IDAHO FALLS

CITY COUNCIL AGENDA

City of Idaho Falls
Regular City Council Meeting
680 Park Avenue

Thursday

April 25, 2024

7:30 p.m.

Mayor

Rebecca Casper

City Council

Lisa Burtenshaw Council President	Michelle Ziel-Dingman Council Seat 1
John Radford Council Seat 5	Jim Francis Council Seat 4
Jim Freeman Council Seat 6	Kirk Larsen Council Seat 3

Livestream at www.idahofallsidaho.gov/429/Live-Stream

PUBLIC PARTICIPATION

Welcome to the Idaho Falls City Council Meeting.

Regularly scheduled City Council meetings are open to the general public. City Council meetings are also live-streamed and archived on the City website. Please be aware that the meeting agenda will differ from the published version if amendments to the agenda are made by the Council during the meeting.

The Council encourages public input. While a general public comment option is not required by Idaho law, the Idaho Falls City Council welcomes general public input as part of regular City Council meetings. General public comment will be allowed for up to 20 minutes. However, citizens are always welcome to contact their Council representatives via e-mail or telephone, as listed on the City website. The Council is committed to an atmosphere that promotes equal opportunity, civility, mutual respect, proper decorum and freedom from discrimination or harassment.

Those who wish to address City Council during the council meetings are encouraged to adhere to the guidelines below.

Public Comment Guidelines

Speakers are encouraged to:

- State their name and city of residence.
- Focus comments on matters within the purview of the City Council.
- Limit comments to three (3) minutes or less.
- Refrain from repeating information already presented to preserve time for others to speak. Large groups are encouraged to select one or two speakers to represent the voice of the entire group.
- Practice civility and courtesy. City leaders have the right and the responsibility to maintain order and decorum during the meeting. Time may be curtailed for those speakers whose comments are profane or disruptive in nature.
- Refrain from comments on issues involving matters currently pending before the City's Planning and Zoning Commission or other matters that require legal due process, including public hearings, City enforcement actions, and pending City personnel disciplinary matters.
- Comments that pertain to activities or performance of individual City employees should be shared directly with the City's Human Resources Director (208-612-8248), the City's Legal Department (208-612-8178) or with the Office of the Mayor (208-612-8235).

Public Hearing Guidelines

- In-person Comment. Because public hearings must follow various procedures required by law, please wait to offer your comments until comment is invited/indicated. Please address comments directly to the Council and try to limit them to three (3) minutes.
- Written Comment. The public may provide written comments via postal mail sent to City Hall or via email sent to the City Clerk at IFClerk@idahofalls.gov. Comments will be distributed to the members of the Council and become a part of the official public hearing record. Written testimony must be received no later than forty-eight (48) hours prior to the date of the hearing to ensure inclusion in the permanent City record.
- Remote Comment. When available, the public may provide live testimony remotely via the WebEx meeting platform using a phone or a computer. Those desiring public hearing access should send a valid and accurate email address to virtualattend@idahofalls.gov no later than twenty-four (24) hours prior to the date of the hearing so log-in information can be sent prior to the meeting. Please indicate which public hearing the testimony is intended for on the agenda. Please note that this remote option will not be available for all meetings.

If communication aids, services, or other physical accommodations are needed to facilitate participation or access for this meeting, please contact the City Clerk at (208) 612-8414 or the ADA Coordinator at (208) 612-8323 not less than 48 hours prior to the meeting. They will help accommodate special needs wherever possible.

680 Park Avenue
Idaho Falls, ID 83402

City Council Meeting

Agenda

Thursday, April 25, 2024 **7:30 PM** **City Council Chambers**

City Council Agenda:

1. **Call to Order.**

2. **Pledge of Allegiance.**

3. **Public Comment.**

   Please see guidelines above.

4. **Consent Agenda.**

   Any Consent Agenda item may be moved to the Regular Agenda for separate consideration if requested by a Council member. Other changes to this agenda may require the approval of a majority of Council.

   A. **Municipal Services**

      1) Purchase of Replacement Mower for Parks and Recreation Department **24-206**

      Attachments: Quote for Replacement Mower for Parks and Recreation

      2) Treasurer’s Report for February 2024 **24-209**

      Attachments: Treasurer's Report for February 2024

   Office of the City Clerk

      1) Minutes from Council Meetings **24-207**

      Attachments: 2024 0411 City Council Meeting - Unapproved

      2) License Applications, all carrying the required approvals

   Action Item:

   Approve, accept, or receive all items on the Consent Agenda according to the recommendations presented (or take other action deemed appropriate).

5. **Regular Agenda.**

   A. **Municipal Services**

      1) American Rescue Plan Act (ARPA) Committee Recommendations **24-201**

      The American Rescue Plan Act provides funding to support response to and recovery from the COVID-19 public health emergency and ensures governments have the resources essential to making investments that support long-term growth in areas of public health, public sector revenue, water, sewer, and broadband infrastructure. The committee recommends the funding of projects from the Fire, Police, Municipal Services, Parks & Recreation, Community Development Services and Public Works as presented during the Monday, April 22, 2024, City Council work session.

Action Item:
Accept and approve the American Rescue Plan Act committee recommendations for a total of $3,705,936.48 (or take other action deemed appropriate).

Attachments:	ARPA Second Round Presentation Work Session 4-22-24
	LF Initial Review for ARPA 2nd round application list
	ARPA 2nd Round Committee Recommendations for Funding

B. Public Works

1) Wastewater Facilities Planning Study **24-203**

In late 2022, the City retained Stantec Consulting Services Inc., and Keller Associates Inc., to conduct a Wastewater Facilities Planning Study. The Study identified capital improvement needs and proposed suggestions for efficient management of the utility spanning a 20-year period. The Study was also submitted to the Idaho Department of Environmental Quality for review.

Findings of the Wastewater Facilities Planning Study were presented to the City Council on March 11, 2024. A public meeting regarding the Study was held on April 3, 2024, and public comments were solicited between March 27 and April 10, 2024. No public comments were received, and staff recommends acceptance of the plan and adoption of the recommendations made therein.

Action Item:
Accept the Wastewater Facilities Planning Study and adopt the recommendations made therein (or take other action deemed appropriate).

Attachments: 4.13.2024_Idaho Falls WWFPS Final City Approval

2) Bid Rejection - Water Service Line Replacement (1st Street & Lincoln Road) **24-204**

On Tuesday, April 16, 2024, bids were received and opened for the Water Service Line Replacement (1st Street & Lincoln Road) project. A tabulation of bid results is attached.

The only bid received was for $1,201,894.50 which is 252% of the engineer’s estimate. Public Works staff reviewed the bid and concluded that awarding this contract is not in the best interest of the city.

Action Item:
Reject the single bid received from Knife River Corporation for the Water Service Line Replacement (1st Street & Lincoln Road), find that these services can be best procured on the open market, and direct staff to solicit the work on the open market (or take other action deemed appropriate).

Attachments: Bid Tab Water Service Line Replacement WTR-2024-18

3) State Local Agreement and Resolution with the Idaho Transportation Department (ITD) for the Elm Street - Yellowstone to South Boulevard Project. **24-205**

Attached for your consideration is a State/Local Agreement for development and a Resolution with ITD for the Elm Street-Yellowstone to South Boulevard project. The proposed project involves reconstructing Elm Street between Yellowstone and South Boulevard.

Action Item:
Approve the State/Local Agreement and Resolution with ITD for the Elm Street-Yellowstone to South Boulevard Project-and authorize the Mayor and City Clerk to sign the documents (or take other action deemed appropriate).

Attachments: 23023 SLA PD Elm Street

6. Announcements.

7. Executive Session

The Executive Session is being called pursuant to the provisions of Idaho Code Section 74-206 (1)(f) to communicate with legal councel for the public agency to discuss the legal ramifications of and legal options for pending litigation, or controversies not yet being litigated, but imminently likely to be litigated. The Council will not reconvene in an open session after the executive session.

8. Adjournment.

Memorandum

File #: 24-206 **City Council Meeting**

FROM: Pam Alexander, Municipal Services Director
DATE: Thursday, April 18, 2024
DEPARTMENT: Municipal Services

Subject

Purchase of Replacement Mower for Parks and Recreation Department

Council Action Desired

☐ Ordinance ☐ Resolution ☐ Public Hearing

☒ Other Action (Approval, Authorization, Ratification, etc.)

Accept and approve the purchase of one Groundsmaster 4000-D (T4) from the Sourcewell cooperative purchasing contract #031121-TTC from Turf Equipment & Irrigation, Inc. for a total of $87,269.52 (or take other action deemed appropriate).

Description, Background Information & Purpose

This purchase will replace unit 2036 that has reached its useful life and is scheduled for replacement.

Alignment with City & Department Planning Objectives

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

The purchase of the mower supports the reliable public infrastructure and transportation community-oriented result by acquiring equipment that is scheduled for replacement.

Interdepartmental Coordination

Parks and Recreation concurs with the contract award.

Fiscal Impact

Sufficient funding is available within the 2023/24 Parks and Recreation, Parks Maintenance capital budget.

Legal Review

The Legal Department concurs that the Council action complies with State Statute.

Proposal Date: 2024-04-10
Expiration Date: 2024-05-13
Quote ID: Q156421

Turf Equipment & Irrigation, Inc.
1630 S. Gladiola St. SLC, UT 84104
P.O. Box 26903 SLC, UT 84126-0903
(801) 566-3256

Tyler Smith
Parks Assistant Superintendent
City of Idaho Falls Parks

Prepared by:
Austin Petterborg
Commercial Sales
+1 2083514346
austin.petterborg@turfequip.com

Sourcewell Pricing

Toro Sourcewell Contract #031121-TTC
Idaho Falls City Member ID# 24221

All pricing is subject to change at the time of delivery.
Availability and time of delivery may vary; please check when placing the order.

Qty	Model #	Name	MSRP	Sourcewell
1	**30609**	**Groundsmaster 4000-D (T4)**	**$111,884.00**	**$87,269.52**
			Equipment Total:	**$87,269.52**

Does not include Sales Tax, Use Tax, or Personal Property Tax
Credit Card Payments will incur an additional 3.00% Fee

Memorandum

File #: 24-209 **City Council Meeting**

FROM: Mark Hagedorn, City Treasurer
DATE: Thursday, April 18, 2024
DEPARTMENT: Municipal Services

Subject

Treasurer's Report for February 2024

Council Action Desired

☐ Ordinance ☐ Resolution ☐ Public Hearing
☒ Other Action (Approval, Authorization, Ratification, etc.)

Accept and approve the Treasurer's Report for the month-ending February 2024 or take other action deemed appropriate.

Description, Background Information & Purpose

A monthly Treasurer's Report is required for City Council review and approval pursuant to Idaho Statutes Title 50-208(1). The attached document is the Treasurer's report for February 2024.

For the month-ending February 2024, cash and investments total $191.4M. Total fiscal year to date receipts received and reconciled to the general ledger were reported at $118.3M, which includes revenues of $53.8M for charges for services and taxes and intergovernmental revenues of $44.4M. Total fiscal year to date distributions reconciled to the general ledger were reported at $85.6M, which includes salary and benefits of $31.9M and operating costs of $39.6M.

Alignment with City & Department Planning Objectives

☐ ☒ ☐ ☐ ☐ ☐ ☐ ☐

The monthly Treasurer's Report supports the good governance community-oriented result by providing sound fiscal management and enable trust and transparency.

Interdepartmental Coordination

N/A

Fiscal Impact

N/A

Legal Review
N/A

IDAHO FALLS

City of Idaho Falls

Treasurers Report

February 29, 2024

Table of Contents

Prepared BY:	Mark Hagedorn, City Treasurer

City of Idaho Falls
Bank Reconciliation Summary
February 29, 2024

Account By Institution:	Beginning Bank Balances	Deposits	Withdrawals	Ending Bank Balances
Mountain West- Workers Comp	$ 100,000	$ -	$ -	$ 100,000
Bank of Idaho 8013	2,000,000	13,606,838	(13,606,838)	2,000,000
Bank of Idaho 1952	2,771,763	51,125	-	2,822,888
Bank of Idaho 2720	2,000,000	6,370,602	(6,370,602)	2,000,000
Bank of Idaho 2746	-	6,386,284	(6,386,284)	-
Bank of Idaho 2845	3,069,217	13,088,922	(13,743,003)	2,415,136
Bank of Idaho 2886	1,827,589	23,639,026	(24,333,917)	1,132,697
Frontier Bank 0590	500	-	-	500
Wells Fargo 0017	5,556,436	23,302,781	(28,744,372)	114,846
Wells Fargo 0962	-	-	-	-
Wells Fargo 4394	-	1,097,926	(1,097,926)	-
Wells Fargo 7687	-	583,269	(583,269)	-
Investment Portfolio	181,132,406	21,297,716	(12,644,264)	189,785,858
Total Financial Institution Balances	**$ 198,457,412**	**$ 109,424,488**	**$ (107,510,475)**	**$ 200,371,925**

Reconciling Items	Beginning	Deposits	Withdrawals / Market Value	Ending
Current Reconciling Items	$ (16,840,484)	$ 7,031,959	$ 723,461	$ (9,085,064)
Next Month's Reconiling Items				91,018
Total Reconciled Balances	**$ 181,616,928**	**$ 116,456,447**	**$ (106,787,014)**	**$ 191,377,879**

General Accounting Ledger	Beginning Ledger Balances	Debits	Credits	Ending Ledger Balances
Cash (Accounts 101 and 102)	$ 108,369,193	$ 32,715,083	$ (22,941,369)	$ 118,142,907
Designated/Restricted Cash (106 and 107)	57,504,049	50,415	(318,117)	57,236,347
MERF Cash (105)	16,889,345	431,271	(1,321,992)	15,998,625
				-
Total General Ledger Balances	**$ 182,762,587**	**$ 33,196,769**	**$ (24,581,477)**	**$ 191,377,879**

IDAHO FALLS

Summary of Cash by Fund and Year

#	FUND	Feb-21	Feb-22	Feb-23	Feb-24
1	GENERAL	17,876,945	29,000,880	31,162,254	32,915,424
10	STREET	5,011,788	5,138,196	9,170,603	12,607,504
11	RECREATION	(61,328)	717,040	318,607	372,044
12	LIBRARY	4,386,554	4,493,806	4,604,766	4,564,166
13	AIRPORT PFC/CFC FUND	-	988,967	2,046,052	2,851,029
14	MUNICIPAL EQUIP. REPLCMT.	5,318,655	99,302	-	-
15	EL. LT. WEATHERIZATION FD	3,579,618	3,766,419	-	-
16	BUSINESS IMPRV. DISTRICT	96,239	107,222	92,813	44,650
18	GOLF	(780,434)	(585,122)	(437,666)	(473,990)
19	RISK MANAGEMENT	3,209,449	3,725,385	4,051,035	4,330,790
20	SELF-INSURANCE FD.	4,625,207	4,593,608	4,537,231	4,675,253
21	AIRPORT CFC		-	-	453,163
23	EMERGENCY MEDICAL SERVICES	(1,502,008)	(572,181)	1,274,541	2,577,609
24	WILDLAND	868,071	815,791	870,745	941,631
32	POLICE IMPACT FEES	-	-	76,344	564,659
33	FIRE IMPACT FEES	-	-	22,660	342,254
34	PARKS IMPACT FEES	-	-	51,266	847,078
35	STREETS IMPACT FEES	-	-	289,387	2,431,966
41	MUNICIPAL CAPITAL IMP.	2,558,386	2,596,605	2,752,870	3,105,216
42	STREET CAPITAL IMPROVEMENT	921,567	898,275	961,972	4,411,447
43	BRIDGE & ARTERIAL STREET	967,441	869,467	1,008,769	1,340,456
45	SURFACE DRAINAGE	231,463	192,212	163,346	671
46	TRAFFIC LIGHT CAPITAL IMPRV.	1,087,130	1,285,033	1,248,091	1,421,416
47	PARKS CAPITAL IMPROVEMENT	2,638	60,436	(164,991)	(151,178)
49	ZOO CAPITAL IMPROVEMENT	296,836	432,555	520,181	758,642
50	CIVIC AUDITORIUM CAPITAL IMP.	204,423	203,095	204,062	214,248
51	GOLF CAPITAL IMP.	319,887	538,897	157,705	173,060
52	POLICE CAPITAL IMPROVEMENT	1,000	1,230	(540,302)	(710,852)
60	AIRPORT	1,656,590	28,425	(1,630,439)	(1,217,198)
61	WATER	14,068,705	17,675,112	20,018,143	25,007,460
62	SANITATION	5,374,874	5,927,147	6,201,184	7,091,128
64	IDAHO FALLS POWER	51,743,806	39,901,981	53,942,417	51,723,313
67	FIBER	340,151	1,120,815	461,191	1,045,049
68	WASTEWATER	26,348,954	29,460,596	28,148,769	27,119,772
	TOTAL	**148,752,605**	**153,481,195**	**171,583,607**	**191,377,879**

City of Idaho Falls
Monthly Revenue and Expense Summary
February 29, 2024

Revenue

Fund Type	Taxes / Intergovernmental	Charges for Services	Permits / Fees	Interest	Other Financing Sources	Total	Budget	%
General Fund	$ 28,227,298	$ 804,681	$ 1,001,380	$ 535,297	$ 1,291,244	**$ 31,859,900**	$ 72,440,631	**43.98%**
Special Revenue Funds	8,756,438	1,895,131	6,150	495,639	3,068,499	**$ 14,221,856**	$ 32,228,418	**44.13%**
Internal Service Funds	-	-	-	243,264	1,500,887	**$ 1,744,151**	$ 3,180,000	**54.85%**
Impact Fee Funds	-	-	2,358,349	70,848	-	**$ 2,429,197**	$ 3,225,353	**75.32%**
Capital Improvement Funds	4,564,921	110,346	-	190,568	4,158,993	**$ 9,024,828**	$ 15,554,624	**58.02%**
Enterprise Funds	2,874,170	51,037,983	-	3,117,649	2,019,369	**$ 59,049,171**	$ 152,957,171	**38.61%**
Total	$ 44,422,827	$ 53,848,141	$ 3,365,879	$ 4,653,266	$ 12,038,991	**$ 118,329,103**	$ 279,586,197	**42.32%**

Expenditures

Fund Type	Personnel Cost	Operating Expense	Capital	Debt	Interfund	Total	Budget	%
General Fund	$ 18,559,014	$ 7,331,141	$ 2,414,291	$ -	$ (5,286,295)	**$ 23,018,151**	$ 73,690,110	**31.24%**
Special Revenue Funds	4,771,365	3,858,626	1,158,130	-	(36,707)	**9,751,415**	$ 36,895,269	**26.43%**
Internal Service Funds	32,426	987,609	-	-	-	**1,020,035**	$ 21,259,389	**4.80%**
Impact Fee Funds	-	-	854	-	-	**854**	$ 3,225,353	**0.03%**
Capital Improvement Funds	-	297,174	3,178,999	-	(31,233)	**3,444,939**	$ 18,417,911	**18.70%**
Enterprise Funds	8,629,219	27,163,939	11,853,531	1,314,336	(573,619)	**48,387,407**	$ 185,995,512	**26.02%**
Total	$ 31,992,025	$ 39,638,490	$ 18,605,804	$ 1,314,336	$ (5,927,854)	**$ 85,622,801**	$ 339,483,544	**25.22%**

City of Idaho Falls
Summary of Significant Adjustments
February 29, 2024

The transparency of financial adjustments is crucial for maintaining trust and accountability, particularly in the governmental sector. Financial adjustments refer to changes made to financial statements or records to correct errors, account for new information, or comply with accounting standards. Transparency in financial adjustments involves providing clear and comprehensive information about the nature, reasons, and impact of the adjustments. The Finance Division is committed to providing a high level of transparency with the adjustments made to budget line items and purchase orders. Budget and purchasing type adjustments do not require Council approval unless they create an authorization to spend above $75,000. Typically, budget adjustments are not considered authorizations to spend unless they add to the overall budget of the City or Department.

