STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

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Brad Little, Governor
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MEMORANDUM:

To: Katy Bergholm, Regional Administrator, Pocatello Regional Office
Allan Johnson, P.E., Engineering Manager, Pocatello Regional Office

From: Scott MacDonald, Staff Engineer, Pocatello Regional Office

Date: November 1, 2022

Subject: **Staff Analysis for the *Draft* Reuse Permit, Basic American Foods, Blackfoot, I-039-04**

Executive Summary

- The Basic American Foods Blackfoot facility is an industrial potato processor.
- The facility will reduce acreage from 448.1 acres to 410.5 acres receiving 520 million gallons (MG) of recycled water.
- An 18.5-acre management unit is permitted for emergency use only.
- The facility is permitted for growing season, and non-growing season land application.
- Staff recommends issuance of Reuse Permit I-039-04, for a period of 7 years.

1 Introduction

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

- Permit I-039-03 was issued on October 4, 2016, expiration date October 3, 2022.
- Permit application materials were received April 1, 2022.
- The 'Completeness Determination' letter was sent May 3, 2022.
- The 'Preliminary Decision' letter was sent on June 3, 2022.
- Draft Reuse Permit issued November 1, 2022.

2 Site Location and Ownership

The Basic American Foods Blackfoot facility's management units are located approximately 3.5 miles to the west of the Snake River to the west of the City of Blackfoot, Idaho. The processing facility is on the south side of Highway 26, just west of Interstate 15 in Blackfoot, while the land application management units are on the north side of Highway 26.

Both the facility and the land application management units are located within Bingham County. Final recycled water treatment is accomplished via land application for crop nutrient uptake over 448.1 acres using primarily pivot and lateral pivot irrigation. A vicinity map, and site maps are provided in the Appendix.

3 Process Description

Process water passes through the clarifier, the mud water clarifier, vacuum filter drum, and screens to remove solids, and then onto the advanced treatment membrane bioreactor system composed of an anoxic basin, three aeration basins, and three membrane trains. Treated process water is mixed with the decant water from the silt settling basins, which is then pumped to the management units.

The system does not include storage lagoons, so all recycled water flow is applied as produced. Supplemental irrigation water can be applied directly on the fields, with or without mixing with recycled water. Each irrigation system has a separate flow meter to measure and report applied water.

Recycled water and supplemental irrigation water are applied during the growing season between April and October. The facility is also permitted for non-growing season recycled water application from November 1, to March 31. Waste solids are recovered for animal feed, with silt and rock sent to an off-site disposal location. Grazing is not permitted.

The six management units shown in Figure 1, consist of 410.5 irrigated acres.

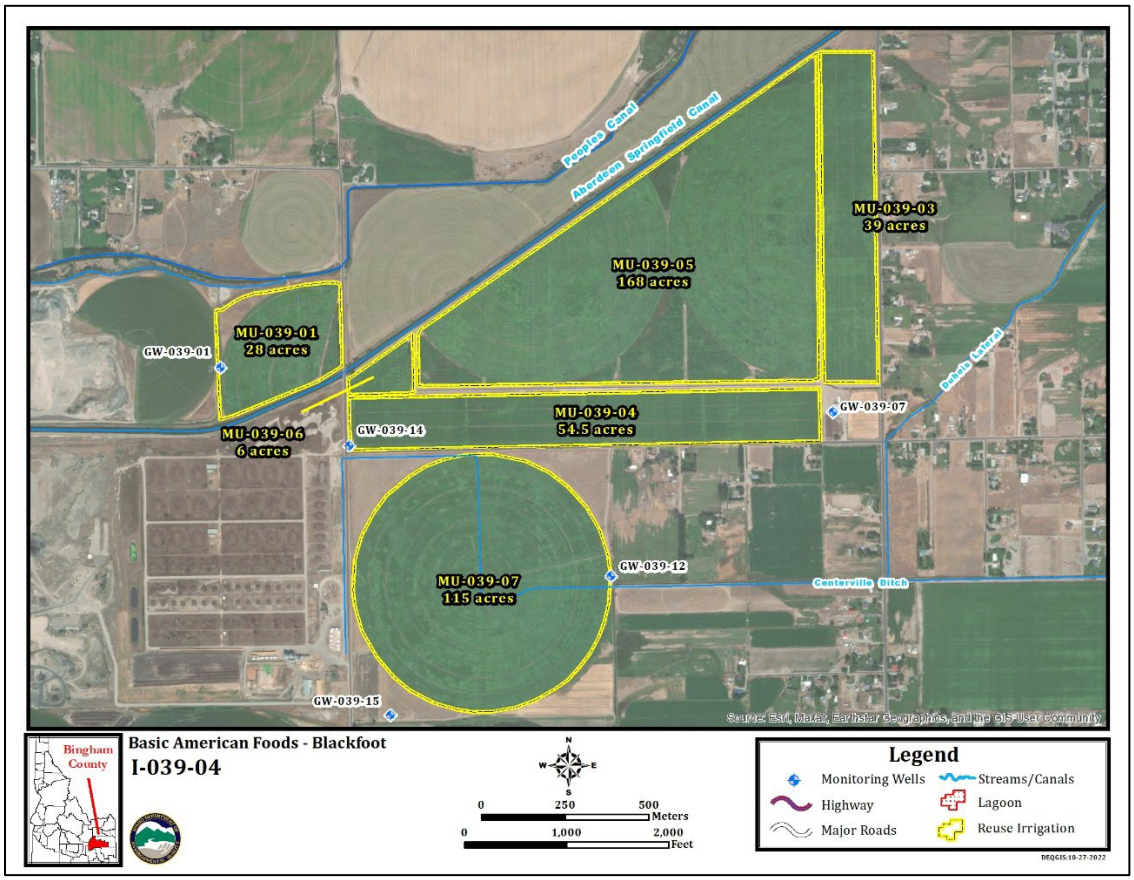


Figure 1. Management unit delineations

Site topography is flat, with a less than 3% slope overall. Management units are bordered by surface waters with the Aberdeen-Springfield Canal and the Peoples Canal on the north end of the site, and roadways on the remaining boundaries. Land use in the area is rural agricultural, irrigated agriculture, rural residential, mobile home courts, and an interstate highway.

