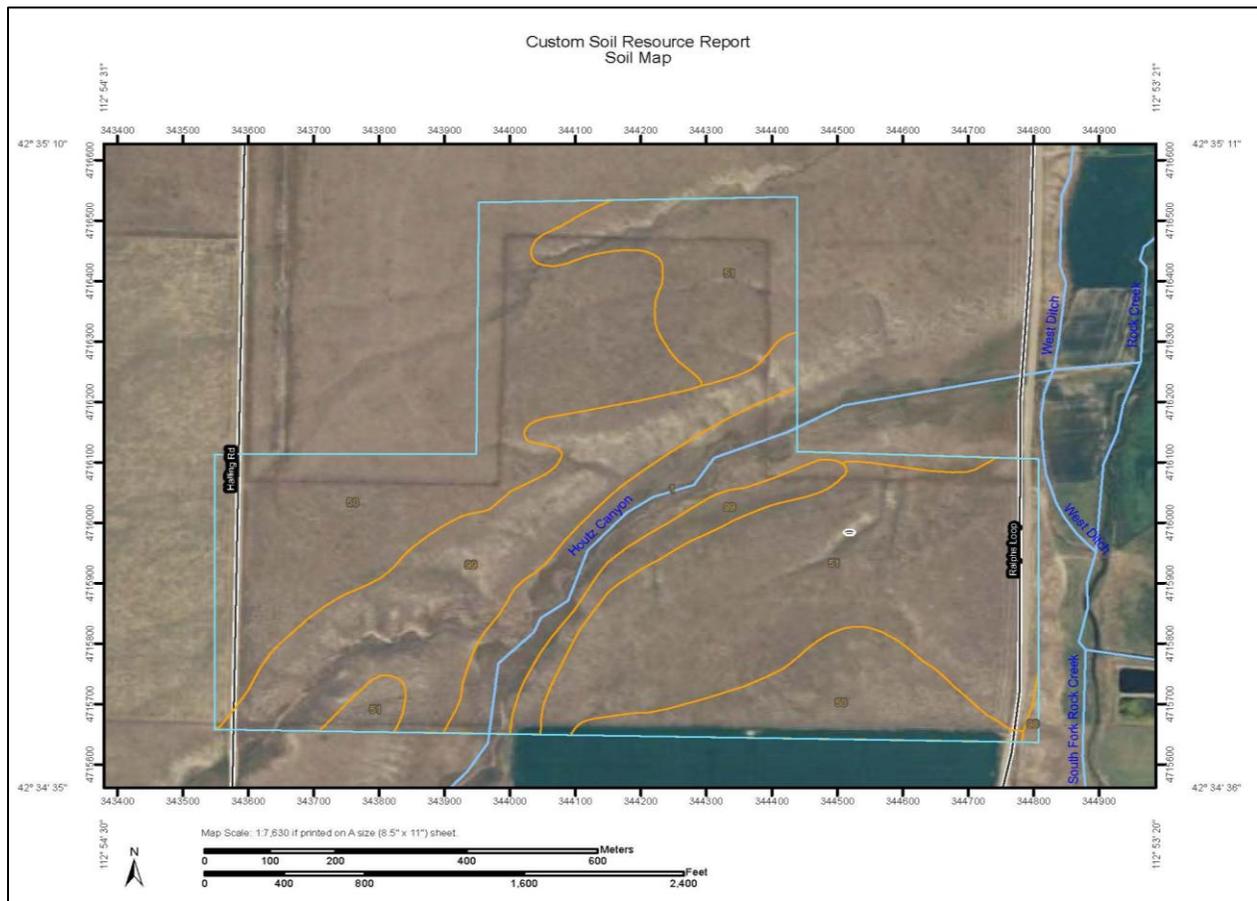


Figure 3. Soil Mapping Units (NRCS)

Table 1 below identifies specific soil types and mapping unit symbols for soils found on the management unit.