Significant Budget Adjustments

Correction of Errors

1. During budget preparation for fiscal year 2024, the Zoo was given $2,000,000 in budget towards their capital improvement fund, fund 49. This budget was mistakenly put into line item 7300 (Improvements other than buildings) instead of line 7200 (Buildings). The budget was moved to correct this.

2. During budget preparation for fiscal year 2024, $3,500,000 was budgeted in the Street Capital Improvement fund. It was mistakenly put into line 6400 (Work order transfers) instead of 7300 (Improvements other than buildings). A budget adjustment in this amount was made to correct this.

Reallocation of Budget

1. A budget adjustment in the amount of $1,280,000 was made to cover charges for Water's main waterline maintenance construction projects that will occur this summer of 2024. This amount was put into water's 8203-602-7300 account and taken from multiple different accounts throughout the Water division.

2. A budget adjustment was made to cover overage's for the Airport's budget. There were multiple immaterial adjustments, and one for $89,000 into 8001-601-6932 to cover credit card fees, and $108,040 taken out of Airport's miscellaneous account 8001-601-6900, distributed to multiple places within the Airport fund.

Memorandum

File #: 24-207 **City Council Meeting**

FROM: Corrin Wilde, City Clerk
DATE: Thursday, April 18, 2024
DEPARTMENT: Mayor's Office

Subject
Minutes from Council Meetings

Council Action Desired
☐ Ordinance ☐ Resolution ☐ Public Hearing
☒ Other Action (Approval, Authorization, Ratification, etc.)
Approve the Minutes from 11 April 2024.

Description, Background Information & Purpose
These are the 11 April 2024 City Council Meeting Minutes.

Alignment with City & Department Planning Objectives

☐ ☒ ☐ ☐ ☐ ☐ ☐ ☐

The Minutes support the Good Governance community-oriented result by providing assurance of regulatory and policy compliance to facilitate transparency and minimize and mitigate risk.

Interdepartmental Coordination
N/A

Fiscal Impact
N/A

Legal Review
N/A

680 Park Avenue
Idaho Falls, ID 83402

City Council Meeting
Minutes - Draft

Thursday, April 11, 2024, **7:30 PM** **City Council Chambers**

1. Call to Order

Present: Mayor Rebecca L Noah Casper, Council President Burtenshaw, Councilor Radford, Councilor Michelle Ziel-Dingman, Councilor Freeman, Councilor Francis; and Councilor Larsen

Also present:

All available Department Directors
Micheal Kirkham, City Attorney
Corrin Wilde, City Clerk

2. Pledge of Allegiance

Bear Prairie led those present in the Pledge of Allegiance.

3. Public Comment

No one appeared.

4. Consent Agenda

A. Idaho Falls Power.
1. Purchase and Sale Agreement with Andco Leasing LC.
Idaho Falls Power and Andco Leasing LC have agreed on a fifteen (15) foot utility easement for a gas, fiber, and power line. Council approved to Ratify the Purchase and Sale Agreement with Andco Leasing, LLC, dba Andco Leasing LC for a utility easement for the Peaking Plant for a total amount of $75,000.

B. Office of the City Clerk
1. Minutes from Council Meetings.
City Council Meeting March 28, 2024.
2. License Applications

It was moved by President Burtenshaw, seconded by Councilor Larsen to approve, accept, or receive all items on the Consent Agenda according to the recommendations presented. The motion was carried by the following vote: Aye – Councilors Larsen, Francis, Freeman, Dingman, Radford, Burtenshaw. Nay – None

5. Regular Agenda

A. Idaho Falls Power

1) IFP 24-20 Rack Substation and Lower Plant Decorative Wall.

IFP solicited bids for an eight (8) foot decorative, concrete wall with iron gates for the Lower Power Plant. The engineer's estimated cost was $72,225. IFP received one bid from the Castle Facility Group of Meridian, MS for $498,004. IFP recommends rejecting the bid and authorizing staff to procure the goods and services on the open market in accordance with Idaho Code § 67-2805(1)(e).

General Manager Bear Prairie explained that the proposed concrete wall closely resembles those found along Sunnyside Rd. Its primary purpose is to enhance security and protect our site, and it is considered the new industry standard for substations. Beyond functionality, this wall contributes to the visual appeal, adding beautification and character. GM Prairie states that as part of a larger project, they remain committed to beautifying and revitalizing the vicinity near the lower plant. Ongoing efforts include creating parking spaces and improving access to the nearby green belt. He says the sole bid received exceeded initial estimates, but he is confident that we can secure a revised bid that better aligns with our projections. GM Prairie points out that while they may not achieve the engineers' original estimates from two years ago due to market fluctuations, he anticipates a significantly improved cost. GM Prairie requests that the Council reject this bid and authorize seeking a lower price to bring back for approval.

Councilor Freeman pointed out that this Bid came in at nearly half a million dollars, and our estimated cost was under a hundred thousand dollars and is way out of the range that we expected to pay for this. Councilor Dingman agreed.

It was moved by Councilor Freeman, seconded by Councilor Dingman to reject the bid received from Castle Construction for Project No. IFP 24-20, that Council finds that it is impractical or impossible to obtain three (3) bids for the decorative wall project and direct the Mayor and City Staff to acquire the work on the open market from a qualified public works contractor. The motion was carried by the following vote: Aye – Councilors Francis, Dingman, Freeman, Larsen Radford, Burtenshaw. Nay – None

B. Municipal Services

1) Addition to Public Works Fleet - One 2024 Chevrolet 3500 HD Silverado.

This request is for an advanced purchase of a Public Works Water division vehicle to replace a pool vehicle the department has been renting for several years. This request was scheduled to come in FY24-25. However, the request to purchase this new fleet vehicle is being made early to take advantage of the vehicle's immediate availability, thus avoiding what has commonly become a year-long wait for service vehicles to be ordered and placed into inventory.

Director Alexander presented the agenda item for the Public Works Department. She says the auto industry has resumed vehicle production, including larger vehicles used by Public Works. We received a notification from Chevrolet about available trucks. The Public Works department has expressed a genuine need for a new truck. Currently, they rely on a borrowed vehicle and pay pull rates for its use. Originally, the replacement for this vehicle was scheduled for either this year or the following year. However, given this opportunity, they would like to proactively purchase the new truck as soon as it rolls off the assembly line. The intention is to allocate it for use in the water division. Public Works will adjust its capital funding to facilitate the acquisition of this vehicle before the start of the next fiscal year.

It was moved by Councilor Burtenshaw, seconded by Councilor Larsen to accept and approve the purchase of one 2024 Chevrolet 3500 HD Silverado from the State of Idaho purchasing contract SBPO18200325, from Smith Chevrolet for a total of $48,110.00. The motion carried by the following vote: Aye – Councilors Dingman, Burtenshaw, Francis, Freeman, Larsen, Radford. Nay -None.

C. Parks & Recreation

1) Approval of Playground Equipment for Parks and Recreation

Great Western is a division of GameTime, a Playcore Company, and a member of the OMNIA Partners purchasing cooperative contract 4003751. The total price for the playground equipment for 20th Street Park is $56,820.77 and $89,935.44 for South Capital Park. The Parks and Recreation Department conducted an online survey asking for the public's help in picking the next playground designs for Idaho Falls. More than 950 individuals from within the community contributed to the survey and these two playgrounds were the incontestable top choices.

Director Holm stated that these two playgrounds for consideration would be located at 20th Street Park and South Capital Park. Typically, they allocate funds in their budget to replace existing playgrounds in our community with updated, ADA-compliant playgrounds. They reached out to three different companies in our region for playground proposals and received a total of five options. This year, they embarked on a new approach by launching a community survey, facilitated by the Public Information Office, to gather input on the playgrounds. Over 950 community members participated, contributing to the decision-making process. Based on this input, they have decided to proceed with the two playgrounds that align with community preferences. Director Holm now seeks approval to move forward with the proposed quotes and finalize the purchase of these playgrounds.

Councilor Francis confirmed that these will replace existing playground equipment. Director Holm agreed that these will be replacing older non-compliant or dilapidated playgrounds that exist. Councilor Larsen asked if we are using a vendor that we are familiar with. Director Holm agreed that we do a lot of business with them in the range of approximately ten structures within our community including schools.

Council President Burtenshaw inquired about the wood chips surrounding the playground equipment and wanted to know if they were ADA-compliant. Director Holm confirmed that they are indeed ADA-compliant. However, he mentioned that they are less accessible than some other surfacing options. This feedback from the community has sparked conversations about the need for a more accessible playground and the distinction between ADA compliance and ADA accessibility.

Mayor Casper then asked for an example of a playground surface that is ADA-accessible. Director Holm explained that our community has two such examples. One is the all-access playground, which features a foam surface that is poured in place but is quite expensive. The other example typically uses tiles, although these tend to shift and split over time, posing a trip hazard. As a result, the decision has been made to use wood chips on the playground.

When Mayor Casper inquired about the number of playgrounds still on the non-compliant list, Director Holm clarified that we have approximately 5 years left to replace playgrounds at a rate of two per year. Some of the existing playgrounds are older and dilapidated, necessitating replacement. For instance, the playground at South Capital was originally installed in 1997, while the one at 20th Street Park dates back to 2001. Typically, a playground's lifespan is 20 to 25 years, but using a foamy surface would reduce that expectancy to around 10 years, as Mayor Casper pointed out, and Director Holm agreed.

It was moved by Councilor Francis, seconded by Councilor Dingman to accept, and approve the quotes to purchase playground equipment from Great Western Recreation for a total of $146,756.21. The motion was carried by the following vote: Aye – Councilors Freeman, Francis, Larsen, Radford, Burtenshaw, Dingman. Nay -None.

D. Public Works

1) 1635 1st Street Right-of-Way Plat.

For consideration is a Right-of-Way Plat for the northern portion of 1635 1st Street. The purpose of the plat is to transfer that portion of 1st Street shown in the plat as public right-of-way.

Director Fredericksen stated that this property is along 1st Street near to Walgreens and WinCo close to Woodruff Ave. The Plat intends to show the property that already exists for the roadway there and confirm that it is to be used as a public Right-of-Way.

It was moved by Councilor Larsen, seconded by Councilor Francis to accept the Right-of-Way Plat for 1635 1st Street and give authorization for Mayor and city staff to sign the document. The motion was carried by the following vote: Aye – Councilors Francis, Dingman, Freeman, Larsen, Radford, Burtenshaw.
Nay - None.

2) Development Agreement for City of Ammon, Riviera Park Subdivision.

Riviera Park Subdivision is a development within the City of Ammon adjacent to 25th East (Hitt Road) and north of Lincoln Road. The Agreement identifies developer responsibilities including the design and construction of road improvements for 25th East (Hitt Road). Specific requirements are covered within Exhibit B, Special Conditions of the Agreement.

Director Fredericksen presented a development agreement for Riviera Park Subdivision which is in the City of Ammon. The reason that this agreement is being presented for Council's consideration is that it is adjacent to 25th East (Hitt Road) and is immediately East of Costco. The development agreement, negotiated between city staff and the developer, outlines special conditions in Exhibit B. These conditions address Right of Way, Easement dedication, access points, street improvements (including illumination), and landscape maintenance. Director Fredericksen highlighted a significant dollar figure in Exhibit B. The developer has agreed to pay $99,250 in lieu of constructing lighting. The reason for this is that lighting already exists on the Western side, which would be extended along Costco. However, the development extends beyond our city boundary on the East side, and the lighting will not be able to be installed at this time. Councilor Francis wanted to clarify that we will be installing the lighting but they would have already paid for it. Director Fredericksen agreed. Councilor Francis also asked for clarification regarding the maintenance of the curb and gutter. Director Fredericksen explained that the street Right of Way is 114 feet wide and goes well beyond the sidewalk. The sidewalk is a public Right of Way that is maintained by the City of Idaho Falls. Landscape maintenance will be done by the developer on the East side of the roadway. Director Fredericksen explained that 25th East (Hitt Road) is the dividing line between the City of Idaho Falls and the City of Ammon and a lot of discussion has taken place regarding that over the years. It is difficult to maintain a roadway just to the center line so we have had an agreement with Ammon that the City of Idaho Falls will take the Right of Way and maintain the roadway and so as we see development on the East side of 25th East we always have a development agreement that is associated with that development and Ammon pays for half of the roadway and dedicates all the needed Right of Ways and easements associated with that as well.

It was moved by Councilor Larsen, seconded by Councilor Francis to approve the Riviera Park Subdivision Development Agreement and authorize the Mayor and City Clerk to sign the necessary documents. The motion was carried by the following vote: Aye – Councilors Dingman, Radford, Francis, Burtenshaw, Larsen, Freeman. Nay - None.

3) Professional Services Agreement with Atlas Technical Consultants, LLC., for Construction Engineering and Inspection for the Meppen Canal Trail Project.

The purpose of this Agreement is to establish a contract to provide construction engineering and inspection assistance for the Meppen Canal Trail project.

Director Fredericksen stated that as indicated in the agreement Atlas will help with the Construction administration and the cost is set at a not-to-exceed amount of 90,749 dollars this agreement utilizes the same match rate that we usually see in our transportation projects and that we will pay 7.34 percent of that cost. Councilor Francis confirmed that this project will be completed by the end of the summer. Mayor Casper noted that it is exciting when we open a new trail and highlighted the benefit of sharing only a portion of the cost with taxpayers.

It was moved by Councilor Larsen, seconded by Councilor Francis to approve the Professional Services Agreement with Atlas Technical Consultants, LLC. And authorize the Mayor and City Clerk to execute the document. The motion was carried by the following vote: Aye – Councilors Burtenshaw, Larsen, Dingman, Radford, Freeman, Francis. Nay - None.

E. Community Development Services

1) Resolution approving the Eligibility Report for the Snake River West Urban Renewal District

Being presented is a resolution approving the Eligibility Report for the Snake River West Urban Renewal District. This is the first step required by Idaho statute in creating a new urban renewal district. The report reviews the criteria for establishing a district and determines which of the criteria are met for the site. The statute requires that only one of the criteria be met. If the Council approves the report, the

Idaho Falls Redevelopment Agency (IFRA) will then be authorized to draft an urban renewal district plan, which will also come back for Council approval. The IFRA board reviewed this report on February 15, 2024, and approved the document.

Council President Burtenshaw has voluntarily recused herself from participating in discussions related to this agenda item, as well as any matters concerning the specific property in question, including annexation and initial zoning considerations. Council President Burtenshaw stepped down from the dais and took a seat in the audience area.

Director Sanner introduced Brad Cramer, who will be presenting. Mr. Cramer represents Perspective Planning and Consulting and is here to present the eligibility report for the Snake River West Urban Renewal District. Mr. Cramer noted that he has been engaged by the Redevelopment Agency as an impartial party and does not represent the developer. His assessment will determine whether the properties meet the 15 criteria outlined in state statute, making them eligible for creating an urban renewal district. Approval of this report does not obligate the district's creation.