4 Site Characteristics

4.1 Site Management History

The reuse system has been in operation in since it was first permitted in September of 1990. BAF Blackfoot land applied recycled water on seven management units, reduced to six management units in the draft permit. The original land application practices included flood irrigation on some fields. All management units now use sprinkle irrigation for recycled water and supplemental irrigation water, with the exception of the corners on MU-039-06 that receive some flood irrigation. All fields will continue to be planted in grass or alfalfa hay for uptake of applied nitrogen and other constituents.

Supplemental fertilizers are generally not applied to the land application site, but some years dry urea fertilizer is added.

4.2 Climatic Characteristics

Climatic characteristics of the BAF Blackfoot site are typical for the surrounding area. Weather data from the Regional Climate Center near Blackfoot is summarized as follows:

- Average annual precipitation of 10.18 inches.
- Minimum monthly precipitation of 0.00 inches, between 1948 - 2005.
- Maximum monthly precipitation of 5.14 inches in June, between 1948 - 2005.
- Average minimum temperature of 33.0 degrees F in February between 1948 - 2005.
- Average maximum temperature of 87 deg. F, in the months of June.
- Winds are primarily out of the southwest.

The net irrigation water requirement (precipitation deficit) for alfalfa with frequent cuttings in Blackfoot is 32.3 inches over the growing season. The Plan of Operation provides watering schedules, in accordance with the site-specific irrigation water requirements, and irrigation system efficiencies. Field managers account for the effects of climatic variability on water requirements, in accordance with the approved plan.

4.3 Soils

Soil management unit delineations match the management unit acreage. The soil management units found west of Blackfoot are at an elevation of approximately 4,490 feet.

Soil profiles are described as Pacham Gravely Loam PaA with 0%-2% slopes, and PaB with 2%-4% slopes consisting of well-drained, nearly level to gently sloping soils that are 20 to 30 inches thick over gravel and sand. Site soils have been found to adequately accommodate the volume of recycled water and supplemental irrigation water applied.

Site soils were evaluated via twenty-nine test pits and three drainage plots. Drainage plots, tested by flooding to saturation, revealed that the site soils drained to field capacity within 21 to 26 hours of the flooding event. With adequate drainage of the soils at this site, irrigation should not damage crops. PaA (Packham gravelly loam, 0-2% slopes) and PaB (Packham gravelly loam, 2-4% slopes) consist of well-drained, nearly level to gently sloping soils that are 20 to 35 inches thick over gravel and sand.

This site does not have high clay content soils or restrictive layers. The fields yield over five dry tons per acre per year of grass-hay on average with pivot irrigation.

Highly biodegradable organics in potato process water are a primary cause of objectionable odors and can have negative effects on site soils. BAF's advanced membrane treatment effectively mitigates the possibility of clogging the soils due to organic overloads. Treating the water and removing these organics before the water is applied to the fields, minimizes the potential for objectionable odors and soil clogging.

Site monitoring wells do not show negative effects from field loadings and even show decreasing constituent levels. Site soils accommodate the non-growing season loadings. Non-growing season loadings will remain as listed in the previous permit.

4.4 Surface Water

The Aberdeen Springfield Canal and the People's Irrigation Canal run through and along the northern boundary of the management units. Runoff has not been a concern, but BAF will be required to submit a Runoff Management Plan to manage potential stormwater runoff from entering surface water. The buffer distances from the management units to canals, ditches, and other surface waters are addressed in Section 4.4 of the permit.

4.5 Ground Water and Hydrogeology

BAF's monitoring wells exhibit high yields from the basalt aquifer due to high secondary porosity and substantial thickness of hundreds of feet. Secondary porosity features include rubble zones between lava flows, voids such as lava tubes and pressure ridges, and fractures. Fine-grained sedimentary deposits occurring above the basalt can perch canal seepage during the growing season but these perched zones commonly become dry after canals are shut off. The aquifer is composed of basalt rock and interbedded sediments that change character over short distances. Depth to first ground water is at approximately 50 feet below ground surface.

Ground water flow direction and flow gradient were assessed from water level measurements collected during sampling. Ground water flows west to south-west with calculated average gradient of 2.2 feet per mile. Nearby canals can influence the gradient when losing water through seepage.

There are no known public water supply wells located near the site that would be impacted by land application activities. The facility has historically sampled up to 17 domestic wells near the site, at the request of the property owners. Wells have not shown exceedances of the ground water quality standards. No new wells are reported to have been installed in the area since the previous permit was issued. The draft permit removes the recommendation to continue to sample any domestic wells within ¼ mile of the reuse site.

4.6 Recycled Water Characterization and Loading Rates

4.6.1 Recycled Water Characterization

In 2002, BAF installed an membrane treatment system to provide advanced treatment prior to application on the management units. Silt water from potato washing receives primary clarification and is sent directly to land application. The silt water is not processed through the membrane treatment system. The silt water is only used to wash potatoes, not to process potatoes.

The advanced treatment system includes a pre-anoxic tank for reduction of nitrogen and extended aeration stabilization tanks for reduction of chemical oxygen demand (COD), nitrification of total Kjeldahl nitrogen (TKN) and stabilization of biosolids. BAF uses a proprietary ultra-filtration system known as the "Z-Weed®" ultra-filter, manufactured by Zenon Corporation. The ultra-filter system is more robust and efficient than a traditional secondary clarifier.