Table 1. Soil Mapping Unit Symbols

Power County Area, Idaho (ID709)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Ammon silt loam, 0 to 3 percent slopes	18.2	9.3%
50	Newdale silt loam, 0 to 4 percent slopes	64.1	32.8%
51	Newdale silt loam, 4 to 12 percent slopes	71.7	36.7%
98	Wheelerville silt loam, 4 to 12 percent slopes	0.3	0.2%
99	Wheelerville silt loam, 12 to 20 percent slopes	41.1	21.0%
Totals for Area of Interest		195.5	100.0%

Soil Monitoring

The permit application shows soil characteristics on portions of the overall 160 acre site that will need to be carefully monitored due to increased alkalinity. The area being developed to receive wastewater does not appear to have the same concerns with alkalinity, but soils there will be monitored for constituent build up. The permit requires annual soil monitoring for pH, plant available P (Olsen Method), NO₃-N (nitrate nitrogen), NH₄⁺-N (ammonium nitrogen), electrical conductivity, and percent organic matter monitored annually. The permit also requires that SAR, DTPA-Fe, and DTPA-Mn be monitored and reported the first year of the permit.

4.4 Groundwater

The permit application shows the groundwater flow direction toward the north-northeast; similar to the surface water flow direction of Rock Creek east of the site. Measurements of groundwater near the site indicate groundwater at 80 feet below ground surface, which is approximately at the elevation of Rock Creek. There are three wells within ¼ mile of the management unit identified as irrigation wells in the well logs.

Groundwater Monitoring Data:

The permittee is required to monitor groundwater at the hydraulic management unit. The permittee will sample the new monitoring wells installed at the site and near the winter storage lagoon. The four proposed monitoring wells will be monitored twice per year for: static water level (in hundredths of a foot), sodium, potassium, calcium, manganese, total coliform (CFU/100 mL), carbonate, bicarbonate, nitrate-nitrogen, total dissolved solids, total Kjeldahl nitrogen, and total phosphorus. The permit will include recommendations for sampling domestic wells within ¼ mile of the land application site or the winter storage lagoon.

4.5 Surface Water

The nearest natural surface water to the site is Rock Creek at 350 feet to the east of the management unit boundary. Rock creek is the current surface water discharge point for the municipal effluent and will continue as an alternative receiving water for Rockland with the renewal of their NPDES permit. The Lake Walcott subbasin TMDL, including Rock Creek lists only limits on sedimentation, there are no TMDL limits for constituents. There is also a canal 120 feet from the north east corner of the site. The canal is filled seasonally. There are no springs reported in the area.

To help protect surface waters from contact with wastewater, compliance activity CA-233-01 in the new permit will require the facility to submit a runoff management plan. The runoff plan will describe how wastewater applied to the permitted HMU will be contained on-site and not allowed to flow to nearby surface waters.

4.6 Historic and Proposed Site Loading

Loading rates for individual management units are determined by crop requirements. The permit limits growing season hydraulic loading to the crop specific IWR, in any combination of treated wastewater and supplemental irrigation water if it is used on site. Calculations require specific methodology to determine the crop IWR. The permittee may use either thirty-year data or current climatic and agronomic information, but whatever method is used it must be used consistently throughout the permit period.

4.6.1 Historic Flows and Proposed Hydraulic Loading Rate

The permit will limit annual loading to 23 MG of wastewater applied annually. Generated wastewater quantities are not expected to exceed the IWR of the available acreage. Annual IWR calculations are required to proactively plan for the most effective use of wastewater (and supplemental water if available) to ensure efficient crop growth, and to maximize wastewater nutrient uptake by the crop.

To plan for crop water needs, DEQ staff used data available from ETIdaho¹ and from information in the permit application materials to compare proposed application rates with the IWR of alfalfa crops in the area. The IWR, or precipitation deficit (P_{def}) for alfalfa for the site is reported at nearly 33 inches of combined wastewater and supplemental irrigation water if it becomes available. Staff does not envision the city being limited by hydraulic loading for the foreseeable future.

¹ (<http://www.kimberly.uidaho.edu/ETIdaho/>)

4.6.2 Wastewater Quality and Sampling

The City of Rockland currently monitors wastewater constituent characteristics for reporting to EPA under their NPDES permit. In addition to any current monitoring and reporting, the new wastewater reuse permit requires additional monitoring for land application reporting to DEQ. Considering the fairly flat population numbers, and lack of industrial flows to the treatment plant, the city's wastewater characteristics appear consistent from year to year. Table 2 below lists the average wastewater constituent data from the permit application.

Table 2. Average Concentration of Key Constituents.