Mr. Cramer presents the Council with a PowerPoint presentation. Slide 1 indicates existing urban renewal districts in the area. In the pink color is the River Commons district that covers a large portion of Snake River Landing and the Eagle Ridge Boundary in Blue. He noted that in the blue you will see two parcels that are not included and the road stretches around them. Those parcels are the catalysts for this application. He indicated that they were not initially included in the Eagle Ridge district because they are currently in the County which is allowable if the property owners and the County Commissioners agree to be included in a city urban renewal district. In this case, the County Commissioners did agree but the property owners did not. He said these parcels were excluded and Pioneer Rd. went around the parcels and then picked up the parcel on the southwest (triangle in blue). Those two parcels are not being requested for inclusion in a district. What is also happening is that a portion of Eagle Ridge is being De-Annexed from the Eagle Ridge boundary as indicated in Slide-2 in yellow as well as Pioneer Road. Mr. Cramer stated that the Idaho Falls Redevelopment Agency determined that it is best to De-Annex the triangle portion on the Southwest as well as Pioneer Rd. from Eagle Ridge and include it along with those two parcels as part of the Snake River West application. Slide 3 Indicates parcel labels. Parcel A indicates the two parcels that were not part of the original Eagle Ridge and Parcel B indicates Pioneer Rd and the triangle portion in the Southwest. This is important because within the Eligibility report parcel A only met one of the criteria on its independent of parcel B. Most of the Eligibility centers around Pioneer Rd and parcel B. Slide-4 Aerial view of the parcels from 1969 The entire area is in yellow and not much has changed since 1969. Slide-5 Aerial view of the parcels from 2023, Mr. Cramer noted not a lot has changed. East side of parcel A you see buildings and those have all been demolished they are not currently on the side. Slide – 6 Comprehensive Plan. Mr. Cramer indicated that these areas are shown as green belt mixed uses that are consistent with what else is in the area, including Snake River Landing. Slide-7 zoning map. Mr. Cramer stated that parcel A is annexed into zone Central Commercial. Parcel B is currently in the County and is on the agenda tonight to be annexed into the city with zoning of Central Commercial. Slide – 8 Criterion 1- Substantial Number of Deteriorating Structures Deterioration of Site. Mr. Cramer stated that the building on parcel A has been demolished so it does not meet this criterion on its own, however, parcel B does, and parcel A will if parcel B is included. He indicated that the reason he is indicating if parcel B is included is because it still would have to De-Annexed and that would have to be a decision that the Council will have to make and will come to you at a future date. If the Council decided not to De-Annex, then he wanted to make sure it was clear when parcel B was eligible and went parcel A was eligible independently. This will cover both scenarios. Slide- 9 Criterion 2: age of obsolescence (if parcel B is included, the criterion is met) because the buildings on parcel A have been demolished it does not meet it independently. Slide-10 Criteria 3,4, and 5. 3: Defective or Inadequate Street layout. Mr. Cramer says this criterion is met. 4: Outmoded Street Pattern. Mr. Cramer says this criterion is met. 5: Need for correlation of area with other areas by streets and modern traffic requirements. Mr. Cramer says this criterion is met. Mr. Cramer indicated that defective or inadequate street layouts are met largely because of Pioneer Rd. and the s-curve that creates a number of scenarios that cause this area to meet the criteria of the Idaho statutes. Slide-11 Criteria 6: Faulty Lot Layout. If parcel B and Pioneer Road are included, the criterion is met. Slide- 12 Criterion 7: Unsuitable topography. Mr. Cramer says the criterion is not met. Normally what we look for here is shallow lava rock or basalt or steep elevation changes. Slide-13 Criteria 8, and 12. 8: Insanitary or unsafe conditions. Mr. Cramer says that if Pioneer is included, the criterion is met. 12: Conditions that endanger life or property. Mr. Cramer says if Pioneer Rd. is included, the criterion is met. Mr. Cramer indicated that evening events at the Mountain America Center parking lot, where cars were also parking on Pioneer Rd. The issue arises when pedestrians try to cross the street, as there’s minimal warning for oncoming vehicles making the free-flowing turn onto that street. Mr. Cramer says if Pioneer Rd is included criteria 8 and 12 are met.

Criteria 9, 10, and 11 were criteria that were not met. 9: Diversity of ownership. 10: Tax or Special Assessment Delinquency. 11: Defective or Unusual Conditions of Title. Mr. Cramer says that criteria 10 and 11 were not evaluated. Criteria 13: Impairs or Arrests Sound Growth – Criterion is met. 14: Retards Development of the Area – Criterion is met. 15: Economic Underdevelopment and Economic Disuse – Criterion is met. Mr. Cramer says the unique challenge for this parcel is the absence of shared development costs due to the lack of two developable sides of the road. Consequently, all expenses fall solely on the one developer, with no other opportunities for cost-sharing except through a public-private partnership like an Urban Renewal District. Mr. Cramer cites this as the reason criteria 13 and 14 are fulfilled. Slide- 19 Summary:
Indicates dependence on either parcel B or Pioneer Rd. being included in the final boundary.

- 1: Criterion is met*
- 2: Criterion is met*
- 3,4,5: Criteria are met*
- 6: Criterion is met*
- 7: Criterion is not met
- 8,12: Criteria are met*
- 9,10,11: Criteria are not met
- 13*,14*,15: Criteria are met

Mr. Cramer is examining whether creating a district would lead to a scenario where all Urban Renewal Areas (URAs) in the city, with base evaluations exceeding 10% of the city’s total evaluation, could meet that requirement. Slide 20 discusses the 10% limit on assessed valuation within Urban Renewal Areas (URAs). Mr. Cramer mentioned that even if this district and other proposed districts were established, their combined evaluation would be less than 1% of the city’s overall assessment.

It was moved by Councilor Larsen, seconded by Councilor Radford to approve the Resolution approving the Eligibility Report for the Snake River West Urban Renewal District and give authorization for the Mayor and City Clerk to execute the necessary documents. The motion carried by the following vote: Aye – Councilors Radford, Freeman, Francis, Dingman, Larsen Nay - None.
Council President Burtenshaw Recused.

RESOLUTION 2024-06
A RESOLUTION OF THE CITY OF IDAHO FALLS, IDAHO, A MUNICIPAL CORPORATION OF THE STATE OF IDAHO, DETERMINING A CERTAIN AREA WITHIN THE CITY, ALSO REFERRED TO AS THE SNAKE RIVER WEST AREA, TO BE A DETERIORATED AREA AND/OR A DETERIORATING AREA AS DEFINED BY IDAHO CODE SECTIONS 50-2018(8), (9) AND 50-2903(8); DIRECTING THE URBAN RENEWAL AGENCY OF THE CITY OF IDAHO FALLS, ALSO KNOWN AS THE IDAHO FALLS REDEVELOPMENT AGENCY, TO COMMENCE THE PREPARATION OF AN URBAN RENEWAL PLAN SUBJECT TO CERTAIN CONDITIONS, WHICH PLAN MAY INCLUDE REVENUE ALLOCATION PROVISIONS FOR ALL OR PART OF THE AREA; AND PROVIDING THAT THIS RESOLUTION BE EFFECTIVE UPON ITS PASSAGE, APPROVAL, AND PUBLICATION ACCORDING TO LAW.

2) Final Plat, Development Agreement, and Reasoned Statement of Relevant Criteria and Standards, Action Sports Addition Division No. 2.

Presented is an application for the Final Plat, Development Agreement, and Reasoned Statement of Relevant Criteria and Standards for Action Sports Addition Division No. 2. The Planning and Zoning Commission considered this item at its November 14, 2023, meeting and unanimously voted to recommend approval of the final plat to the Mayor and City Council as presented.
Director Sanner highlighted that the applicant requested that language be added to the plat to accommodate a 26-foot wide Public Utility Easement (PUE) with the proposed 26-foot wide Cross Access Easement (CAE) on the northern portions of Lots 2 and 3 of the Action Sports Addition Final Plat. The easement intends to allow a sewer utility line to run under the ground in the cross-access easement. Councilor Francis stated that as he read it there is access on to Lincoln Road from this plat but he didn't see it. Director Sanner clarified that the access easement only extends to Holli Park Dr. Barry Bane from Connect Engineering explained that the plan intentionally includes only one access point from Lincoln Rd. to allow multiple lots to share the same access. Councilor Francis questioned whether Lincoln is an arterial road, and Mr. Bane confirmed it. The goal is to limit access points, which caught Councilor Francis's attention. Mr. Bane clarified that only one access point will remain from Lincoln, and the cross-access easement will serve other lots coming off Holli Park Dr., minimizing traffic from Lincoln and avoiding additional access points to it.

It was moved by Councilor Radford, seconded by Councilor Larsen to approve the Development Agreement as described by Director Sanner for the Final Plat for Action Sports Addition Division No. 2 and give authorization for the Mayor and City Clerk to sign said agreement. The motion was carried by the following vote: Aye – Councilors Larsen, Francis, Radford, Dingman, Burtenshaw, Freeman. Nay - None.

It was moved by Councilor Radford, seconded by Councilor Larsen to accept or Approve the Final Plat for Action Sports Addition Division No. 2 and give authorization for the Mayor, City Engineer, and City Clerk to sign said Final Plat. The motion was carried by the following vote: Aye – Councilors Larsen, Burtenshaw, Dingman, Freeman, Francis, Radford. Nay - None.

It was moved by Councilor Radford, seconded by Councilor Larsen to approve the Reasoned Statement of Relevant Criteria and Standards for the Final Plat for Action Sports Addition Division No. 2 and give authorization for the Mayor to execute the necessary documents. The motion was carried by the following vote: Aye – Councilors Freeman, Radford, Burtenshaw, Francis, Dingman, Larsen. Nay - None.

3) Quasi-judicial Public Hearing-Rezone from I&M, Industrial and Manufacturing to HC, Highway Commercial, Zoning Ordinance and Reasoned Statement of Relevant Criteria and Standards on approximately 3.671 acres, Part of the Southeast ¼ of Section 24 and the Northeast ¼ of Section 25, Township 2 North, Range 37 East.

For consideration is the application for Rezoning from I&M to HC, Zoning Ordinance, and Reasoned Statement of Relevant Criteria and Standards for approximately 3.671 acres, Part of the Southeast ¼ of Section 24 and the Northeast ¼ of Section 25, Township 2 North, Range 37 East. The Planning and Zoning Commission considered this item at its March 5, 2024, meeting and unanimously voted to recommend approval of the zone change from I&M to HC to the Mayor and City Council as presented.

Mayor Casper opened the hearing and ordered that all testimony and materials presented become part of the permanent record.

Applicant: Clint Jolley from HLE Inc. 101 South Park Ave. Idaho Falls.
Mr. Jolley refers to the PowerPoint presentation to describe the location of the property. South of Pancheri and West of Yellowstone, just south of Candlewood Suites. He says they are requesting to rezone from I&M to HC Zone which will match Candlewood suites and the property against Yellowstone. This fits with the city’s comprehensive plan and the HC zone will be better suited to be adjacent to the path along the river.

Director Sanner appeared. He stated that the property is located at 1740 South Yellowstone Hwy which is Southwest of Yellowstone Hwy and Pancheri. Director Sanner stated that what is being requested is that the property be rezoned from I&M or Industrial to the Highway Commercial which does exist just to the North. The property has three different transects that cut across the property being Industrial mixed-use centers and corridors as well as Urban Core. Highway Commercial meets two of those so it becomes the purview of the City Council but it does meet the comprehensive plan, the majority of the property to the East is in the urban core which does allow for commercial uses and Highway Commercial matches what is to the North. This property is also in the airport-compatible land use overlay, it’s in the controlled development district. Slide-6 View of the property West of Yellowstone Ave. Slide-7 View of the Property facing South from Pancheri on City Pathway (looking South from Pancheri). Director Sanner stated that this item was presented to Planning and Zoning and they sent a unanimous positive recommendation to City Council and there were no public comments on this application.
Public Comment: No one appeared.

Mayor Casper declared the hearing to be closed.

Council President Burtenshaw is excited to see this move from I&M to commercial and feels that it will be a great thing for along the river walk. Councilor Larsen agreed. Councilor Francis added that this will be a catalyst for change in this area and is happy that they worked out a temporary access.

It was moved by Councilor Larsen, seconded by Councilor Radford to approve the Ordinance Rezoning approximately 3.671 acres, Part of the Southeast ¼ of Section 24 and the Northeast ¼ of Section 25, Township 2 North, Range 37 East from I&M, Industrial to HC, Highway Commercial, under suspension of the rules requiring three complete and separate readings and request that it be read by title and published by summary. The motion was carried by the following vote: Aye – Councilors Larsen, Burtenshaw, Dingman, Freeman, Francis, Radford. Nay - None.

At the request of Mayor Casper, the City Clerk read the ordinance by title only:

ORDINANCE NO. 3566
AN ORDINANCE OF THE CITY OF IDAHO FALLS, IDAHO, A MUNICIPAL CORPORATION OF THE STATE OF IDAHO; PROVIDING FOR THE REZONING OF APPROXIMATELY 3.671 ACRES AS DESCRIBED IN SECTION 1 OF THIS ORDINANCE FROM I&M, INDUSTRIAL AND MANUFACTURING, TO HC, HIGHWAY COMMERCIAL AND PROVIDING SEVERABILITY, PUBLICATION BY SUMMARY, AND ESTABLISHING EFFECTIVE DATE.

It was moved by Councilor Larsen, seconded by Councilor Radford to approve the Reasoned Statement of Relevant Criteria and Standards for the Rezone from I&M to HC and give authorization for the Mayor and City Clerk to execute the necessary documents. The motion was carried by the following vote: Aye – Councilors Freeman, Radford, Burtenshaw, Francis, Dingman, Larsen. Nay - None.

4) Legislative Public Hearing-Part 1 of 2 of the Annexation and Initial Zoning-Annexation Ordinance and Reasoned Statement of Relevant Criteria and Standards for approximately 5.042 acres, part of the Southeast ¼ of the Southeast ¼ of Section 23, Township 2 North, Range 37 East.

For consideration is an application for Annexation and Initial Zoning of CC, Central Commercial with the Controlled Development Airport Overlay Zone which includes the Annexation Ordinance and Reasoned Statement of Relevant Criteria and Standards for approximately 5.042 acres, part of the Southeast ¼ of the Southeast ¼ of Section 23, Township 2 North, Range 37 East. On March 5, 2024, the Planning Commission unanimously voted to recommend approval of the annexation with initial zoning of CC with the Controlled Development Airport Overlay Zone to the Mayor and City Council as presented.

Council President Burtenshaw has recused herself from the agenda items regarding the Annexation and Initial zoning of the property described above.

Mayor Casper opened the hearing and ordered that all testimony and materials presented become part of the permanent record.

Applicant: US Development. Applicant did not appear.

Director Sanner provided a staff report regarding the request to annex the property that is located at 1618 South Pioneer Rd. This is a category A annexation and it is located just north of the Mountain America Center. The applicant is requesting the CC Zone (Central Commercial) and the properties to the Northeast are zoned Central Commercial as well so it would be in conjunction with the adjacent properties. The property is located in the Mixed-use centers and corridors transect and the CC Zone does match with Imagine IF and is also located in the airport-compatible land use with the controlled development overlay.

Public Comment: No one appeared. Mayor Casper Closed the Hearing.

It was moved by Councilor Larsen, seconded by Councilor Radford to approve the Ordinance annexing approximately 5.042 acres, part of the Southeast ¼ of the Southeast ¼ of Section 23, Township 2 North, Range 37 East; assign a Comprehensive Plan Designation of "Mixed-Use Centers and Corridors; "and under a suspension of the rules requiring three complete and separate readings, request that it be read by title and published by summary. The motion was carried by the following vote: Aye –Councilors Larsen, Radford, Dingman, Freeman, Francis. Nay - None. Council President Burtenshaw – Recused.

At the request of Mayor Casper, the City Clerk read the ordinance by title only:

ORDINANCE NO. 3567
AN ORDINANCE OF THE CITY OF IDAHO FALLS, IDAHO, A MUNICIPAL CORPORATION OF THE STATE OF IDAHO; PROVIDING FOR THE ANNEXATION OF APPROXIMATELY 5.042 ACRES DESCRIBED IN EXHIBIT A OF THIS ORDINANCE, AMENDING THE LEGAL DESCRIPTION OF THE CITY WITH THE APPROPRIATE COUNTY AND STATE AUTHORITIES; AND PROVIDING SEVERABILITY, PUBLICATION BY SUMMARY, AND ESTABLISHING EFFECTIVE DATE.

It was moved by Councilor Larsen, seconded by Councilor Radford to approve the Reasoned Statement of Relevant Criteria and Standards for the annexation of approximately 5.042 acres, part of the Southeast ¼ of the Southeast ¼ of Section 23, Township 2 North, Range 37 East and give authorization for the Mayor to execute the necessary documents. The motion was carried by the following vote: Aye – Councilors Larsen, Radford, Francis, Dingman, Freeman. Nay - None. Council President Burtenshaw – Recused.

5) Legislative Public Hearing-Part 2 of the Annexation and Initial Zoning of CC, Central Commercial with the Controlled Development Airport Overlay Zone, Initial Zoning Ordinance and Reasoned Statement of Relevant Criteria and Standards for approximately 5.042 acres, part of the Southeast ¼ of the Southeast ¼ of Section 23, Township 2 North, Range 37 East.