Nitrogen loading from recycled water and supplemental fertilizers will continue to be limited to 150% of typical crop uptake. Figure 8 shows that nitrogen loading from recycled water increased from 2016 to 2017, with the last five years exceeding BAF's 'target' loading rate. The target nitrogen loading rate is less than 300 lb/acre, while the 3-year typical crop uptake, multiplied by 150% allows for 708 lb N per acre. The facility is not overloading the management units compared to crop uptake, but the facility's target values appear very low in comparison.

4.6.2 Hydraulic Loading Rates

Crops are a mixture of alfalfa hay and grass hay, with an irrigation water requirement of 32 inches per year, based on permitted acreage. Calculations suggest that the 410.5 acres will be adequate for recycled water treatment for the 6-year average volume of 506 MG annually for both the growing season and the non-growing season.

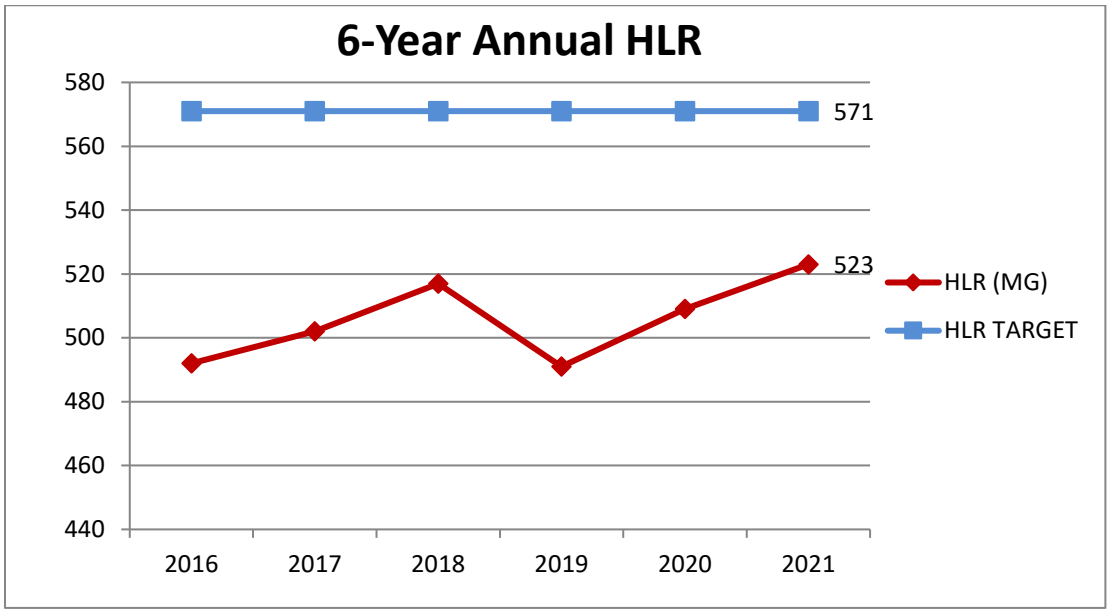


Figure 5. Target and Actual Hydraulic Loading Rates – 2016 to 2021.

BAF is required to estimate crop water requirements at the beginning of each year and to sufficiently pre-plan recycled water and supplemental irrigation water applications to ensure healthy crops for maximum nutrient uptake. An analysis of Irrigation Water Requirement (IWR) and irrigation scheduling is a requirement in the reuse Plan of Operation.

The precipitation deficit (net irrigation water requirement or IWR) for alfalfa with frequent cutting is 32.2 inches over the growing season. Using an irrigation efficiency of 80%, the equivalent irrigation water requirement for the irrigation pivots on site will be 40.4 inches per year on average. The Plan of Operation provides operators with watering schedules, in accordance with the site-specific irrigation water requirements.

Non-growing season loading limits remain unchanged from the previous permit, at approximately 220 MG. Loading limits were based on the performance-based loading calculations for the site specific soils.

Non-growing season loading occurs during the months when there is no water in the adjacent canals, so any potential NGS runoff could not come in contact with surface waters. If there were some extraordinary precipitation event or field overwatering event that led to runoff into an empty canal, it would be immediately obvious, and addressed by the facility according to their approved Runoff Management Plan.

The NGS loading rates have led to a few odor complaints over the years, but not to excess solids application, or conditions that adversely affect public health or safety. During regular facility inspections, there has been no observed crop damage from NGS loadings that would have been observable in the spring during crop emergence.

Analysis of the site ground water does not indicate that iron is present in excess in the ground water samples, verifying that current hydraulic loading is not contributing to secondary iron contamination. Excessive COD loading is not a concern from the highly treated recycled water applied at the site. COD loading ranges from 10% to 40% of the permit limit.

The facility employs an advanced membrane treatment system that removes the constituents that could accumulate on the management units. Regular site inspections, conducted even during freezing conditions, have not identified accumulations of frozen recycled water. Spring thaws have not led to any reported runoff events.

Since the site has been in operation, there have been no reports of runoff from the site or runoff to surface waters. The facility is required to have an approved Runoff Management Plan in place to address any potential sources of water that may leave the permitted management units. A Runoff Management Plan is required to address the potential effects from 25-year, 24-hour precipitation events.

4.6.3 Constituent Loading Rates

Chemical oxygen demand (COD) loadings are reported well below the standard permit limit of 50 lb/acre-day for both the growing season and the non-growing season, and below the facility target loading rate. COD is calculated for each management unit on a monthly basis for both the growing season and non-growing season. COD loading is not averaged between the growing season and the non-growing season.