Parameter	Concentration	
	Units	Average
BOD ₅	mg/L	15.8
TSS	mg/L	8.5
Ammonia-N	mg/L	3.2
E. coli	#/100 mL	119
pH	SU	8.0

Calculations in the permit application indicate that the site will approach hydraulic loading limits before any land limiting constituents have been reached. Nitrogen and possibly COD loading would likely be the limiting constituents and are reported in more detail below. The *E. coli* reference in Table 2 above reflects monitoring requirements in the NPDES permit. The wastewater reuse permit will include the standard Class D limits for total coliform rather than *E. coli*.

The permit requires the facility to monitor the volumes of wastewater and supplemental irrigation water (if available) applied on the land application site on a daily basis. Wastewater sampling is required on a monthly basis when effluent is being applied to the site.

4.6.3 Nitrogen Loading

Comparisons between site nitrogen loading and crop nitrogen uptake values are not yet established. However, standard table values of 140 lb_N/ac nitrogen removal rate for alfalfa or an alfalfa grass mix are reasonable for the area. The nitrogen removal rate is derived from approximately 56 lb_N per ton of alfalfa, and 2-4 tons per acre average yield, the 140 lb_N per acre could easily be attained. If nitrogen is loaded at 150% of the median crop removal, that would allow for 210 lb_N per acre. The permit application estimates applied nitrogen at 13.5 lb_N per acre, but that estimate is based only on ammonia nitrogen. Using total nitrogen estimates in typical municipal effluent of between 20 and 85 mg/l, the nitrogen loading rates will be closer to 50 mg/l typical value for a total applied nitrogen content of 228 lb_N per acre. This estimate is for total loadings at build out, so the permittee should be able to manage the site effectively for nitrogen loading and uptake for quite some time until those high estimates on nitrogen loading are reached.

The permitted nitrogen loading limit is 150% of the median three-year crop uptake for all sources, including fertilizer application. The permit application does not include information on historical fertilizer application, since the land has not been farmed for 20 years. Required annual reporting must list supplemental fertilizer application if applied on site.

4.6.4 Hydraulic Flow, and Storage

Growing season wastewater application limit is 23 million gallons annually. The loading limit is established as a conservative estimate of future flows for a 20 to 50 year population growth estimate.

Flow meter calibration for wastewater and supplemental irrigation water application is a requirement in the permit. The treatment lagoon pump house will contain the flow meter used to record supplemental irrigation water volume from Rock Creek. Effluent flow is measured as it is pumped from the winter storage lagoon to the land application site. Effluent samples are taken at the pump house. Following chlorination, city personnel collect grab samples from a sampling point at the land application site.

The permit lists four active containment structures. The four wastewater storage structures and capacities are listed in Table 4 below. The three treatment cells are HDPE lined while the winter storage lagoon is clay lined. The three treatment lagoons have an operating capacity of 2 MG each. The winter storage lagoon has a design capacity of 13 MG. Each of the treatment lagoons has been seepage tested, with seepage plans and results reviewed and approved by DEQ. The winter storage lagoon will be required to be seepage tested in compliance activity CA-233-02.

Table 3. Wastewater Storage Structures and Capacity.

Storage Structure	Serial Number	Design Capacity (Million Gallons)
Cell1	LG-019201	2.0
Cell 2	LG-019202	2.0
Cell 3	LG-019203	2.0
Winter Storage Lagoon	LG-019204	13

4.6.5 COD Loading

Municipal effluent COD concentrations have been shown to be less than 5% of the standard limit of 50 lb/ac/day. The new permit will not include requirements for monthly wastewater monitoring for COD or a COD loading limit.

4.6.6 Other Constituent Loading - Trace Element Management

The permit will require monitoring of supplemental irrigation water sources. Any supplemental irrigation water source will be monitored for quantity on a daily basis when being applied to the site, and sampled twice per year in the first year of the permit for TKN, ammonium nitrogen, total-P, EC, pH, and TDS. While the permit application specifies only a generic supplemental irrigation source at this time, the permit includes provisions for supplemental source reporting should they become available.

4.7 Site Management and Related Permit Recommendations

4.7.1 Buffer Zones

Buffer zones for the new permit WRU M-0233-01 reflect the standard municipal buffer zone distances for Class D municipal effluent, (Secondary effluent quality–disinfected to <230 CFU/100 ml¹), listed in Table 4 below. The permit requires submittal of a Buffer Zone Plan within 12 months of permit issuance.