It was moved by Councilor Larsen, seconded by Councilor Radford to approve the Ordinance establishing the initial zoning for CC, Central Commercial with the Controlled Development Airport Overlay Zone as shown in the Ordinance exhibits under a suspension of the rules requiring three complete and separate readings; and request that it be read by title and published by summary; that the City limits documents be amended to include the area annexed herewith; and that the City Planner be instructed to reflect said annexation, amendment to the Comprehensive Plan, and initial zoning on the Comprehensive Plan and Zoning Maps located in the Planning office. The motion was carried by the following vote: Aye – Councilors Larsen, Radford, Dingman, Freeman, Francis. Nay - None. Council President Burtenshaw – Recused.

At the request of Mayor Casper, the City Clerk read the ordinance by title only:

ORDINANCE NO. 3568
AN ORDINANCE OF THE CITY OF IDAHO FALLS, IDAHO, A MUNICIPAL CORPORATION OF THE STATE OF IDAHO; PROVIDING FOR THE INITIAL ZONING OF APPROXIMATELY 5.042 ACRES DESCRIBED IN EXHIBIT A OF THIS ORDINANCE AS CC ZONE; WITH THE AIRPORT OVERLAY OF CONTROLLED DEVELOPMENT, AND PROVIDING SEVERABILITY, PUBLICATION BY SUMMARY, AND ESTABLISHING EFFECTIVE DATE.

It was moved by Councilor Larsen, seconded by Councilor Radford to approve the Reasoned Statement of Relevant Criteria and Standards for the initial zoning of CC, Central Commercial, with the Controlled Development Airport Overlay Zone, and give authorization for the Mayor to execute the necessary documents. The motion was carried by the following vote: Aye – Councilors Larsen, Radford, Francis, Dingman, Freeman. Nay - None.

6) Cityworks Software and Building Permit Review Process Presentation.

Director Wade Sanner presented the new Cityworks permit review software to the Mayor and City Council. He explained that Cityworks is an online permitting software that streamlines the permit review process. It allows applicants to submit applications, pay fees, track reviews, and schedule inspections online in real time. Director Sanner demonstrated how the software works, showing the application submission process, the distributed review process across different departments, and how applicants can view the status of their permits. He highlighted features like automatic notifications to applicants via email when tasks are completed. Director Sanner also explained how the new software and process reduced bottlenecks by ensuring complete applications, distributing workload across staff, and allowing parallel reviews. He noted they are typically meeting a 14-day review timeline now.

Mayor Casper asked Director Sanner to clarify when impact fees are paid in the process. Director Sanner responded that impact fees are assessed when fees are paid, but the permit is not issued until impact fees are paid.

Councilor Burtenshaw asked if existing permits in the process were moved to Cityworks. Director Sanner said all permits had been migrated over and the remaining permits in queue just await action from contractors. Councilor Larsen commented that the improved communication with applicants through automatic emails is a real benefit. Mayor Casper thanked Director Sanner and staff for their work in implementing the new system to address the backlog problem over the past year.

6. Announcements

Mayor Casper provided the following announcements:

- Tax Day is coming up on Monday, so be prepared if filing taxes.
- The Chamber of Commerce is hosting a legislative session recap luncheon on Tuesday, at 11:30 AM at the Quality Inn Suites.
- The City Club will have Lee Radford, the director of the Idaho Falls Redevelopment Agency, speaking on April 25th at noon about the urban renewal process.

Councilor Larsen commented that the Idaho Falls Redevelopment Agency does great work utilizing tax incremental financing and taking redevelopment seriously.

Councilor Francis announced the following upcoming community events:

- The Japanese American Citizen League is having its Day of Remembrance on April 20th at the ARTitorium, at 10:00 AM.
- The Art Museum of Eastern Idaho gala fundraiser is on April 26th.
- The Youth Association of Idaho Falls' Sister Cities is having a sushi fundraiser on May 10th.

7. Adjournment.

There being no further business, the meeting adjourned at 9:14 PM

s/ Corrin Wilde
Corrin Wilde, City Clerk

s/Rebecca L. Noah Casper
Rebecca L. Noah Casper, Mayor

Memorandum

File #: 24-201 **City Council Meeting**

FROM: Pam Alexander, Municipal Services Director
DATE: Monday, April 22, 2024
DEPARTMENT: Municipal Services

Subject

American Rescue Plan Act (ARPA) Committee Recommendations

Council Action Desired

☐ Ordinance ☐ Resolution ☐ Public Hearing

☒ Other Action (Approval, Authorization, Ratification, etc.)

Accept and approve the American Rescue Plan Act committee recommendations for a total of $3,705,936.48 (or take other action deemed appropriate).

Description, Background Information & Purpose

The American Rescue Plan Act provides funding to support response to and recovery from the COVID-19 public health emergency and ensures governments have the resources essential to making investments that support long-term growth in areas of public health, public sector revenue, water, sewer, and broadband infrastructure. The committee recommends the funding of projects from the Fire, Police, Municipal Services, Parks & Recreation, Community Development Services and Public Works as presented during the Monday, April 22, 2024, City Council work session.

Alignment with City & Department Planning Objectives

☐ ☒ ☐ ☐ ☐ ☐ ☐ ☐

The acceptance and approval of the ARPA committee recommendations supports the good governance community-oriented result by providing sound fiscal management and enable trust and transparency.

Interdepartmental Coordination

All city departments were represented in the project evaluation and recommendation process.

Fiscal Impact

The City of Idaho Falls has a balance of $3,705,936.48, from the original $10.5M. This balance of funds is required to be obligated by December 31, 2024, and expended by December 31, 2026.

Legal Review
The Legal Department concurs that the Council action is within State Statute.

City of Idaho Falls

American Rescue Plan Act (ARPA) Presentation

City Council Work Session
Monday, April 22, 2024

IDAHO FALLS

American Rescue Plan Act (ARPA) Funding

- Total ARPA Funds - $10.5M for City of Idaho Falls
- Funds must be committed no later than December 31, 2024.
- Funds must be expended no later than December 31, 2026.

American Rescue Plan Act (ARPA) Overview

Public Health Expenditures
Lost Public Sector Revenue
Water, Sewer and Broadband Infrastructure
Expanded guidelines – January 2022

American Rescue Plan Act Applications

Project Name	Department Applicant	Description	Amount Requested
Body Worn Camera and In-Car Video Project	IF Police	Purchase newest generation body cameras and in-car video systems from Lenslock Inc. to allow cloud-based digital storage (not server based).	$201,666
Bearcat G3	IF Police	Purchase of Lenco Bearcat G3 armored vehicle for high-risk law enforcement operations to keep officers and citizens safe.	$411,097
(4) Police Vehicles	IF Police	Lease (4) additional police vehicles from Unified Fleet Services. Add to Impact fees of approx. $100,000 to replace (4) vehicles as per fleet replacement strategy.	$86,508
Fire Dept. North Station	IF Fire Dept.	Fire station/storage facility on North Fire Dept. property to bolster Fire/EMS response capabilities.	$1,500,000
Cityworks Site Upgrades	CDS	Change order to existing contract for upgrade to Cityworks version 23.	$40,000
City Wide Community Survey	Office of Mayor	Survey to gauge support for a community rec center, training center, or fire station, and overall satisfaction with city services.	$35,000
City Hall Annex Parking Lot Pavement Replacement	Municipal Srv.	Full re-pavement of City Hall parking lot.	$60,000
City Council Chambers Expansion	Municipal Srv.	Remove back wall to expand space/relocate City Attorney offices to other City facility location.	$100,000
Frontier Cntr. Performing Arts ADA RR/Lobby Expansion	Municipal Srv.	Construction phase to add lobby space, ADA compliant restrooms, and elevator access to lower and mezzanine lobbies.	$1,000,000
City Hall Elevator Project Contingency	Municipal Srv.	Current ARPA elevator project recently discovered an issue with the landing drain which may cause a change order for additional work (Contingency).	$100,000
Asphalt Repair/Seal River Pkwy	Parks/Rec	At River Parkway from Driftwood Hotel to John's Hole forebay. Repair/patch potholes and coat with a chip seal.	$35,000
Employee RR/Wash Station Pinecrest Golf Course	Parks/Rec	Build an employee washroom/restroom to replace porta potties and provide a shower/eye wash station.	$50,000
Heritage Park RR	Parks/Rec	Public restroom for Idaho Falls Riverwalk trail at Heritage Park.	$200,000
GIFT ADA Replacement Van	Public Works	Purchase a 16 passenger ADA van to replace the 2009 ADA van.	$165,000
Storm Drain Improvements	Public Works	Remove several storm taps from sanitary sewer system in oldest sections of city.	$250,000
Commercial Water Meters	Public Works	Purchase/install commercial water meters. Decrease water usage/extend rights.	$250,000
16 Applications Received	7 Depts.	Total Amount Requested	$4,484,271

ARPA Application Scoring and Analysis

Taken from Project Worksheets Provided by Lead Departments				
Requested Project Name	Lead Department	Fits an identified SLFRF/ARPA Category? If so, which?	Able to contract by 12/31/24? Complete by 12/31/26? (Consider supply chain, labor pool)	Proposed Amount Requested

GRANT ELIGIBILITY:
On a scale of 0-5, does the Project ____?

a. Impact community health?*	b. Address a future community health crisis?	c. Address public safety needs?	d. Offer long term community impact?	e. Address needs associated disadvantaged neighborhoods (LMI)?	f. Enhance Infrastructure dedicated to natural resource or environmental management?	g. Support *Imagine IF* or another recognized City/Dept. Plan?	h. Support 2024 City Council Budget Priorities by Dept.?

FINANCES:
On a scale of 0-5, is the project …

a. Classified as a "One-time" expenditure?	b. Financially sustainable (re. future ongoing replacement costs), reasonable estimate.	c. Not likely to be funded in any other way?

Total Score

ARPA Application Committee Recommendations

Project Name	Department	Fits an identified SLRFR/ARPA Category	Able to contract by 12/31/24 and Complete by 12/31/26	Total Requested	Total Recommended (Committee)
North Station	Fire	Public Health/Safety	Yes	$1,500,000.00	$1,414,270.48
GIFT ADA Van	Public Works	Public Health/Safety	Yes	$165,000.00	$165,000.00
City Hall Elevator (Contingency)	Municipal Services	Public Health/Safety/ Lost Revenue	Yes	$100,000.00	$100,000.00
Frontier Center ADA Restrooms	Municipal Services	Public Health/Safety/Lost Revenue	Yes	$1,000,000.00	$900,000.00
Heritage Park Restrooms	Parks & Recreation	Lost Revenue	Yes, by 12/31/24	$200,000.00	$200,000.00
Storm Drain Improvements	Public Works	Water/Infrastructure /Public Health	Yes	$250,000.00	$200,000.00

ARPA Application Committee Recommendations (Continued)

Project Name	Department	Fits an identified SLRFR/ARPA Category	Able to contract by 12/31/24 and Complete by 12/31/26	Total Requested	Total Recommended (Committee)
Pinecrest Restroom and Eye Wash Station	Parks & Recreation	Lost Revenue/Public Health/Safety	Yes, by 12/31/24	$50,000.00	$50,000.00
City Wide Survey	Office of the Mayor	Public Health/Community	Yes	$35,000.00	$35,000.00
City Works Upgrade	Community Development	Lost Revenue/Public Health	Yes, by 10/1/24	$40,000.00	$40,000.00
Asphalt River Parkway	Parks & Recreation	Lost Revenue/Public Health	Yes, by 10/1/24	$35,000.00	$ --
City Hall Annex Parking Lot	Municipal Services	Public Health/Safety	Yes	$60,000.00	$ --
Body Camera/Car Video	Police	Public Safety	Yes, by 12/31/24	$201,666.00	$201,666.00

ARPA Application Committee Recommendations (Continued)

Project Name	Department	Fits an identified SLRFR/ARPA Category	Able to contract by 12/31/24 and Complete by 12/31/26	Total Requested	Total Recommended (Committee)
Bearcat G3	Police	Public Safety	Yes	$411,097.00	$400,000.00
Water Meters	Public Works	Water/Infrastructure	Yes	$250,000.00	$ --
Police Vehicles	Police	Public Safety/Lost Revenue	Yes	$ 86,508.00	$ --
City Council Chambers Expansion	Municipal Services	Public Health/Safety/Lost Revenue	Yes	$100,000.00	$ --
Total Requests				$4,484,271.00	$3,705,936.48

Discussion

Project Name	**Department Applicant**	**Description**	**Amount Requested**
Body Worn Camera and In-Car Video Project	IF Police	Purchase newest generation body cameras and in-car video systems from Lenslock Inc. to allow cloud-based digital storage (not server based).	**$201,666**
Bearcat G3	IF Police	Purchase of Lenco Bearcat G3 armored vehicle for high-risk law enforcement operations to keep officers and citizens safe.	**$411,097**
(4) Police Vehicles	IF Police	Lease (4) additional police vehicles from Unified Fleet Services. Add to Impact fees of approx. $100,000 to replace (4) vehicles as per fleet replacement strategy.	**$86,508**
Fire Dept. North Station	IF Fire Dept.	Fire station/storage facility on Noth Fire Dept. property to bolster Fire/EMS response capabilities.	**$1,500,000**
Cityworks Site Upgrades	CDS	Change order to existing contract for upgrade to Cityworks version 23.	**$40,000**
City Wide Community Survey	Office of Mayor	Survey to gauge support for a community rec center, training center, or fire station, and overall satisfaction with city services.	**$35,000**
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Asphalt Repair/Seal River Pkwy	Parks/Rec	At River Parkway from Driftwood Hotel to John's Hole forebay. Repair/patch potholes and coat with a chip seal.	**$35,000**
Employee RR/Wash Station Pinecrest Golf Course	Parks/Rec	Build an employee washroom/restroom to replace porta potties and provide a shower/eye wash station.	**$50,000**
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Commercial Water Meters	Public Works	Purchase/install commercial water meters. Decrease water usage/extend rights.	**$250,000**
16 Applications Received	**7 Depts.**	**Total Amount Requested**	**$4,484,271**

LF - Notes from initial review

Project Name	**Dept./ Applicant**	**ARPA criteria**	**Review of Criteria**
Body Worn Camera In-Car Video Project	IF Police	Public safety	Can be contracted/delivered before 12/31/24. Identified in IF Police Dept. Strategic Plan 2019-2024. Supports 2024 City Council Priorities.
Bearcat G3	IF Police	Public safety	Can be contracted before 12/31/24. Delivered before 12/31/26. Identified in IF Police Dept. Strategic Plan 2019-2024. Supports 2024 City Council Priorities.
(4) Police Vehicles	IF Police	Public safety Loss revenue	Can be contracted by 12/31/24 and completed by 12/31/26. Identified in IF Police Dept. Strategic Plan 2019-2024. Supports 2024 City Council Priorities.
Fire Dept. North Station	IF Fire Dept.	Public safety Public health	Can be contracted by 12/31/24 through coordination with PW, MW, and CDS. Anticipates completion by 12/31/26. Identified in 2024 City Council Priorities for IFFD. Supports needs identified in IFFP Strategic/Capital Plans.
Cityworks Site Upgrades	CDS	Public health Loss revenue	Can be contracted/completed by fall 2024. Is a City/Community software program initiated with ARPA round 1 funds that have been spent.
City Wide Community Survey	Office of Mayor	Public health community	May be contracted by 12/31/24 and completed by 12/31/26.
City Hall Annex Parking Lot Pavement Replacement	Municipal Srv.	Public safety Public health	Can contract by 12/31/24 and completed by 12/31/26.
City Council Chambers Expansion	Municipal Srv.	Public safety health and Loss revenue	Can be contracted by 12/31/24 and completed by 12/31/26. Identified in MS Dept. Strategic Plan for improving access to City bldgs.
Frontier Cntr. Performing Arts ADA RR/Lobby Expansion	Municipal Srv.	Public safety health and Loss revenue	Can be contracted by 9/30/24 and completed by 12/31/26. Identified as 2024 City Council Priorities for MS Dept. Supports the 2018-22 City ADA Transition Plan, and MS Dept. Strategic Plan for improving access to City buildings.
City Hall Elevator Project Contingency	Municipal Srv.	Public safety health and Loss revenue	Possible change order created the need for a contingency to cover additional costs for issues recently identified with the landing drain. Can fall under current contract and be completed by 12/31/26. Identified as 2024 City Council Priorities for MS Dept. Supports needs identified in the 2018-2022 City ADA Transition Plan, and MS Dept. Strategic Plan for improving access to City buildings.

Asphalt Repair/Seal River Pkwy	Parks/Rec	Public health Loss revenue	Can contract with current Public Works contract for seal coat and be completed by 10/01/24. Supports 2024 City Council Priorities for Parks to pursue implementation of existing plans Supports needs identified in the RECreate IF Plan.
Employee RR/Wash Station Pinecrest Golf Course	Parks/Rec	Loss revenue	Can contract/complete by 12/31/24. Supports 2024 City Council Priorities for Parks to pursue implementation of existing plans. Identified need in Parks Capital Plan and Golf Operations Business Plan.
Heritage Park RR	Parks/Rec	Loss revenue	Can contract/complete by 12/31/24. Supports 2024 City Council Priorities for Parks to pursue implementation of existing plans. Identified need in the Heritage Park Masterplan and Parks 5-Year Capital Plan.
GIFT ADA Replacement Van	Public Works	Public safety health	Can contract by 12/31/24 and be on site by 4/1/2025. Identified need in Imagine IF, and the 2023 CDBG Annual Action Plan. Supports 2024 City Council Priorities for PW of developing a financial sustainability plan for GIFT.
Storm Drain Improvements	Public Works	Water/sewer infrastructure Public health	Can contract by 9/30/24. Completed by 12/31/26 more than likely. Supports need identified in Wastewater Facility Plan to remove stormwater taps from sanitary sewer collection system.
Commercial Water Meters	Public Works	Water infrastructure	May contract by 8/1/24 and completed by 12/31/26. Supports 2024 City Council Priorities for PW of water meter planning/water use public messaging.