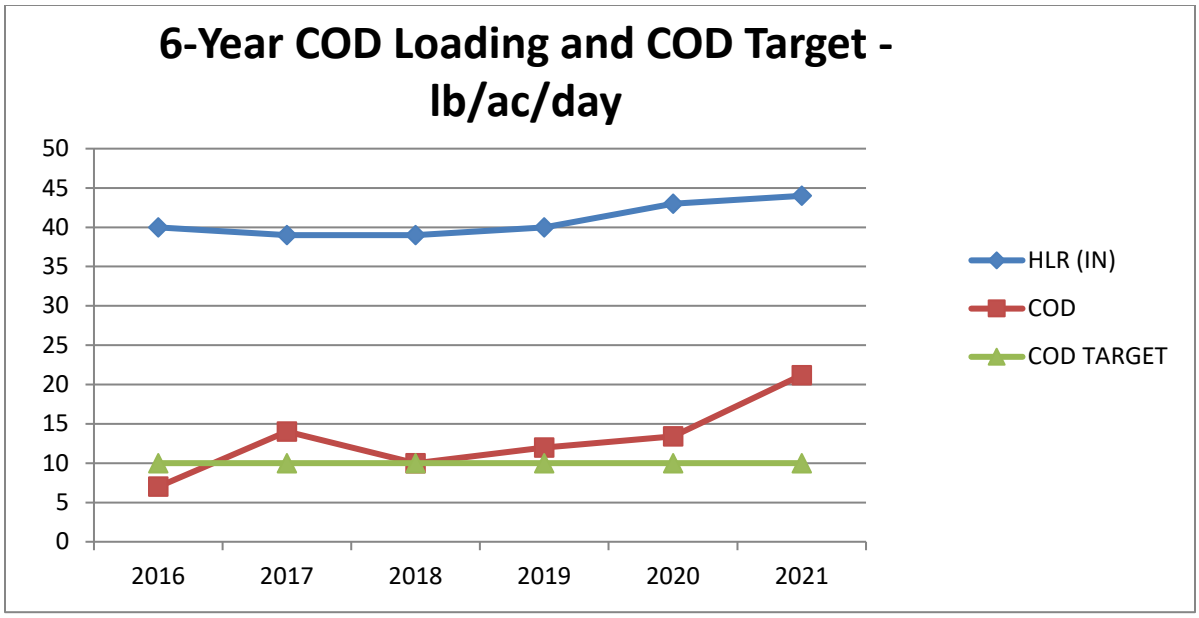


Figure 7. 6-year COD Loading and COD Target in lbs per acre, compared to hydraulic loading

Nitrogen loading is limited to150% of typical crop uptake calculated separately for each management unit. Nitrogen loading is below the three-year median crop uptake each year, but has been above the permittee's target value for the last five reporting periods.

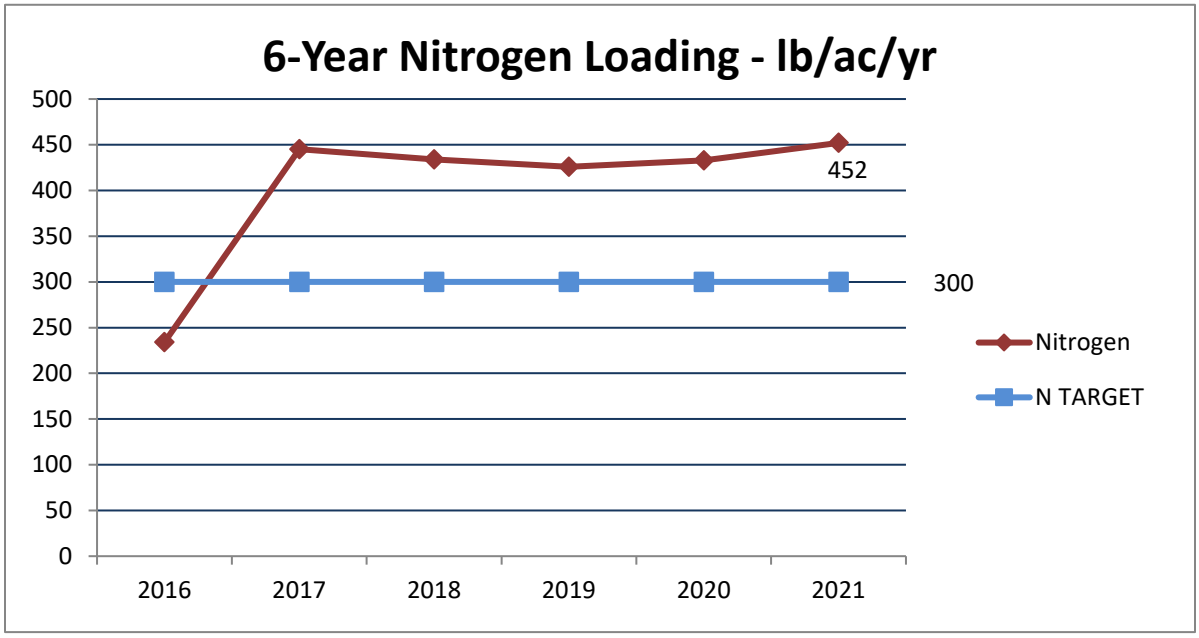


Figure 8. 6-year Nitrogen Loading Rates compared to the Target Loading Rate

5 Site Management

5.1.1 Buffer Zones

Compliance Activity CA-039-01 in the draft permit requires an updated Buffer Zone Management Plan. The management units are located in a rural area off of publicly accessible roads, so restrictive buffer zones are not required for the facility. Engineered buffer zone mitigation strategies have been employed to maintain the permit buffer zone requirements.

5.1.2 Runoff

A Runoff Management Plan will be required in the new permit. Recycled water applied to the land surface must be restricted to the permitted management units. The facility does not currently have discharges to surface waters. Wastewater discharges to surface water that require a permit under the Clean Water Act must be authorized by the appropriate permitting authority.

5.1.3 Seepage Rate Testing

The facility does not use storage lagoons.

5.1.4 Waste Solids, Sludge, and Solid Waste

A separate Waste Solids Management Plan will not be required, since any waste solids generated are covered under the approved plan for the adjacent BAPCI (Basic American Potato Company Incorporated) facility, under the same management. Potato waste solids are sent off site as cattle feed and are managed under an approved plan. Tare dirt and silt is generally applied to field corners. The facility does not generate sludge, or solid waste as part of the reuse activities.