Table 4. Level of Wastewater Disinfection and Resulting Buffer Zones.

<i>FEATURE OF INTEREST</i>	<i>MINIMUM DISTANCE (FEET)</i>
Inhabited Dwellings	300
Areas Accessible to Public	50
Public Water Supply	1,000
Private Potable Water Supply	500
Natural Surface Water Bodies	100
Man-made Surface Water (Irrigation canals, reservoirs)	50
FENCING TYPE	Three-Wire Pasture Fence
Required	Yes
POSTING ⁽²⁾	Class D
Required	Yes

(1) The median number of total coliform organisms does not exceed two hundred thirty (230) per one hundred (100) milliliters, as determined from the bacteriological results of the last three (3) days for which analyses have been completed. No sample shall exceed two thousand three hundred (2300) per one hundred (100) milliliters in any confirmed sample.

(2) When using Class D recycled water for irrigation, the personnel at the use area must be notified that the water used is recycled water and is not safe for drinking. For the public, signs must be posted around the perimeter of the irrigation site stating that recycled water is used and is not safe for drinking or human contact. Signs shall be posted and must state “Warning: Recycled Water - Do Not Enter”, or equivalent signage both in English and in Spanish, posted every 500 feet and at every corner of the outer perimeter of the site.

4.7.2 Crop Management

The proposed crop is an alfalfa hay mix reflecting crops managed in same area. The city will grow the alfalfa hay mix on the site and may rotate in other crops as necessary to maintain healthy crop production.

The new permit will require an update to the plan of operation, including an agricultural management plan. The city has proposed grazing on the site for fall clean-up of remaining stubble. The permit requires the city to have an approved grazing management plan prior to grazing animals on-site.

4.7.3 Nuisance Plan

The new permit will not include a compliance activity requirement for submittal of a nuisance odor management plan for wastewater reuse land application activities. The effluent composition is not known to produce nuisance odors. The winter storage lagoon and the treatment lagoons must be managed without causing nuisance conditions according to standard permit requirements.

4.8 Compliance Schedule for Required Activities – Permit Section 3

New Permit WRU M-0233-01

CA-233-01 requires submittal of an updated plan of operation within one year of permit issuance to include a runoff management plan, a quality assurance project plan, an agricultural management plan, a site instrumentation plan, a buffer zone plan, and a grazing management plan. The permittee may submit the required plans in CA-233-01 as individual documents or as sub-parts incorporated into a comprehensive, system-wide plan of operation. Individual management plans will be reviewed and approved separately.

CA-233-02 requires submittal of a seepage testing plan for review and approval prior to seepage testing the new winter storage lagoon. The treatment lagoons were seepage tested in 2010. All three cells passed. Cell 1 was approved on January 11, 2011, and cells 2 and 3 were approved on July 12, 2010. They will be retested at 10 year intervals as required by rule.

CA-233-03 requires submittal of a monitoring well network installation plan to ensure that the monitoring well location and design is approved by DEQ prior to installation.

CA-233-04 requires submittal of permit renewal information a minimum of 180 days prior to permit expiration.

4.8.1 Permit Limits and Conditions – Section 4

The City of Rockland wastewater reuse facilities constitute a municipal wastewater land application system. Current standards for municipal wastewater reuse systems are incorporated into the draft permit. The wastewater reuse permit is for the land application of treated municipal effluent. Industrial effluent is not described in the permit application and is not permitted to be sent to the treatment lagoons or to the land application system.

The buffer zone criteria in the previous permit will remain unchanged in the new permit. Operating plan updates and buffer zone maps should reflect the recommended buffer distances.

4.8.2 Monitoring and Reporting – Sections 5 & 6

The permit requires the facility to monitor the volume of wastewater and supplemental irrigation water applied on the land application site on a daily basis, wastewater composite sampling and reporting is required on a monthly basis when effluent is being applied.

The facility is required to calibrate wastewater and supplemental irrigation water flow measuring equipment annually or as required by the manufacturer. Other monitoring requirements listed in Section 6.1.2 of the draft permit include calculation of the monthly irrigation water requirement for each crop, annual hydraulic loading rates, annual nutrient loading rates, crop yield, and crop nutrient uptake as the crop is removed from the site.