American Rescue Plan Act Project Applications

April 19, 2024

Project Name	Department	Total Requested	Committee Recommendations for Funding
Fire Dept. N. Station	Fire	$ 1,500,000.00	$ 1,414,270.48
GIFT ADA Van	Public Works	$ 165,000.00	$ 165,000.00
City Hall Elevator	Municipal Services	$ 100,000.00	$ 100,000.00
Frontier Ctr. ADA RR	Municipal Services	$ 1,000,000.00	$ 900,000.00
Heritage Park RR	Parks & Recreation	$ 200,000.00	$ 200,000.00
Storm Drain Imprvts.	Public Works	$ 250,000.00	$ 200,000.00
Pinecrest RR/Eye wash	Parks & Recreation	$ 50,000.00	$ 50,000.00
City Wide Survey	Office of Mayor	$ 35,000.00	$ 35,000.00
Cityworks Upgrade	Community Development Services	$ 40,000.00	$ 40,000.00
Asphault-Rvr Pkwy	Parks & Recreation	$ 35,000.00	$ -
City Hall Anx. PkLot	Municipal Services	$ 60,000.00	$ -
Body Cam/Car Video	Police	$ 201,666.00	$ 201,666.00
Bearcat G3	Police	$ 411,097.00	$ 400,000.00
Water Meters	Public Works	$ 250,000.00	$ -
Police Vehicles (4)	Police	$ 86,508.00	$ -
City Council Expans.	Municipal Services	$ 100,000.00	$ -
		$ 4,484,271.00	$ 3,705,936.48

Memorandum

File #: 24-203 **City Council Meeting**

FROM: Chris H Fredericksen, Public Works Director
DATE: Monday, April 15, 2024
DEPARTMENT: Public Works

Subject
Wastewater Facilities Planning Study

Council Action Desired
☐ Ordinance ☐ Resolution ☐ Public Hearing
☒ Other Action (Approval, Authorization, Ratification, etc.)
Accept the Wastewater Facilities Planning Study and adopt the recommendations made therein (or take other action deemed appropriate).

Description, Background Information & Purpose
In late 2022, the City retained Stantec Consulting Services Inc., and Keller Associates Inc., to conduct a Wastewater Facilities Planning Study. The Study identified capital improvement needs and proposed suggestions for efficient management of the utility spanning a 20-year period. The Study was also submitted to the Idaho Department of Environmental Quality for review.

Findings of the Wastewater Facilities Planning Study were presented to the City Council on March 11, 2024. A public meeting regarding the Study was held on April 3, 2024, and public comments were solicited between March 27 and April 10, 2024. No public comments were received, and staff recommends acceptance of the plan and adoption of the recommendations made therein.

Alignment with City & Department Planning Objectives

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☒

This Planning Study supports the community-oriented result of reliable infrastructure by planning for future needs of the utility.

Interdepartmental Coordination
N/A

Fiscal Impact

The Planning Study recommends utility rate increases of 5% annually to establish adequate funding for proposed improvements.

Legal Review

N/A

2-37-35-1-SWR-2023-18

2024-020

IDAHO FALLS, IDAHO

WASTEWATER TREATMENT PLANT

WASTEWATER FACILITIES PLANNING STUDY

CITY OF IDAHO FALLS, IDAHO

FINAL CITY REVIEW

April 2024

PROJECT NO. 222229-000

PREPARED BY:

Keller Associates, Inc.
305 N. 3rd Ave.
Pocatello, ID 83201
(T) 208 238 2146

Stantec Consulting
Services Inc.
727 E. Riverpark Lane
Suite 150
Boise, ID 83706
(T) 208 340 8284

PREPARED FOR:

City of Idaho Falls
308 Constitution Way
Idaho Falls, ID 83405
(T) 208 612 8250

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AUTHORIZATION

In November 2022, the City of Idaho Falls, Idaho contracted with Stantec Consulting Services, Inc. and Keller Associates, Inc. to prepare a Wastewater Facilities Planning Study (WWFPS) for the City’s Wastewater Treatment Plant (WWTP) and develop a capital improvements plan to prioritize and recommend allocations for future expenditures. The study was funded by both the City of Idaho Falls and a grant from the Idaho Department of Environmental Quality (DEQ).

EXECUTIVE SUMMARY

Introduction and System Summary

The City of Idaho Falls is one of the largest communities in Idaho. The City maintains a significant residential, commercial, and industrial presence in the eastern portion of the State and has constructed and maintained a regional Wastewater Treatment Plant (WWTP) to treat municipal, commercial, and industrial generated wastewater. The WWTP is located on the banks of the Snake River on the south side of the City and accepts and treats wastewater from the City of Ucon and the Iona-Bonneville Sewer District as well as multiple industries and area septage haulers.

Treatment is currently achieved using a conventional primary and secondary treatment process including an activated sludge process that is operated in a manner to encourage enhanced biological removal of phosphorus (EBPR). Wastewater entering the treatment facility first passes through the headworks facility to screen large objects before entering the influent splitter box which routes flow through one of two primary clarifiers. The clarified wastewater is then sent through the primary effluent lift station and pumped to the secondary process while solids removed within the primary clarifiers are diverted to a grit removal process, gravity thickener/fermenter, and then to the anaerobic digesters.

The wastewater enters a biological selector cell from the primary effluent pump station and proceeds through the anoxic and swing basins before entering one of three aeration basins. From the aeration basins, a portion of the flow can be recycled back to the anoxic basins while most of the flow is sent to the secondary clarifiers. From the secondary clarifiers, return activated sludge (RAS) is pumped to the anaerobic selector while waste activated sludge (WAS) is sent to the gravity belt thickeners (GBTs) and then to the anaerobic digesters. Once digested, the comingled digestate is land applied. Clarified effluent from the secondary clarifiers is then disinfected with chlorine before being discharged into the Snake River.

Scope

Treatment Plant Facility Condition Assessment

- The planning team assessed and documented the general condition of the existing treatment facilities

Planning Criteria

- 20-year population projections were based on projections developed by the Bonneville Metropolitan Planning Organization, and information provided by the City
- Historical flow and loadings at the treatment facility were evaluated and used to develop projections for flow, five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), ammonia, and total phosphorus for the 20-year planning horizon

Regulatory Evaluation

- A high-level evaluation of the current, pending, and anticipated future regulatory requirements and planning criteria were provided
- The anticipated performance of the existing WWTP to meet current and anticipated discharge limits was considered
- The existing TMDL was reviewed to identify future impacts to permit limits

WWTP Liquids Stream Capacity Evaluation

- A hydraulic model was developed to evaluate the hydraulic capacity of the WWTP with the objective of establishing unit process hydraulic capacities and identify potential future hydraulic bottlenecks

Alternatives Identification and Selection

- Alternatives were considered for optimization of the headworks, fermenter odor control, biosolids treatment and handling, sidestream treatment, disinfection, and the collection system
- Developed alternatives were evaluated using a life cycle cost analysis where appropriate
- An Excel spreadsheet tool was developed to identify when the various unit processes should be upgraded based on the results of the capacity evaluations
- Final alternative improvement and project packages were documented

Facility Plan and Capital Improvements Plan (CIP) Development

- Cost estimates were created for the identified project packages
- A CIP was developed which identified and prioritized the projects to be completed. Scheduling was based on short-term (0-10 years), and long-term (10-20 years) recommended improvements

Report Organization

This report is intended to provide a methodical description of the City of Idaho Falls's WWTP. The report is organized to address system components with regard to current and future conditions. The table of contents provides a complete directory of sections included in this report and additional lists of tables and figures are included immediately following the table of contents. Chapters in the report are summarized below.

Chapter 1 – Project Planning
Chapter 2 – Existing Conditions and Future Projections
Chapter 3 – Development and Evaluation of Alternatives
Chapter 4 – Funding Analysis and CIP Implementation

System Concerns

The Idaho Falls WWTP complies with permit limitations; however, the facility faces numerous system needs that could begin to impact overall operating conditions. Of particular concern are the potential impacts of nutrient recycle from the new dewatering process, ongoing operator safety concerns with the disinfection process, and available digester capacity in the mid-term. Additional needs are identified throughout the treatment facility, as discussed within Chapter 2 and, where appropriate, alternatives were developed to address those challenges. Significant needs are addressed as part of the development of the CIP discussed in Chapter 4.

Alternatives Considered

Numerous project alternatives are considered and evaluated throughout Chapter 3 based on the greatest needs identified by the City. Alternatives further developed are noted within the headworks, the fermenter odor control, biosolids treatment and handling, sidestream treatment, disinfection, and the collection system.

Nutrient recycling from the dewatering process currently being constructed and subsequent digester space was identified as potential near-term capacity concern among other high priorities. Longer-term needs are also identified within Chapter 3.

Preferred Alternative(s) and Implementation Schedule

The final preferred alternatives were identified with input from the public and are presented in Chapter 4 as part of the final capital improvements plan (CIP). As outlined in Table 4-6, over the next several years it is recommended that the City begin an evaluation of the secondary treatment system and initiate design for the Clean B System and disinfection system improvements.

Financial Analysis

An extensive financial analysis was developed as part of the study and is discussed in detail within Chapter 4 and Appendix E. Ultimately to achieve the City’s goal of rate sufficiency based on the current predicted timeline of improvements, consistent rate increases of 5% are required through 2040 with 3% annual increases beginning thereafter. Based on the assumptions documented herein, it was predicted that this would provide for capital projects to be completed while also covering operating expenses and preserving minimum fund balances.

CHAPTER 1 PROJECT PLANNING

1.1 LOCATION AND PROPOSED PLANNING AREA

The City of Idaho Falls Wastewater Treatment Plant (WWTP) is located along the Snake River off South Koester Road, near the Fielding Memorial Park Cemetery. The facility receives and treats wastewater from the City of Idaho Falls, the Iona-Bonneville Sewer District (IBSD), and the City of Ucon (Ucon) and discharges treated effluent into the Snake River. A septage dump station is also provided at the facility where local septage haulers are allowed to unload pursuant to the requirements set forth in Title 8, Chapter 1, Section 8-1-84 of the City Code (City of Idaho Falls, 2023).

The proposed project planning area (PPPA) is primarily concentrated on the existing footprint of the treatment plant, the sludge lagoon located immediately adjacent to the treatment plant, and the approximately 120 acres of agricultural land located directly adjacent to the WWTP site which is owned by the City of Idaho Falls and used to land apply a portion of the biosolids generated by the WWTP. The PPPA is shown in Figure 1-14.

The wastewater collection system is considered separately from the WWTP herein. A brief overview of the collection system is presented and discussed as part of the existing conditions assessment included in Chapter 2.

1.2 PROJECT PURPOSE AND NEED

The purpose of this Wastewater Facility Planning Study (WWFPS) is to assess the current condition of the City of Idaho Falls WWTP and to evaluate the facility regarding future needs. It is anticipated that future improvements will be necessary due to a service population that is expected to continue growing into the foreseeable future and the potential for future regulatory adjustments. A comprehensive evaluation of feasible alternatives that will address the current and future needs of the WWTP is presented in Chapters 3 and 4 based on the conditions observed and documented in Chapters 1 and 2.

1.3 ENVIRONMENTAL RESOURCES PRESENT

The City of Idaho Falls lies at approximately 4,750 feet above mean sea level and is bordered by higher elevations on the south and east. The topography in and around the City generally slopes down towards the Snake River which flows southward through Idaho Falls and maintains a gradual downward slope from north to south. Within the PPPA, site elevations generally range between 4,670 and 4,709 feet above sea level.

Classification of soils in and around the planning area was completed by the USDA Natural Resource Conservation Service (NRCS) (NRCS, 2023). The soils in the planning area are generally sandy and lie on varying slopes. Area soils and their relative prevalence are shown in Table 1-1 and Figure 1-15 and a soils report may be referenced within Appendix A.

Table 1-1 – Idaho Falls WWTP Area Soils

Map Unit Name	Acres in PPA	Percent of PPA
Harston fine sandy loam	144.5	73.4%
Heiseton fine sandy loam, drained	51.7	26.3%
Pits	0.6	0.3%
Total	**196.8**	**100.0%**

1.3.1 Groundwater Hydrology

Although the WWTP is in close proximity to the Snake River, the NRCS report indicates that the depth to groundwater is generally greater than 2 meters. This appears to remain consistent across the treatment plant site (NRCS, 2023).

Potable water in the City, Ucon, and the IBSD Service area is generally supplied from groundwater sources. The City has numerous municipal wells positioned throughout the respective City and service area limits. No delineated Nitrate Priority Areas lie within Bonneville County or impact the PPPA (Idaho DEQ, 2023).

1.3.2 Proximity to a Sole Source Aquifer

A sole source aquifer is defined by the Idaho Department of Environmental Quality as:

> *"…an aquifer that has been designated by EPA as the sole or principal source of drinking water for an area. As such, a designated sole source aquifer receives special protection. EPA designates an aquifer as a sole source based upon a petition from an individual, company, association, or government entity. Three of Idaho's aquifers – the Eastern Snake River Plain Aquifer, the Spokane Valley-Rathdrum Prairie Aquifer, and the Lewiston Basin Aquifer – are classified as sole source aquifers."*[1]

The City of Idaho Falls and the Idaho Falls WWTP lie on the eastern extent of the Eastern Snake River Plain Aquifer.

1.3.3 Surface Water Hydrology

Surface water is plentiful in and around Idaho Falls. The Snake River dominates the central area in Idaho Falls and several controlled irrigation canals flow near the planning area. The Idaho Falls WWTP discharges to the Snake River on the southern extent of the Idaho Falls City Limits.

The Wild and Scenic Rivers Act of 1968 serves to protect designated free-flowing rivers that have "outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural and other similar values." The act states that these rivers "shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations" (U.S. Fish & Wildlife Service, 2023). No surface waters in or around the PPPA have been designated as wild and scenic rivers.

Because Idaho Falls and Bonneville County lie within the eastern extent of the Columbia River Basin Watershed, all water flowing in the vicinity eventually reaches the Pacific Ocean via the Snake and Columbia Rivers.

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[1] (Idaho DEQ, 2023)

1.3.4 Fauna, Flora, and Natural Communities

The U.S. Fish and Wildlife Service has identified the Yellow-billed Cuckoo as a threatened species and the Monarch Butterfly as a candidate endangered species in the vicinity of the WWTP (U.S. Fish and Wildlife Service, 2023). There are 17 migratory birds which frequent the area during certain periods of the year which are listed as either a 'bird of conservation concern' or which are otherwise protected by the Migratory Bird Treaty Act and/or the Bald and Golden Eagle Protection Act. For the migratory birds listed, the identified period of highest probability of presence is mid-May.

1.3.5 Housing, Industrial, and Commercial Development

The primary land uses in and around Idaho Falls are residential and light commercial with sections of industrial use in certain areas. Downtown Idaho Falls is dominated by commercial, and significant industrial facilities are located on S Yellowstone Avenue, US Hwy 20. The Idaho National Laboratory also maintains an office complex along Fremont Avenue. Outside of the developed areas, pasture and irrigated farmland are prevalent; however, development is increasingly converting previously undeveloped areas into housing and/or commercial units.

1.3.6 Cultural Resources (Historical and Archaeological)

The National Register of Historic Places is the official catalogue of those properties considered historically and culturally significant. The service identifies buildings, sites, and districts that are significant in American history, architectural history, engineering, archeology, and/or culture. There are no listings identified in the immediate vicinity of the WWTP, and the nearest listed entity is the Art Troutner Historical District located just over a mile away. A significant number of historical registries exist in downtown Idaho Falls (National Park Service, 2023). No cultural resources are anticipated to be impacted by activities in the PPPA.

1.3.7 Utility Use and Energy Production

Electricity is provided within the planning area by Idaho Falls Power. Minimizing electrical consumption is an important consideration when evaluating system upgrades or expansion. In cases where it is necessary to utilize electrical power (e.g., pumping, aeration, etc.) it is important to consider efficient components as well as to ensure proper design so that all components are operating as efficiently as possible. The WWTP has numerous mechanical components which require power for treatment.

The City of Idaho Falls does operate several anaerobic digesters which produce methane gas that is captured and used to fuel the on-site boilers. Excess methane is flared as needed, but consideration is being given to transitioning towards other biogas uses, including cogeneration or renewable natural gas (RNG), (Stantec Consulting & Keller Associates, Inc., 2022).

1.3.8 Floodplains/Wetlands

The Federal Emergency Management Agency (FEMA) determined that the project planning area is in Zone C which is used to designate an area of minimal flooding (Federal Emergency Management Agency, 2023). Delineated flood zones around the planning area are identified within Figure 1-16.

Wetlands were delineated by the National Fish and Wildlife Service (FWS) (U.S. Fish & Wildlife Service, 2023). A freshwater pond is identified by the FWS within the project site; however the area identified as a pond overlaps the WWTP's sludge lagoon and drying beds and is likely referring to these facilities. Figure 1-17 shows a map of the wetlands located within the area of potential effect. No wetland areas are anticipated to be impacted by activities within the PPPA.