5.1.5 Nuisance Odors

A Nuisance Odor Management Plan will be required in the new permit. The facility received odor complaints from a residence in March and October 2021, for their land application operations. BAF had raw material issues that caused an organic overload in the treatment plant. A current odor plan should provide operators with instructions on how to document and respond to odor complaints.

5.1.6 Cropping Plan

A Cropping Plan will be required in the draft permit. An analysis of crop yield is listed in Section 6.1.5 below.

5.1.7 Grazing

Grazing is not proposed for the site, and submittal of a grazing management plan is not necessary as a new permit requirement. If grazing is considered, the facility must submit a Grazing Management Plan to DEQ for review.

5.1.8 Salts

Excessive salt loading can be a deterrent to crop growth, but has not been identified as an issue on the reuse management units. Submittal of a salt loading management plan is not necessary as a new permit requirement.

6 Monitoring

6.1.1 Recycled Water Monitoring

Draft permit Section 5.1.1 includes the following recycled water monitoring requirements, total nitrogen, total phosphorus, chemical oxygen demand (COD), electrical conductivity, pH, sulfate, and non-volatile dissolved solids. Total applied recycled water volumes will be reported for each management unit, by month, compiled annually.

6.1.2 Supplemental Irrigation Water and Monitoring

The BAF Blackfoot facility uses the Dubois Canal as their supplemental irrigation water source (SW-039-01). BAF has 1,274 shares from both the Peoples Canal and the Dubois Canal (18,461 ac-ft. – 6,016 MG/yr.). Sufficient water rights are available to meet the irrigation water requirements on the management units. The canal passes under Bond Road, just south of the east lateral field, flowing west to the sampling point, and then to the pump station, the pipeline connection includes a backflow device to ensure proper backflow prevention.

Field managers optimize crop health and production with respect to the nutrients supplied by process water and supplemental irrigation water. Irrigation water must be applied at times and in volumes to match crop needs. The permit requires that BAF calculate the irrigation water requirement on a monthly basis during the growing season. Supplemental irrigation water will be sampled twice during the permit cycle for total nitrogen, total phosphorus, and NVDS.

6.1.3 Ground Water Monitoring

Some monitoring wells show extremely stable ground water elevations that vary less than 2 tenths of a foot over the year. However, some wells show depth to water varying between 60 feet and 80 feet below ground surface. The variability is likely due to seasonality, which can be influenced by canal seepage when the canals are full, and inversely by irrigation wells which can draw down ground water elevations in the area. The reported field parameter measurements for the wells sampled indicate that sampling is being conducted according to an established sampling plan. Domestic wells were not sampled, due to receiving no requests from neighbors.

6.1.4 Soil Monitoring

Soil monitoring has been completed each year according to the permit and is reported in the annual reports. Soil monitoring is completed primarily for nutrient management purposes to assess soil quality and determine whether supplemental fertilizers are needed.

Soil management units are monitored in the spring and fall. Soil nitrate-nitrogen spring samples were within the 'low" to 'medium' range (0-15 ppm) for all fields at all depths except for high samples at all depths of the North Flood, with values of 15,16, and 20 ppm. Nitrate levels decreased with the increasing depth in the soil profile in the spring sampling event. Fall sampling for the West 28 location doubled, but were still in the low to medium range.

Nitrate-nitrogen levels across the management units continue to be on the low side for both sampling events, which has been a consistent trend since the installation and operation of the Advanced Waste Treatment system.

BAF will continue to use a soil consultant testing firm to collect and discuss the sampling data because the enhanced soil fertility analysis skills have enabled BAF to better plan for any required soil amendment needs.

Constituent	Low	Medium	High	Excessive
Nitrate-N (mg/Kg)	<10	10-20	20-30	>30
Phosphorus (mg/Kg)	<10	10-20	20-40	>40
Soluble Salts (mg/Kg)	<1.0	1-2	2-4	>4

Source: Soil Test Interpretation Guide: Oregon State University Extension Service. 1996. Soil Test Interpretations, Guide A

Figure 9. Soil test interpretation for crop production, Table 2-11 from the permit application

Phosphorus levels are in the excessive range for most site soils. Phosphorus levels in the one-foot soil depth are the most concentrated; the lower depths show that applied phosphorus is being used by the crops. The facility reports applying fertilizer in the past with only nitrogen content, listed with the formula 46-parts nitrogen, 0-parts phosphorus, and 0-parts potassium (46-0-0), meaning that no additional phosphorus was applied as fertilizer, in agreement with DEQ's recommendation to all facilities, that they use low phosphorus fertilizer on any fields with high phosphorus content.

Overall, the site soils do not appear to be increasing in constituent concentrations to a point that would hinder crop growth. With increased recycled water application, and attention to crop management the site should be able to maintain acceptable crop yields.

6.1.5 Crop Yield and Tissue Monitoring

BAF will sample crop yield and crop tissue during each harvest, reporting, TKN, nitrate-N, phosphorous, ash content, and moisture content when the crop is removed. The facility reports alfalfa as the primary crop, but additional crops may be rotated in as the needed to maintain healthy crop production.