The permittee is required to submit an annual report that includes 1) all monitoring conducted under the terms of the permit, 2) the status of compliance activities required by the permit, and 3) an interpretive discussion of the monitoring data with particular respect to any potential environmental impacts. The annual report is due by January 31 of each year, and will address operations conducted from November 1 through October 31 of the preceding years.

5 Recommendation for Issuance of Permit

Based on review of applicable state rules, staff recommends that DEQ issue draft Permit WRU M-0233-01 for a public review and comment period. The draft permit contains effluent quality requirements for the wastewater treatment system, as well as terms and conditions required for operation of the reuse system.

6 References

Keller Associates, March 14, 2012, Wastewater Reuse Permit Technical Report (Permit Application), City of Rockland, March.

Seepage testing approval letters TRIM #'s 2010AGD2890, and 2011AGD160

Appendix A: Site Maps

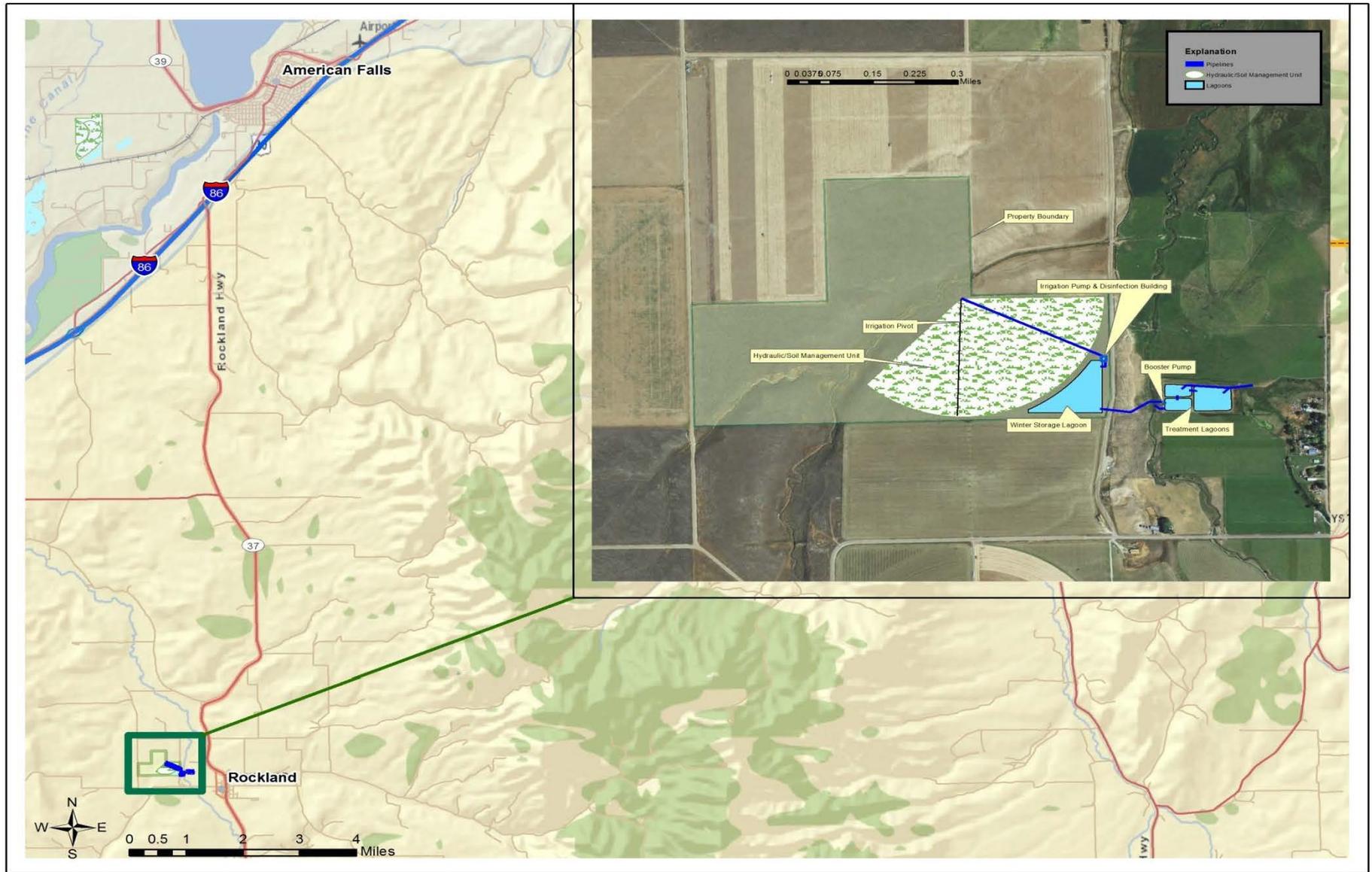


Figure 1. City of Rockland Vicinity map

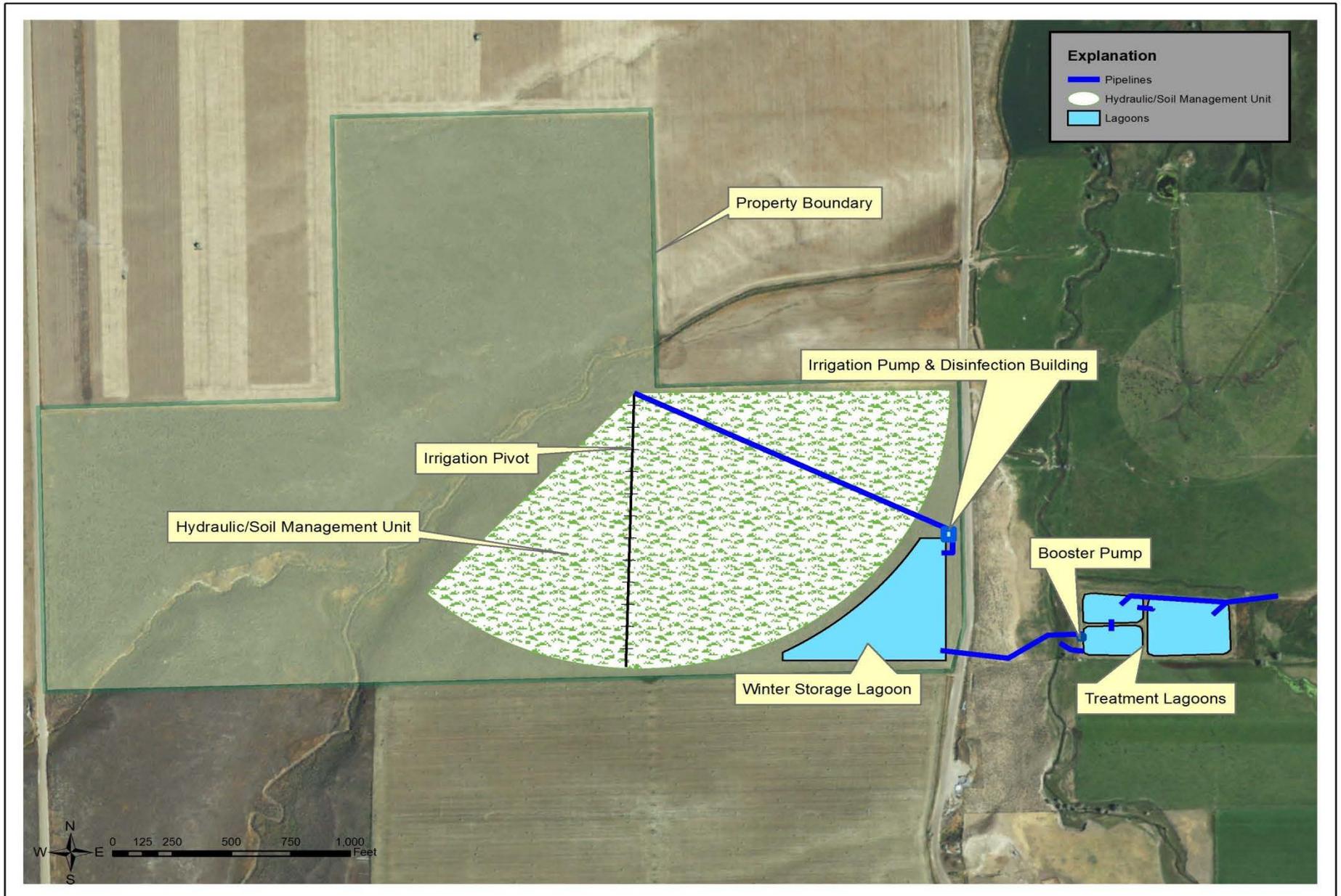


Figure 2. City of Rockland Hydraulic Management Unit, pivot area, and lagoons.