1.3.9 Important Farmlands Protection

Prime farmland, is defined by the U.S. Department of Agriculture as:

> *"Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban, built-up land, or water areas."*[2]

Prime farmland is of major importance in meeting the Nation's short- and long-term needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible governments, as well as individuals, should encourage and facilitate the wise use of the Nation's prime farmland (U.S. Dept. of Agriculture, 2023).

The City of Idaho Falls land applies their Class B biosolids on City-owned fields adjacent to the WWTP as well as other fields owned and managed by local farmers. Much of this land is considered prime farmland if irrigated (USDA Natural Resource Conservation Service, 2023). According to the WWTP staff, the nearest farmer-owned application site is nearly 7 miles away and the furthest is over 15 miles away. As development continues the adjacent Agriculture property becomes more difficult to distribute biosolids on.

1.3.10 Land Use and Development

Outside of greater Idaho Falls, Bonneville County, the Cities of Ammon, Ucon, and Iona are responsible for the administration of the land near to the Idaho Falls City limits. Undeveloped areas surrounding the City of Idaho Falls are almost exclusively zoned for grazing. Parks and other open spaces are located to the north and south of the PPPA, but much of the area immediately adjacent to the WWTP is zoned as industrial and/or manufacturing.

A map identifying different land use within Idaho Falls is included in Figure 1-18. Most of the City is zoned as residential of varying densities; however, there are also commercial zones, professional business districts, industrial designations, and public lands. Commercial and industrial activities are primarily concentrated along S Yellowstone Ave., N Yellowstone Hwy, Interstate 15, and the Snake River. Growth within the city and the Ucon and IBSD service areas is likely to increase flows and loadings at the WWTP.

1.3.11 Precipitation, Temperature and Prevailing Winds

The Western Regional Climate Center records data from several weather stations located in and around Idaho Falls. The area is generally considered to have a mild climate with four distinct seasons. The greatest average maximum monthly temperature is approximately 86.0° F, with an average total precipitation of 9.95 inches, and an average total snowfall depth of 35.3 inches (Western Regional Climate Center, 2023). Climate data are summarized in Table 1-2.

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[2] (U.S. Dept. of Agriculture, 2023)

Table 1-2 – Climate Data for Idaho Falls

Month	Average Maximum Temp (°F)	Average Minimum Temp (°F)	Average Total Precipitation (inches)	Average Total Snowfall (inches)
January	27.2	10.2	0.76	8.7
February	33.6	15.3	0.72	6.4
March	44.2	23.6	0.75	3.8
April	57.0	31.2	0.88	2.2
May	66.9	39.0	1.38	0.5
June	76.2	45.5	1.15	0.0
July	86.0	50.8	0.54	0.0
August	84.5	49.1	0.70	0.0
September	73.8	40.6	0.70	0.0
October	60.3	31.1	0.76	0.7
November	42.2	22.0	0.81	4.5
December	30.1	12.5	0.79	8.6
Annual	**56.9**	**30.9**	**9.95**	**35.3**

1.3.12 Air Quality and Noise

Idaho is among the states that have primacy authority designated from the United States Environmental Protection Agency (EPA) to issue air quality permits and enforce air quality regulations. Idaho DEQ's air quality programs are designed to encourage compliance with federal and state health-based air quality regulations. The Clean Air Act of 1970 identified six common air pollutants of concern, called "criteria pollutants." These criteria pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. Fugitive dust is also closely regulated as it contributes to particulate matter.

The City of Idaho Falls is not considered to be within a nonattainment area, maintenance area, or particulate matter advanced area. The City is also not listed as an area of general air quality concern. There are no anticipated long-term adverse impacts to air quality or noise levels from any proposed improvements that have been identified at this time; however, any improvements made to the WWTP may have a temporary local impact on both noise and air quality (dust) due to construction activities. Best management practices during construction can mitigate these adverse impacts. Identified areas of general air quality concern are shown in Figure 1-19.

1.4 POPULATION TRENDS

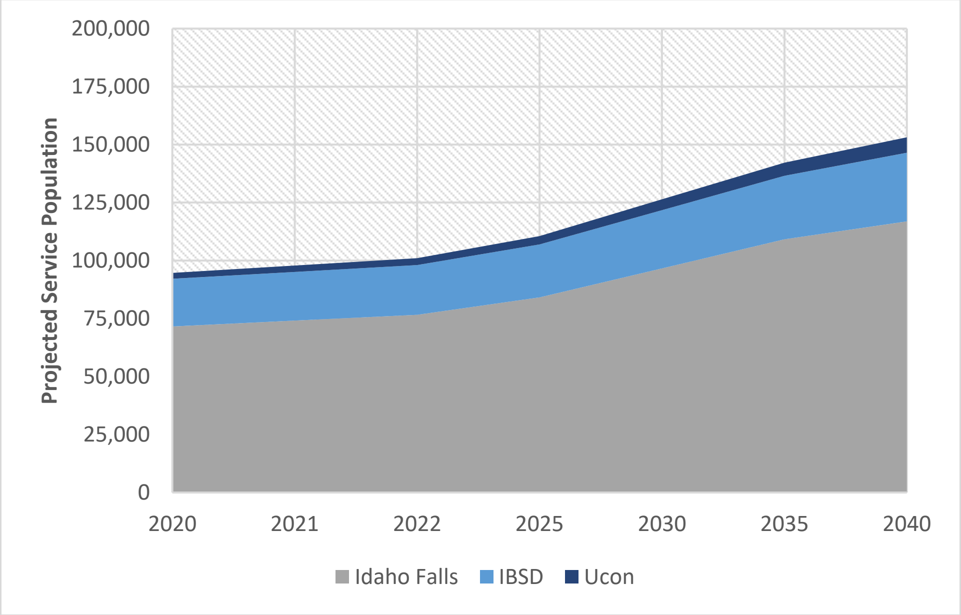
The Idaho Falls WWTP collects and treats wastewater from residents and businesses within the City of Idaho Falls, various area industries, and accepts wastewater from Ucon, the IBSD, and a small portion of the City of Ammon. Prior to 2013, the City of Ammon contracted with the City of Idaho Falls for treatment of their entire domestic wastewater flow; however, beginning in 2013, the City of Ammon transitioned away from the City of Idaho Falls WWTP and partnered with the City of Shelley and other groups in Bingham and Bonneville Counties to form the East Idaho Regional Wastewater Association. The Association has since been reorganized as the East Idaho Regional Sewer District. The current and potential projected service area of each entity is shown in Figure 1-20.

Population projections established and maintained by the Bonneville Metropolitan Planning Organization (BMPO) were used as a basis of planning (BMPO, 2023). Projections were obtained through ArcGIS Online and utilized herein. Ucon and the IBSD have discussed terminating their current wastewater service agreements with the City of Idaho Falls; however, no definite plans to do so have been announced. Therefore, population scenarios with and without Ucon and the IBSD were considered. Projected populations are summarized in Table 1-3 and shown in Figure 1-1. The BMPO provided an estimate for 2035 and 2050, values for other years were interpolated using the BMPO benchmarks.

Table 1-3 – Projected Service Area Population

Entity	2020	2022	2025	2035	2045	2050
Idaho Falls	71,592	76,602	84,116	109,166	124,589	132,300
IBSD	20,562	21,472	22,837	27,387	31,790	33,991
Ucon	2,538	2,958	3,587	5,685	7,659	8,645
IF + IBSD + Ucon	**94,692**	**101,031**	**110,541**	**142,238**	**164,037**	**174,937**

Figure 1-1 – Projected Service Area Population



These population projections are used for estimating and projecting influent flows and loadings to the WWTP and establishing design criteria for the planning period.

1.5 WASTEWATER INFLOWS AND PROJECTIONS

Historic daily and monthly average flow data from 2019 – 2022 were considered as part of the development of this wastewater flow analysis. Currently, the City of Idaho Falls measures effluent flow at the WWTP which precludes information from being obtained for peak hour flow due to potential buffering with the treatment plant and the influence of side-stream processes such as solids handling.

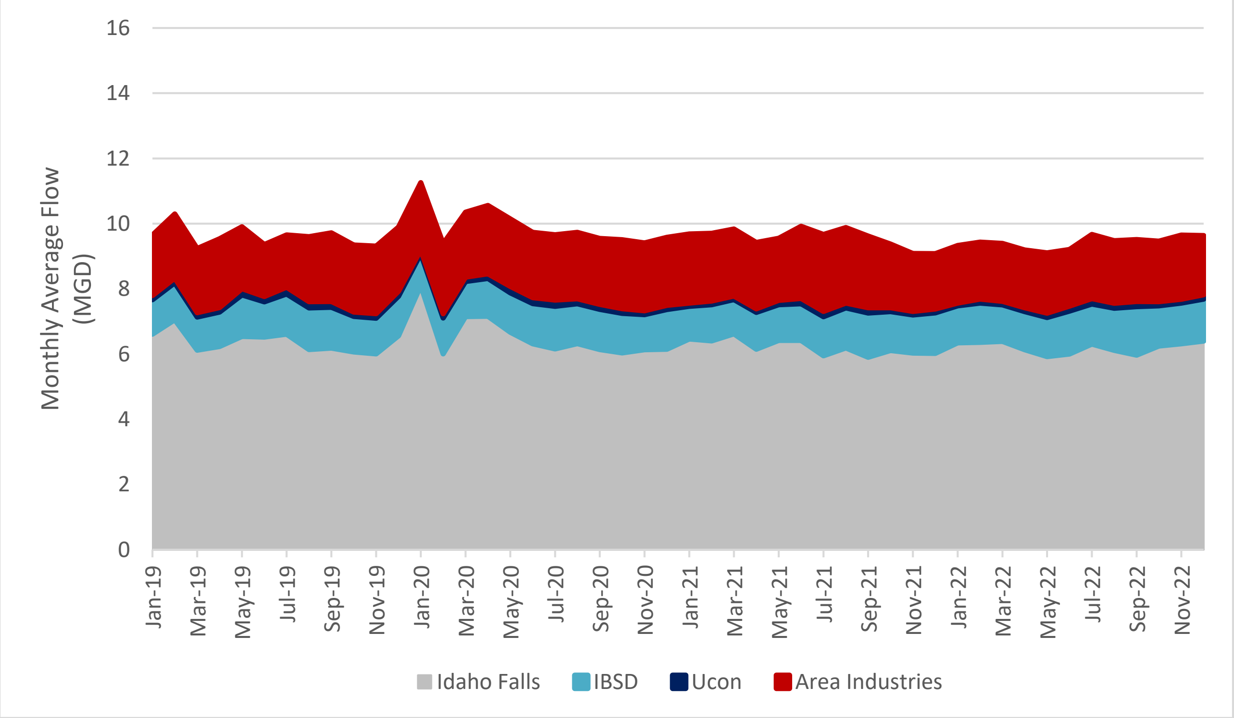
Ultimately, daily data was available for the WWTP itself and monthly data was available for Ucon, the IBSD, and the large industries discharging to the City of Idaho Falls' Wastewater System. These industries include Anheuser-Busch (BARI), Ingredion Inc., Golden Valley Natural, Melaleuca, the East Idaho Regional Medical Center (EIRMC), the Idaho National Laboratory's (INL) Idaho Falls campus, Circle Valley Produce, and Northwest Cosmetics. Since November 2022, Intermountain Packing has also been discharging to the City of Idaho Falls wastewater collection system. Specific assumptions are indicated where applicable.

1.5.1 Historic Flows

Since January 2019, flows have averaged 9.6 MGD and appear relatively consistent with little apparent seasonal influences as shown in Figure 1-2. A single spike in the data record occurred in January 2020 and represented a maximum flow of 11.3 MGD. This spike does not appear within the data record from the IBSD, Ucon, or the large industrial dischargers and operators have indicated this could be tied to flow metering or other issues experienced in 2020 and is likely anomalous.

Comparing flows from the area industrial discharges to the total volume metered at the WWTP, it was determined that the relative proportion of flow contribution from industrial sources has also remained consistent over the period considered. Total industrial contributions to the WWTP accounted for approximately 20.4% of total flow volume while domestic users (e.g., Idaho Falls, the IBSD, and Ucon) contributed an average of 79.6% of the total flow to the WWTP. Of total domestic contributions, Idaho Falls, the IBSD, and Ucon each contributed an average of 65.7%,12.2%, and 1.5% of total flow, respectively. Relative flow contributions from each domestic entity and the area industries are shown in Figure 1-2.

Figure 1-2 – Average Monthly Influent Flow (January 2019 – December 2022)



Interestingly, despite an apparent increasing service population, a significant increasing trend in influent flow was not observed over the period considered. However, based on American

Community Survey estimates for the cities of Iona, Ucon, and Idaho Falls, it appears that population growth has largely plateaued since 2019 which could be tied to conditions during the COVID-19 pandemic and the temporary decline in housing development which occurred as a result (US Census Bureau, 2023). This plateau in service population is not anticipated to persist due to the level of development pressure within the service area of the Idaho Falls WWTP and the developments that are underway.

1.5.2 Infiltration and Inflow

Infiltration is defined as water entering the wastewater collection system through cracks, fractures, and holes in system components. Inflow is defined as the amount of flow into the sanitary sewer through a direct stormwater connection such as a storm water drain or direct flow through the manhole lid. Contributions from infiltration and inflow (I&I) during significant wet weather events may exceed the transmission or treatment capacity of wastewater systems resulting in surcharges or overflows that may have adverse environmental or public health impacts (U.S. EPA, 2023).

Two periods of wet weather were identified for consideration using the National Weather Service (NWS) historic Southeast Idaho Climate Graphs (National Weather Service, 2023). Rainfall data from the NWS was used in conjunction with the daily effluent record at the WWTP to conduct a brief inflow and infiltration analysis. Following each storm event, substantial increases in recorded flow were observed following each storm event. No other apparent explanation was available for the observed increase in flow. Rainfall and recorded flows are shown in Figure 1-3 and Figure 1-4.

Figure 1-3 – July/August 2021 Rainfall and Flow

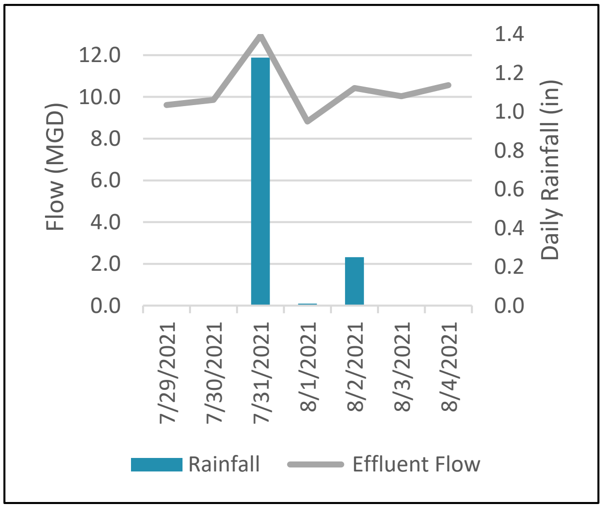
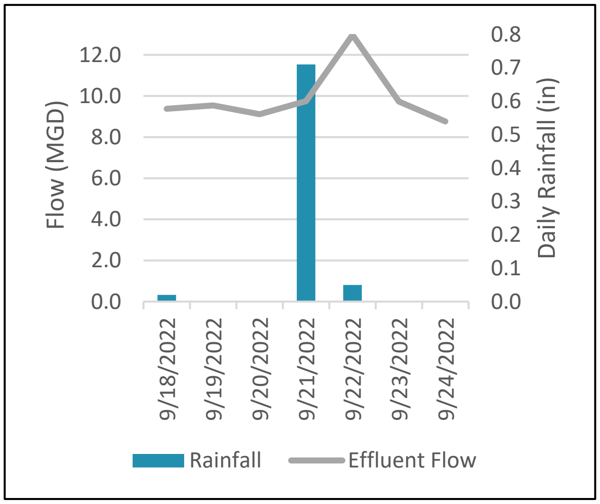


Figure 1-4 – September 2022 Rainfall and Flow



Based on these data, it appears there is correlation between rainfall events and increased flow at the WWTP; however, the WWTP has been able to accommodate these temporary increased flows, but their frequency seems to be increasing over the past several years. A more detailed analysis and extensive data collection would need to be completed to determine the potential sources of the I&I.

1.5.3 Design Flows

IDAPA 58.01.16 requires design flows to be calculated and used in the design and evaluation of wastewater facilities. Specifically, Average Day Flow (ADF), Maximum Day Flow (MDF), Maximum Month Flow (MMF), Peak Hour Flow (PHF), and Peak Instantaneous Flow (PIF) are to be identified if required for a specific design. These terms are defined within their respective sections herein.

Flow projections were completed for the domestic and industrial contributions individually and considered data collected since 2019. Ultimately data collected from 2021 and 2022 was used due to variations in industrial flows and loadings which occurred during the period considered.

Average Day Flow

The average day flow (ADF) is the average volume of water received daily over the course of a year. The average day flow, as shown in Table 1-4 and Table 1-5, is the average flow measured from January 2021 through December 2022. This value was then extrapolated for the 20-year planning period by normalizing the flow to a ‘gallon per capita daily’ (gpcd) basis by dividing the component of the measured flow attributable to municipal wastewater generation (approximately 80% of total effluent flow) by the estimated service population. Once flow was normalized to the gpcd basis, the projected populations discussed in Section 1.4 were used to determine anticipated contributions in the future resulting from an increased service population from Idaho Falls, the IBSD, and Ucon. Table 1-5 also presents a scenario in which Ucon and the IBSD no longer contribute flow to the Idaho Falls WWTP. Since the departure of Ucon and the IBSD would not impact the area industries, the relative contribution from the industrial sources was slightly higher (23%) under that scenario.