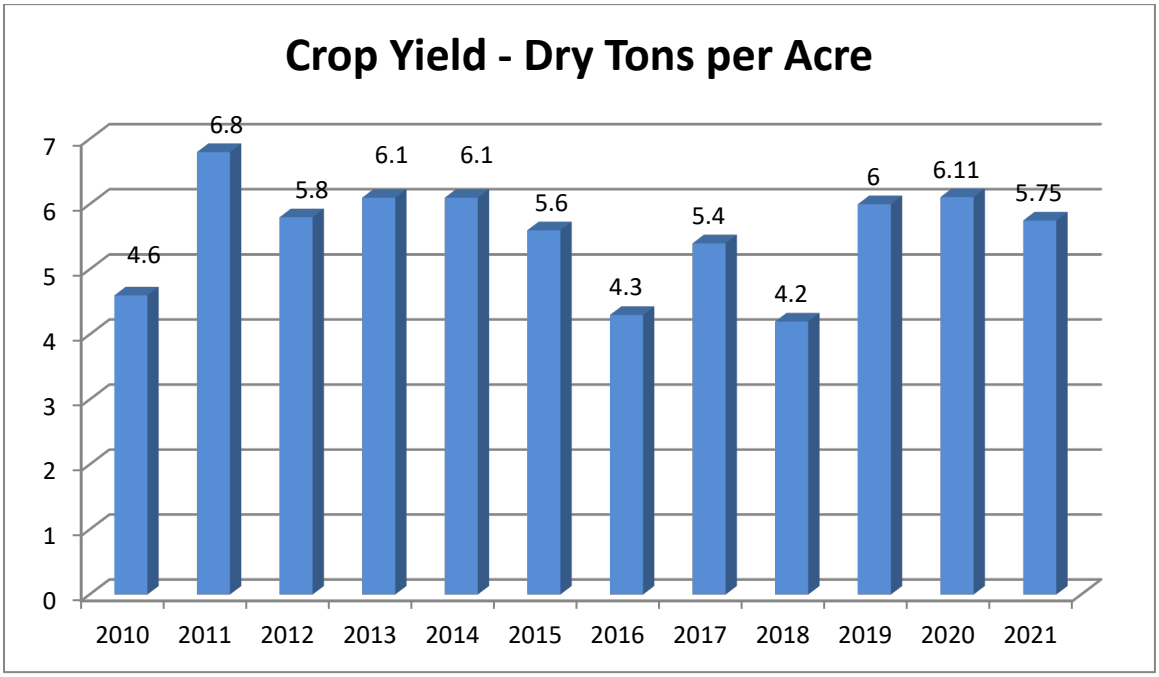


Figure 10. Crop Yield Chart from 2010 to 2021

Nitrogen removal is reported as 490 lb per acre in the 2020-2021 annual report, which is higher than the three-year median value of 472 lb per acre. The facility reports a nitrogen loading rate of 452 lb per acre, which is within the permit limit of 708 lb per acre, but above their target loading rate of <300 lb nitrogen per acre. Supplemental fertilizer was not applied.

6.1.6 Calculation Methodologies

BAF provides example calculations for crop tissue monitoring in each annual report, and provides copies of the lab sheets for DEQ to use to verify calculation methods and crop nutrient uptake. Crop uptake is carefully tracked across all management units, and crop yields are typical for area harvests. A contract farmer is employed to harvest crops from the reuse sites.

7 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) is a written document outlining the procedures used by the permittee to ensure the data collected and analyzed meets the requirements of the permit.

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

The QAPP is a permit requirement and must be submitted to DEQ as a stand-alone document for review and acceptance. The QAPP is used to assist the permittee in planning for the collection, analysis, and reporting of all monitoring data in support of the reuse permit and explaining data anomalies when they occur.

DEQ does not approve QAPPs, but reviews them to determine if the minimum EPA guideline requirements are met and that the reuse permit requirements are satisfied. The reason DEQ does not approve QAPPs is that the responsibility for validation of the facility sampling data lies with the permittee's quality assurance officer and not with DEQ.

The format of the QAPP should adhere to the recommendations and references in 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*.

The facility QAPP, required by compliance activity CA-039-03 in Permit I-039-03 was accepted by DEQ on June 24, 2021.

8 Site Operation and Maintenance

The Basic American Foods, Blackfoot facility is an industrial recycled water facility. The facility will be required to keep their Plan of Operation current for facility operations and maintenance.

The facility is not required to have a licensed operator for the system at this time.

Maintenance will be performed by the facility operators. Third-party cropping and farming operations are conducted under the supervision of the BAF Blackfoot facility management.

9 Compliance Activities

This section provides a summary and status of the compliance activities in Permit I-039-03, and a list of the compliance activities required in Draft Permit I-039-04.

9.1.1 Status of Compliance Activities in Permit I-039-03

1. CA-039-01, The permittee is required to update the facility Plan of Operation, which will include updates to all the facility management plans.

Status: The Plan of Operation was approved on May 3, 2022.
Management plan updates will be required in Permit I-039-04.

2. CA-039-02, The permittee will complete a Monitoring Well Network Analysis of the current monitoring wells on site, to ensure that all wells provide sufficient samples, according to the permit requirements.

Status: Complete.

3. CA-036-03, The permittee shall prepare and implement a QAPP that incorporates all monitoring and reporting required.

Status: Complete. The QAPP acceptance letter was sent June 24, 2021.

4. CA-036-04, The permittee will be required to schedule a Pre-Application Conference, 12 months prior to permit expiration.

Status: Complete

5. CA-036-05, The permittee will be required to submit a complete Permit Application Package to DEQ, 180 days prior to permit expiration.

Status: Complete.