Maximum Month Flow

The maximum month flow (MMF) is the largest volume of flow received during any calendar month. The maximum month flow, as shown in Table 1-4 and Table 1-5, is the largest monthly flow recorded during the 2021-2022 period. Maximum month flow projections were conducted in the same manner as described previously for the average day flow.

Maximum Day Flow

According to IDAPA 58.01.16.010, the maximum day flow (MDF) is the largest volume of flow received during a continuous 24-hour period. The maximum day flow, as shown in Table 1-4 and Table 1-5 is the largest daily flow recorded from January 2021 through December 2022. Flow projections were conducted for both future scenarios in the same manner as described previously.

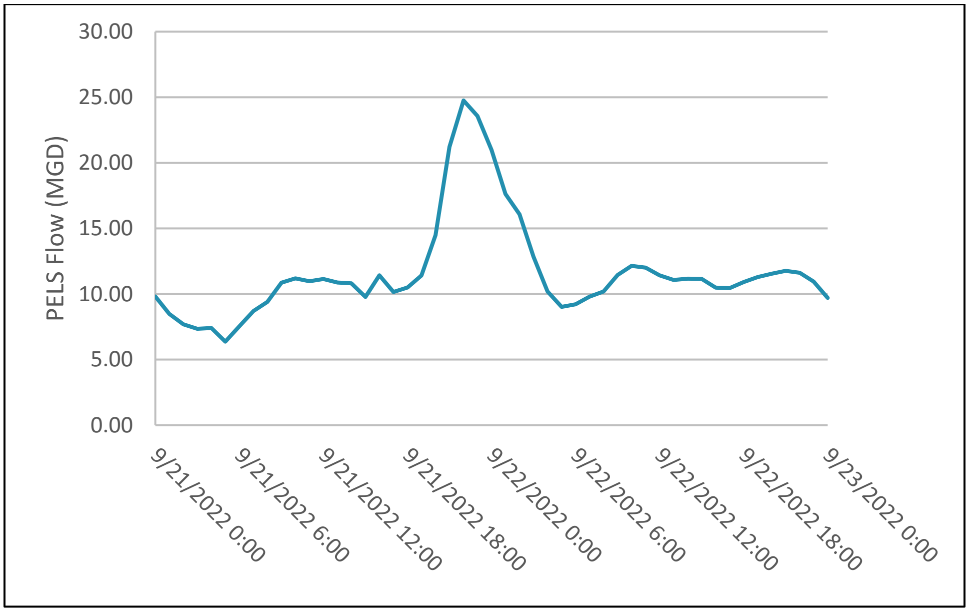
Peak Hour Flow

The peak hour flow (PHF) is the largest volume of flow to be received during a one-hour period (IDAPA 58.01.16.010). Typical PHF for communities like Idaho Falls will occur during the morning or evening hours due to residential water use increasing during these periods; however, PHF can also be influenced by large industrial dischargers or may occur after large rainfall events.

Due to meter data being at the Plant effluent only, an average day to peak hour factor of 2.87 was used within the 2010 WWFPS to estimate PHF (MSA, Inc., 2010). Pump speed and runtime information following two large storm events in July 2021 and September 2022 was used as a further estimate of peak hour flows through the primary effluent lift station (PELS). The PELS is located downstream of the primary clarifiers and therefore some flow buffering due to the residence time within the primary clarifiers is likely; however, the PELS provides the best available data on peak flows at the WWTP. Ultimately it was determined that the 2010 peaking factor provides a reasonable approximation of peak hour flows and therefore are used to maintain consistency of the City's planning documents.

Calculated PHF through the PELS during the September 21, 2022 storm event is presented graphically in Figure 1-5 and tabulated values for PHF using the 2010 peaking factor are provided in Table 1-4 and Table 1-5. Flow projections were conducted in the same manner as described previously for the average day flow.

Figure 1-5 – Estimated PELS Flow, September 21-22, 2022



Peak Instantaneous Flow

The peak instantaneous flow (PIF) is the single largest instantaneous flow rate to be received at the WWTP and is critical for adequate sizing of plant influent and headworks infrastructure (IDAPA 58.01.16.010). PIF cannot be estimated with confidence using PELS data due to flow buffering in the primary clarifiers and no other data is available that would allow for its calculation. PIF was also not considered within the 2010 WWFPS (MSA, Inc., 2010). Due to the known stormwater inflow issues, and based on similar systems, it is likely that the City of Idaho Falls experiences a peak hour to peak instantaneous factor of 1.1x – 1.2x. A factor of 1.2x is used as a basis for planning only and as a means to evaluate the hydraulics within the existing headworks; however, prior to the design of any headworks improvements, actual influent flow data should be collected.

Industrial Flows

Monthly flow data was collected by each of the large industrial users discharging to the City of Idaho Falls. This industrial flow data was compared with flow data from the Idaho Falls WWTP to determine that large industrial dischargers account for approximately 20% of the total influent flow volume received by the WWTP. As domestic flow increases due to an expanding service population, it was assumed that industrial contributions to the overall wastewater volume would remain at approximately 20% of the total as additional industries are attracted to the area. The City staff has indicated that multiple industries are currently considering opening or expanding facilities within the service area which is anticipated to keep the relative percentage of industrial discharge constant as the service population continues to increase. Because of the low resolution of the industrial flow data, peaking factors for max day, peak hour, and peak instantaneous flow were assumed to be the same as peaking factors observed for the total flow received at the WWTP.

Based on the assumptions documented herein, it is anticipated that average day and maximum month hydraulic loading at the Idaho Falls WWTP have the potential to increase significantly over the 20-year planning period. However, the overall projections remain below the 2028 projected values included in the 2010 WWFPS (ADF = 17 MGD, MMF = 18 MGD) as total flows have not increased as quickly as originally expected (MSA, Inc., 2010).

Table 1-4 – Design Flows and Projections, Scenario 1 **with** IBSD + Ucon

Flow Regime (MGD)	Domestic Flow					Industrial Flow				Total Flow to WWTP			
	2022	**2022**	**2025**	**2035**	**2045**	**2022**	**2025**	**2035**	**2045**	**2022**	**2025**	**2035**	**2045**
	MGD	**gpcd**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**
Average Annual Day	7.6	75.4	8.3	10.7	12.4	2.0	2.1	2.7	3.2	9.6	10.5	13.5	15.5
Maximum Month	7.9	78.1	8.6	11.1	12.8	2.0	2.2	2.8	3.3	9.9	10.9	14.0	16.1
Maximum Day	10.3	101.9	11.3	14.5	16.7	2.6	2.9	3.7	4.3	12.9	14.2	18.2	21.0
Peak Hour[3]	21.9	216.3	23.9	30.8	35.5	5.6	6.1	7.9	9.1	27.5	30.0	38.7	44.6

Table 1-5 – Design Flows and Projections, Scenario 2 **without** IBSD + Ucon

Flow Regime (MGD)	Domestic Flow					Industrial Flow				Total Flow to WWTP			
	2022	**2022**	**2025**	**2035**	**2045**	**2022**	**2025**	**2035**	**2045**	**2022**	**2025**	**2035**	**2045**
	MGD	**gpcd**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**
Average Annual Day	6.2	81.3	6.8	8.9	10.1	2.0	2.1	2.7	3.2	8.2	9.0	11.6	13.3
Maximum Month	6.5	84.2	7.1	9.2	10.5	2.0	2.2	2.8	3.3	8.5	9.3	12.0	13.8
Maximum Day	8.4	109.9	9.2	12.0	13.7	2.6	2.9	3.7	4.3	11.1	12.1	15.7	18.0
Peak Hour[3]	17.9	233.2	19.6	25.5	29.1	5.6	6.1	7.9	9.1	23.5	25.7	33.3	38.2

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[3] Assuming an ADF:PHF Factor of 2.87 from 2010 WWFPS (MSA, Inc., 2010)

1.6 INFLUENT CHARACTERISTICS

As has been established, the wastewater flow to the City of Idaho Falls WWTP is a mixture of contributions from residential, commercial, and various industrial dischargers. Local septic haulers are also allowed to unload at the dump station located within the treatment plant; however, this location will change following the completion of the City's current dewatering project which includes a septage receiving station component. A description of the WWTP influent quality and characteristics, organized by constituent, is provided in the following sections.

The City of Idaho Falls does employ a pre-treatment program which subscribes to local and federally established pre-treatment standards. Local limits for pH, Arsenic, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, Silver, Zinc, and Oil and Grease are imposed (City of Idaho Falls, 2023).

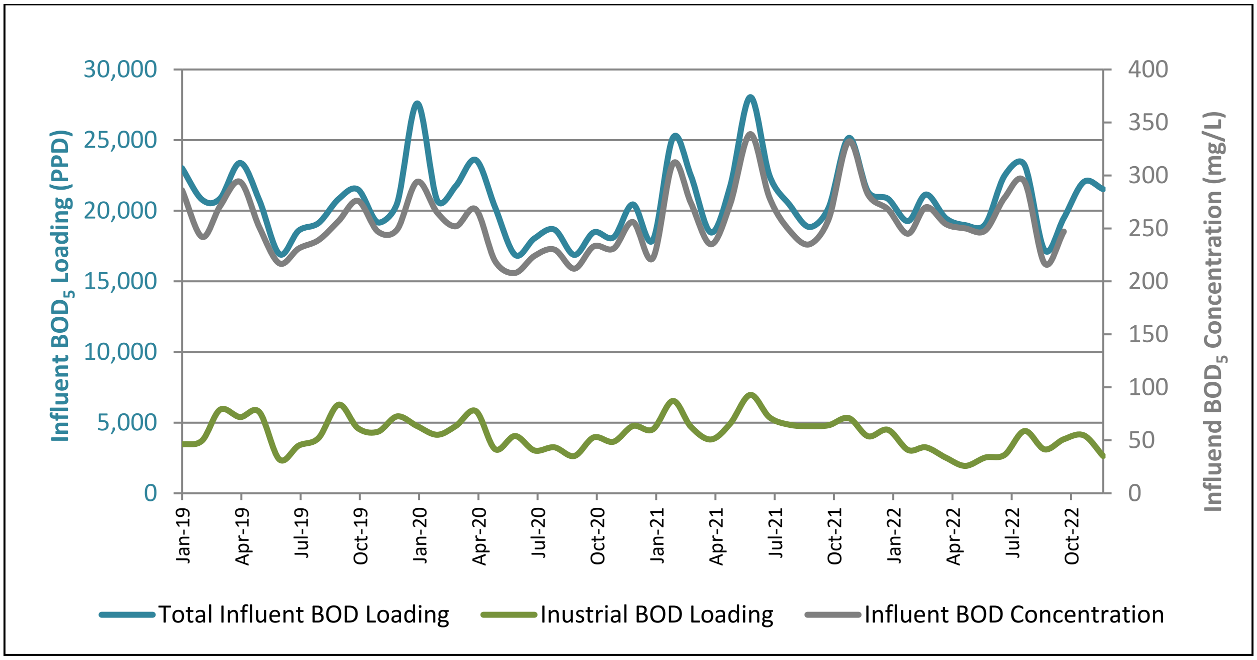
1.6.1 Influent BOD_5

City operators have reported that significant reductions in influent BOD_5 have occurred over the past decade which has required some operational adjustments. Within the past decade, the City of Ammon ceased contributing wastewater to the City of Idaho Falls and Anheuser-Busch installed an industrial pre-treatment plant which significantly reduced BOD_5 loadings from their malting facility. Combined, the exodus of Ammon and additional treatment at the Anheuser-Busch facility significantly reduced loadings at the WWTP which averaged nearly 26,000 pounds per day (PPD) between 2004 and 2008 (MSA, Inc., 2010).

As part of the 2017 primary upgrades, the City installed a gravity thickener/fermenter which thickens primary solids and provides residence time for the formation of additional volatile fatty acids (VFA's) to help fuel the secondary biological processes in the plant.

Monthly influent BOD_5 data from January 2019 through December 2022 are shown in Figure 1-6. During the period considered, recorded monthly average influent BOD_5 concentrations varied between 208 – 339 mg/L with an average of 257 mg/L (loading rate between 16,873 and 28,038 PPD with an average of 20,717 PPD). The highest BOD_5 loading occurred in June of 2021 and similar loading rates have occurred since. Industrial BOD_5 loading accounted for approximately 20% of the total BOD_5 loading at the treatment plant.

Figure 1-6 – Influent BOD5

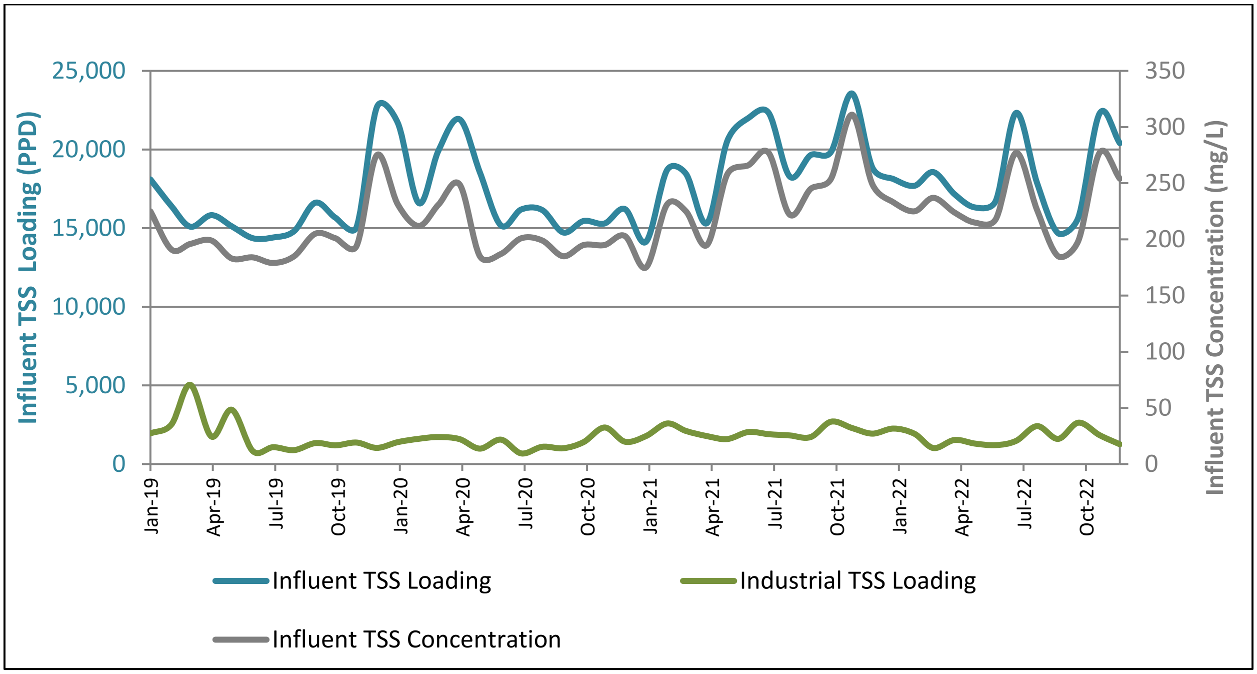


1.6.2 Influent TSS and VSS

Monthly influent TSS for January 2019 through December 2022 are shown in Figure 1-7. During the period considered, recorded monthly average influent TSS concentrations varied between 175 – 311 mg/L with an average of 220 mg/L (loading rate between 14,131 and 23,562 PPD with an average of 17,723 PPD). Industrial contributions since 2019 have accounted for approximately 10% of the total TSS loading measured at the treatment plant. The highest TSS loading occurred in November 2021.

Monthly average influent VSS concentrations varied between 152 – 290 mg/L with an average of 193 mg/L (loading rate between 11,863 and 21,971 PPD with an average of 15,495 PPD). The highest VSS loading also occurred in November 2021 during the influent TSS spike. Based on average values, influent TSS to the WWTP are approximately 87% VSS. VSS is tracked downstream of the influent screens, ahead of the primary clarifiers while TSS is sampled ahead of the influent screens.