9.1.2 Compliance Activities Required in Permit I-039-04

The following Compliance Activities are specified in the draft permit:

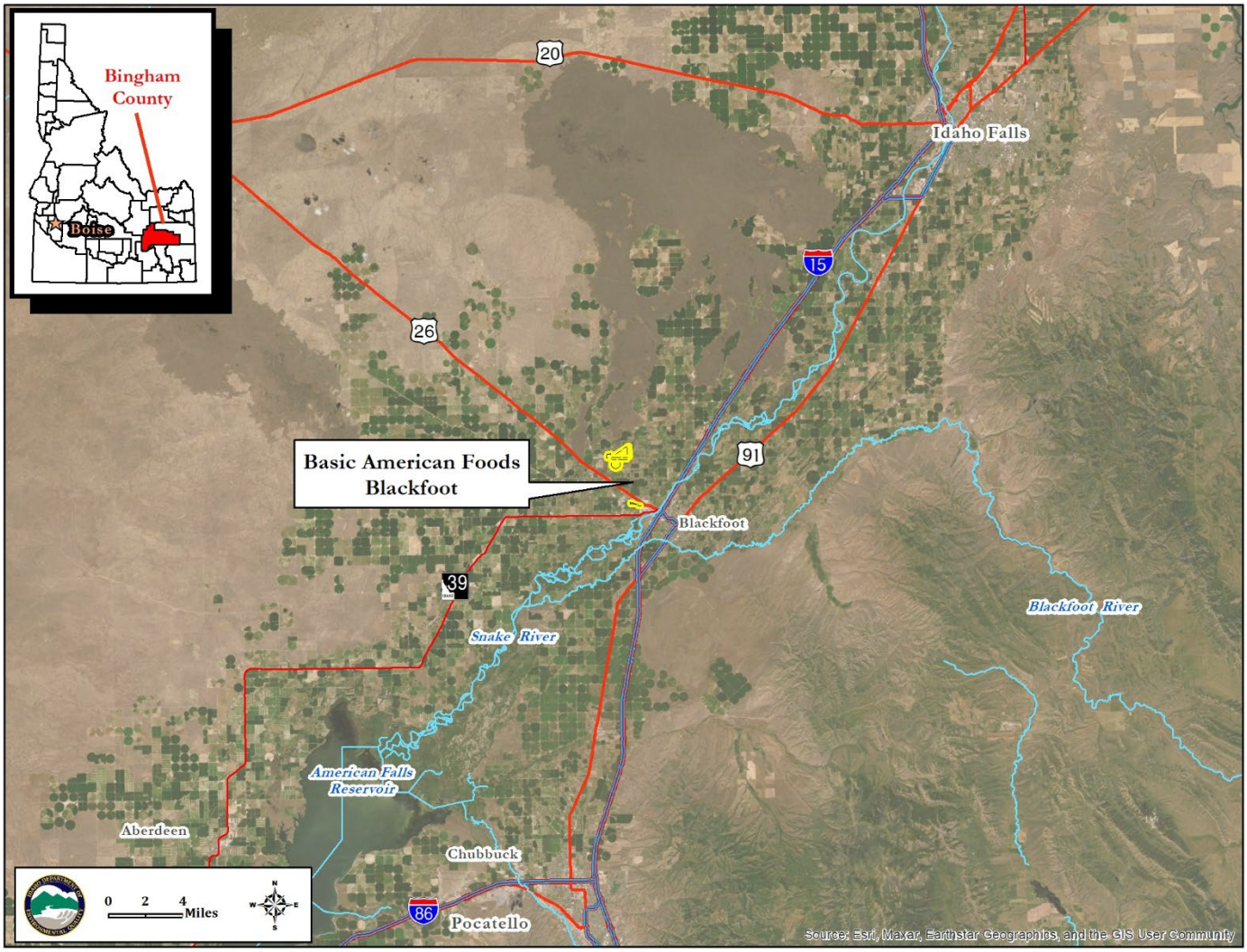
1. CA-039-01, The permittee must update the facility management plans where needed.
2. CA-036-02, The permittee will be required to schedule a Pre-Application Conference, 12 months prior to permit expiration.
3. CA-036-03, The permittee will be required to submit a complete Permit Application Package to DEQ, 180 days prior to permit expiration

10 Recommendations

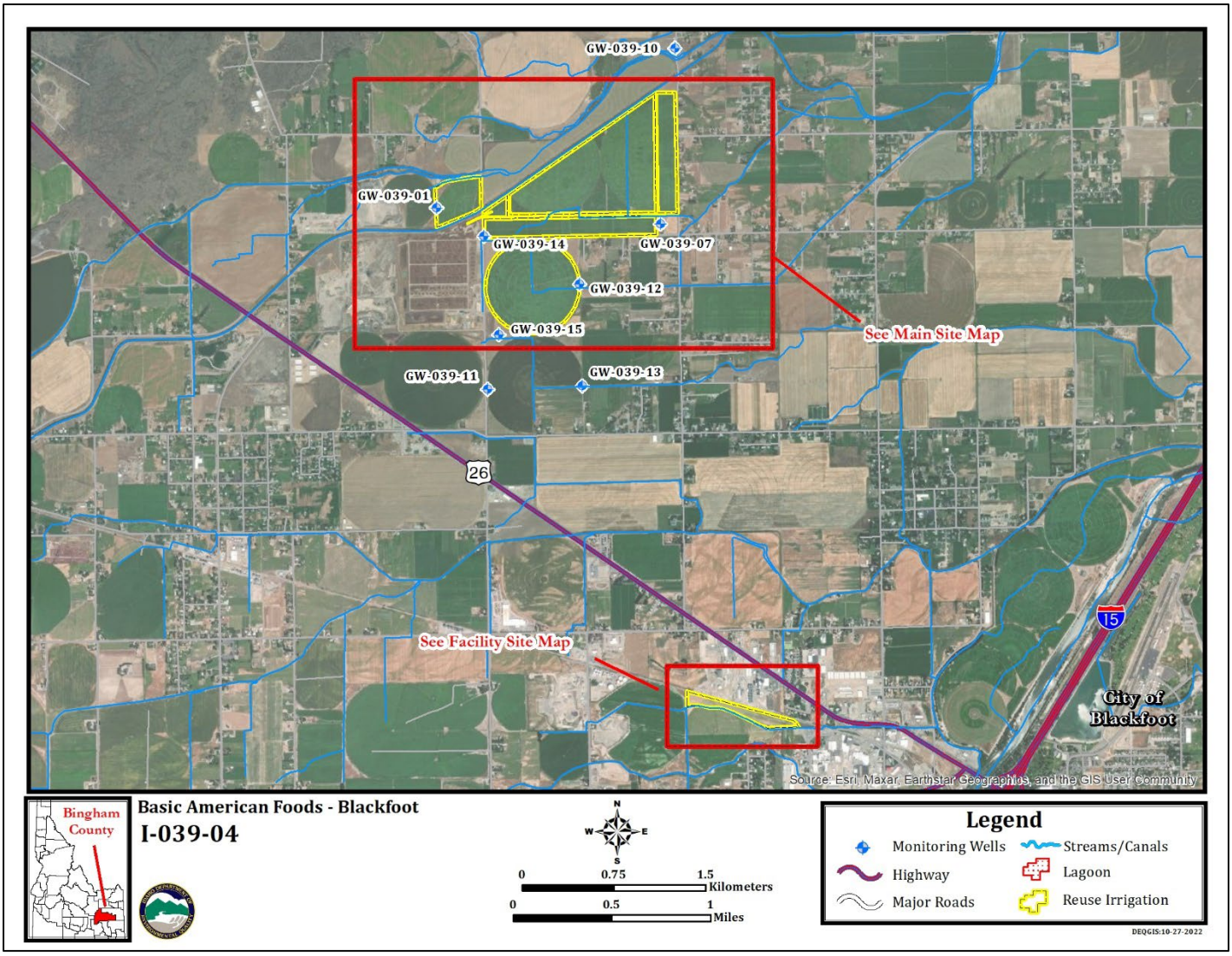
Staff recommends draft Reuse Permit I-039-04 be issued for a period of 7 years. The permit specifies hydraulic and constituent loading limits and establishes monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance.

Appendix A. Site Maps

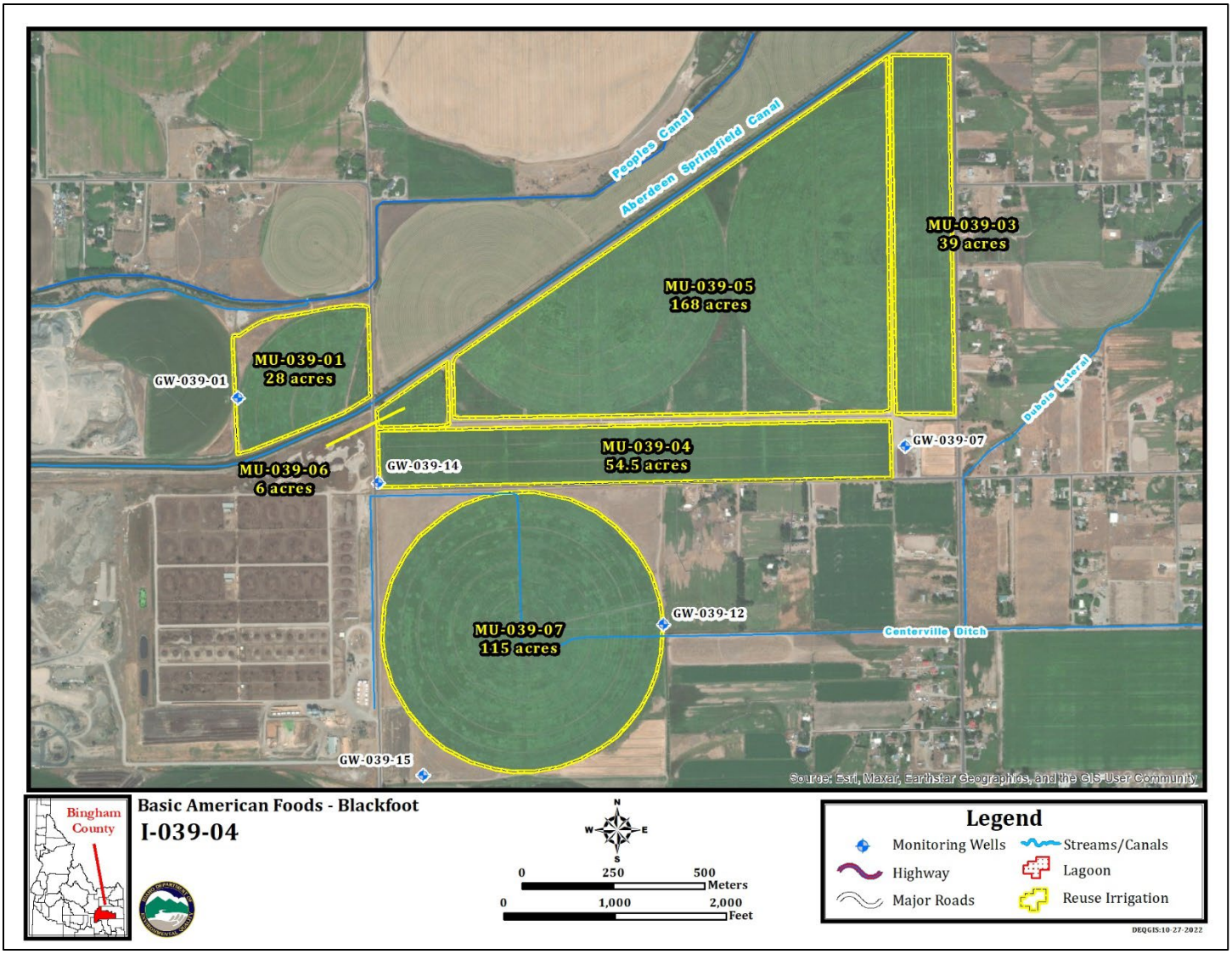
Appendix A, Figure 1. Regional Map, showing the reuse facility in relation to major surrounding features such as cities, water bodies, highways and roads, county boundaries, state boundaries, etc.



Appendix A, Figure 2. Facility Map showing the layout of the reuse site management units.



Appendix A, Figure 3. Basic American Foods – Management Units



Appendix A, Figure 4. Basic American Foods – Facility Site, for emergency use only.