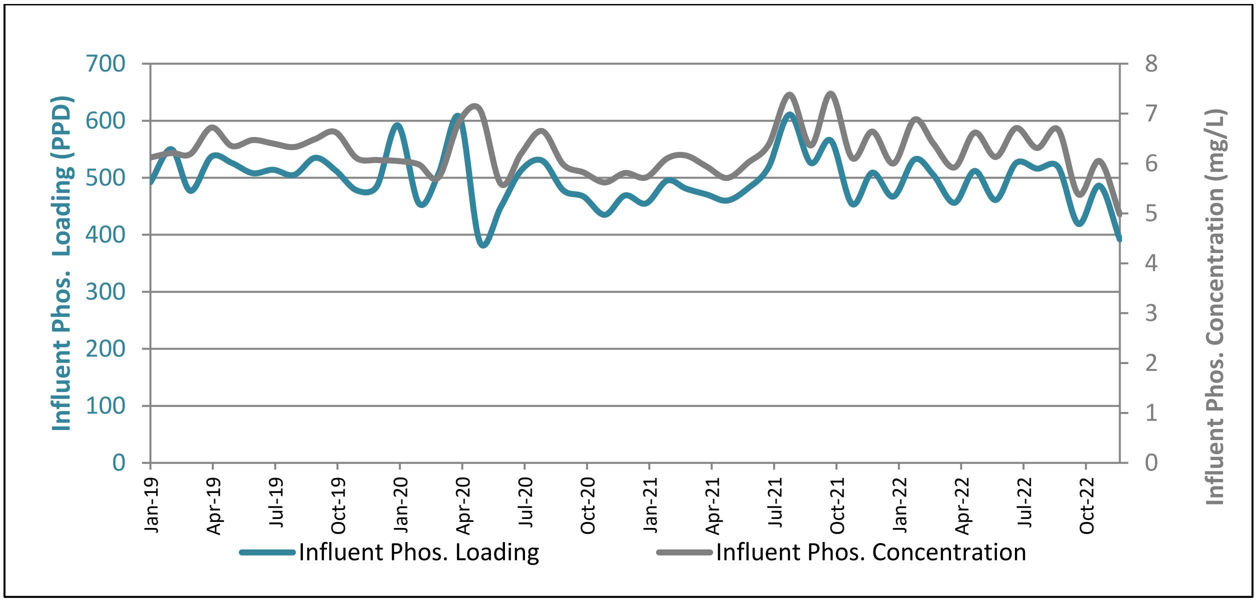
Figure 1-7 – Influent TSS



1.6.3 Influent (Primary Effluent) Total Phosphorous

Influent total phosphorous is tracked in the primary effluent, downstream of both the headworks screens and primary clarifiers. Monthly total phosphorous measurements taken from January 2019 through December 2022 are shown in Figure 1-8. During the period considered, recorded monthly average total phosphorous concentrations varied between 5 – 7 mg/L with an average of 6 mg/L (loading rate between 387 and 611 PPD with an average of 496 PPD). The highest phosphorous loading occurred in August 2021.

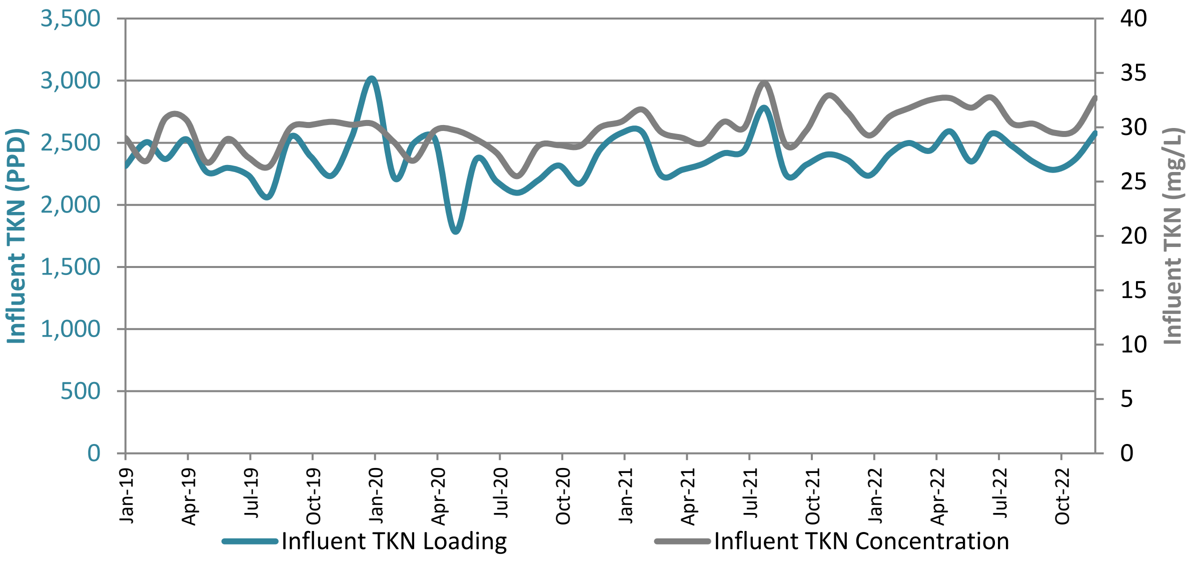
Figure 1-8 – Influent Phosphorous



1.6.4 Influent (Primary Effluent) Total Kjeldahl Nitrogen (TKN)

Influent TKN is tracked in the primary effluent, downstream of both the headworks screens and primary clarifiers. Monthly influent TKN data from January 2019 through December 2022 are shown in Figure 1-9. During the period considered, recorded monthly average influent TKN concentrations varied between 26 and 31 mg/L with an average of 29 mg/L (loading rate between 1,338 and 3013 PPD with an average of 2,321 PPD). The highest TKN loading occurred in January of 2020 during the peak observed in the flow record; however, this loading appears primarily tied to the flow data for that month rather than a spike in the observed influent TKN concentration. Planning criteria for TKN will therefore be based on the next highest maximum month load from August 2021 rather than January 2020 due to the concerns about the reliability of that flow data as discussed in Section 1.5.

Figure 1-9 – Influent TKN



1.6.5 Other Influent Constituents – pH

During the period considered, influent pH ranged between 6.8 and 8.1 with an average value of 7.4. While influent pH has remained constant and is not projected to vary significantly in the future, pH has the potential to impact all treatment processes within the treatment plant and can significantly impair effluent quality and the anticipated lifetime of both treatment and collection system infrastructure. Certain industrial processes could significantly impact pH and upset the City's WWTP.

1.6.6 Projected Influent Loads

To project future influent loadings, maximum month influent loadings were normalized to a per capita basis (pounds per capita daily or PPCD) based on the population data presented within Section 1.4. Information regarding the industrial dischargers in the area was also used to establish the relative industrial to municipal loadings ratio for each influent constituent considered. Based on the most recent samples available at the time of this writing, industrial contributions account for approximately 20% of the total BOD_5 loading at the WWTP as well as nearly 10% of the total influent TSS loading. It was assumed that, for the foreseeable future, the relative industrial to domestic loading ratio for these constituents would remain approximately constant as anticipated domestic population growth balances the potential for additional industrial discharges.

Total phosphorous or TKN contributions from area industrial dischargers is a concern that is increasing. Currently, data is not available to determine the actual contribution of these constituents resulting from industrial sources. Projections for these constituents are based on normalizing total influent loads by the current estimated service population and then projecting using the future estimated population. Values are presented in Table 1-6, and Table 1-7.

The City of Idaho Falls has increased monitoring of total phosphorus, TKN and ammonia data as part of the sampling that is currently being done for BOD_5 and TSS. Other constituents which should be tracked from industrial dischargers and the discharge from the IBSD and Ucon include pH and FOG at a minimum. Any metals or other constituents which could be of concern based on the nature of the industry (i.e., copper, mercury, etc.) should also be tracked. Apart from providing more comprehensive information regarding who is responsible for the loadings at the WWTP, this data can also better inform and identify prudent pre-treatment requirements and ultimately protect the City against harmful discharges from these producers of wastewater.

In a similar way to the flow projections discussed in Section 1.5, a scenario was projected in which the IBSD and Ucon terminate wastewater service agreements with the City of Idaho Falls. The City has data record for BOD_5 and TSS contributions for both the IBSD and Ucon, but the results in pounds per day per capita seem very low in comparison to Idaho Falls and were therefore not used. Instead, the same domestic pounds per capita were used from scenario 1 to estimate the reduction in load at the treatment plant in the event of their exodus. Because area industries would continue discharge to the Idaho Falls WWTP under this scenario, projected industrial loadings remained the same which would result in a modest increase in the industrial to domestic ratio.

Based on the available information, the Idaho Falls WWTP has the potential to experience a nearly 60% increase in influent pollutant loading because of the projected population increase and a potential sustained increase in industrial contributions over the 20-year planning period. These projections should be re-evaluated on a continuous basis as area industries adjust business practices, the City collects additional data on their discharge, and the potential for new industrial growth becomes clearer in the future. New industrial dischargers, dissimilar to those currently contributing to the loadings at the WWTP, also have the potential to significantly impact future loadings depending on the nature of the business they are performing.

Table 1-6 – Projected Loadings, Scenario 1 **with** IBSD + Ucon

Influent Constituent	Domestic Loading					Industrial Loading				Total Flow			
	2022	2022	2025	2035	2045	2022	2025	2035	2045	2022	2025	2035	2045
	PPD	ppcd	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD
BOD_5	22,345	0.22	24,449	31,459	36,281	5,692	6,228	8,014	9,242	28,038	30,677	39,474	45,523
TSS	21,169	0.21	23,162	29,803	34,371	2,392	2,617	3,368	3,884	23,562	25,779	33,171	38,255
Phos[4]	--	--	--	--	--	--	--	--	--	611	669	860	992
TKN[4]	--	--	--	--	--	--	--	--	--	2,780	3,042	3,914	4,514

Table 1-7 – Projected Loadings, Scenario 2 **without** IBSD + Ucon

Influent Constituent	Domestic Loading					Industrial Loading				Total Flow			
	2022	2022	2025	2035	2045	2022	2025	2035	2045	2022	2025	2035	2045
	PPD	ppcd	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD	PPD
BOD_5	22,345	0.22	18,604	24,145	27,556	5,692	6,228	8,014	9,242	28,038	24,833	32,159	36,798
TSS	21,169	0.21	17,625	22,874	26,105	2,392	2,617	3,368	3,884	23,562	20,242	26,242	29,989
Phos[4]	--	--	--	--	--	--	--	--	--	611	509	660	753
TKN[4]	--	--	--	--	--	--	--	--	--	2,780	2,315	3,004	3,428

---

[4] Projections based on normalized total loading and future anticipated service population.

The 2012 design drawings for the Secondary Treatment System Improvements Project identify a design maximum month total phosphorus load of 1,000 PPD and total TKN load of 3,560 PPD (MSA, Inc., 2013). Identified max month design loads for BOD_5 and TSS are 44,600 PPD and 44,750 PPD, respectively (MSA, Inc., 2013). Based on the projections included in Table 1-6, design influent loadings for TKN will likely be exceeded within the next decade and loadings for total phosphorus and BOD_5 will approach their respective design values within the next 15-20 years. Sidestream loading from the planned dewatering improvements will also exacerbate the capacity issue.

As development and population growth continue within the service area of the Idaho Falls WWTP, and the dewatering process is brought online, it is likely that additional aeration basin capacity and supplemental treatment methods may need to be considered to augment the biological treatment process. It is recommended that the biological model be updated to reflect current operating conditions in order to identify optimization strategies and more precisely determine when expansion of the secondary treatment process is required.

1.7 REGULATIONS AND PERMITTING

Permit limits govern discharge quality from wastewater treatment plants (WWTPs) and future permitting requirements often act as the impetus for treatment plant capital improvements. Therefore, it is prudent to consider current, proposed, and potential future permit limits as part of any capital planning effort associated with municipal WWTPs. In this section, a review of the currently available permit information, and discussions with representatives from the Idaho Department of Environmental Quality (DEQ), are summarized in regard to potential future permit limitations.

1.7.1 NPDES/IPDES Permit

The City of Idaho Falls currently operates and discharges treated wastewater to the Snake River under National Pollutant Discharge Elimination System (NPDES) permit No. ID-0021261. The permit was issued by the US Environmental Protection Agency (EPA) on September 20, 2012, and remained effective until October 31, 2017. As the effective date approached, a renewal application was submitted by the City of Idaho Falls following which the 2012 permit was administratively extended and has remained in effect while an updated permit is prepared.

Beginning in July of 2018, the Idaho DEQ was granted primacy authority by the US EPA for NPDES permit writing within the State of Idaho and the Idaho Pollutant Discharge Elimination System (IPDES) was established. As such, Idaho DEQ will act as the issuing body for the City’s upcoming IPDES permit but has provided no definite timeline regarding when an updated permit will be released. However, based on discussions held with regulators on February 10, 2023, it is likely that an updated permit will be issued within the next 1-2 years. The administratively extended 2012 NPDES Permit Limits are identified in Table 1-8 (US EPA, 2012).

Table 1-8 – Summarized 2012 NPDES Permit Limits

Parameter	**Effluent Limitations**				**Monitoring Requirements**		
	Units	**Average Monthly**	**Average Weekly**	**Maximum Daily**	**Sample Location**	**Sample Frequency**	**Sample Type**
Numeric Effluent Limits							
Biochemical Oxygen Demand (BOD_5)	mg/L	**30**	**45**	**—**	Influent & Effluent	3/week	24-hour composite
	lb/day	**4,250**	**6,380**	**—**			
	% removal	**85% min.**	**—**	**—**	% removal	1/month	Calculation
Total Suspended Solids (TSS) TMDL-based limit	mg/L	**30**	**45**	**—**	Influent & Effluent	3/week	24-hour composite
	lb/day	**4,250**	**6,380**	**—**			
	% removal	**85% min.**	**—**	**—**	% removal	1/month	Calculation
E. Coli Bacteria[5,6]	#/100 ml or MPN/100 ml	**126 (Geometric Mean)**	**—**	**406 (Instantaneous Maximum)**	Effluent	5/month	Grab
pH	s.u.	**6.5 – 9.0 at all times**			Effluent	Daily	Grab
Total Residual Chlorine	µg/L	**90**	**—**	**200**	Effluent	Daily	Grab
	lb/day	**12.8**	**—**	**28.4**			
Total Ammonia (as N) *(June-September)*[7]	mg/L	**3.8**	**—**	**14.1**	Effluent	Daily	24-hour composite
	lb/day	**539**	**—**	**1,999**			
Total Ammonia (as N) *(October-May)*[7]	mg/L	**3.4**	**—**	**12.3**	Effluent	Daily	24-hour composite
	lb/day	**482**	**—**	**1,744**			
Total Phosphorus (as P)	mg/L	Report	Report	—	Effluent	3/week	24-hour composite
	lb/day	**391**	**586**	**—**			
	lb/day	**Annual Average Limit: 236 lb/day[7]**					

In addition to the summarized permit limits, the City of Idaho Falls is required to monitor and report the following constituents at various frequencies and using either composite or grab samples as indicated within the permit:

- Flow (Influent OR Effluent)
- Effluent Temperature
- Effluent Alkalinity, Total
- Influent and Effluent Arsenic, Total
- Influent and Effluent Cadmium, Total Recoverable
- Influent and Effluent Chromium VI, Dissolved
- Influent and Effluent Chromium, Total
- Influent and Effluent Cyanide
- Influent and Effluent Copper
- Effluent Dissolved Oxygen
- Effluent Hardness, as $CaCO_3$
- Influent and Effluent Lead
- Influent and Effluent Mercury
- Influent and Effluent Nickel
- Effluent Nitrate + Nitrite
- Effluent Oil and Grease
- Effluent Total Orthophosphate, as P
- Influent and Effluent Silver
- Effluent TDS
- Effluent TKN
- Effluent Toxicity
- Influent and Effluent Zinc
- Expanded Effluent Testing

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[5] The average monthly E. Coli bacteria counts must not exceed a geometric mean of 126/100 ml based on a minimum of five samples taken every 3-7 days within a calendar month.

[6] Reporting is required within 24 hours of a maximum daily limit or instantaneous maximum limit violation.

[7] The annual average total phosphorus load must be calculated as the sum of all daily discharges measured for total phosphorus during a calendar year, divided by the number of daily discharges measured for total phosphorus during that year.

No justification within the 2012 NPDES permit or it's associated fact sheet give indication that any monitored constituents are likely to become permit limits as part of future discharge permits; however, they are nonetheless constituents of interest for the US EPA and constituents which the Idaho DEQ has been tracking (US EPA, 2012).

Based on the City's compliance history, the facility appears able to meet current limitations. However, because many of the current numeric limitations imposed upon the City include loading limits, as flow increases due to population or industrial growth within the WWTP service area, the City will need to continually treat to a higher standard. That being said, DEQ regulators indicated during the February 10, 2023, meeting that there is a willingness to work with the City based on future design flows that could be included in future permits.

1.7.2 Future Discharge Permitting

It is difficult to predict whether substantive changes will be included within the City's upcoming IPDES Permit. No formal communications regarding potential changes have been provided by either the US EPA or Idaho DEQ. Discussions held with regulators on February 10, 2023, indicated that no obvious modifications were planned; however, historically interpretations of an existing 'Total Maximum Daily Load' (TMDL) have been revisited which could have implications to discharge permitting – either in regard to additional or fewer discharge limitations.

Section 303(D) of the Clean Water Act requires states and tribal entities to establish beneficial uses for the bodies of water within their respective jurisdictions and develop improvement plans referred to as TMDLs in the event of an observed impairment. The TMDL establishes a total pollutant load that a given waterway can accept without exceeding applicable water quality standards and impairing its identified beneficial use. As part of the TMDL, point sources along each reach of the waterway in question are identified and assigned a waste load allocation (WLA) for each pollutant identified as impairing water quality within the waterway. In so doing, downstream conditions in the waterway can ripple upstream and impact dischargers higher in the watershed.

Within the State of Idaho, TMDLs are completed at the subbasin level. The City of Idaho Falls discharges treated wastewater to the Snake River and is included in the Idaho Falls Subbasin (HUC 17040201) of the Snake River. The Idaho Falls Subbasin is approximately 563 square miles and comprises of a portion of the South Fork Snake River that flows from near Heise to the Henry's Fork River as well as a section of the main stem of the Snake River from the Henry's Fork confluence down to the diversion dams located south of Idaho Falls. The designated beneficial uses applicable to these waterways are cold water aquatic life, salmonid spawning, primary contact recreation, and domestic water supply. In addition, the Idaho Water Quality Standards state that all waters of the State of Idaho are protected for industrial and agricultural water supply, wildlife habitats, and aesthetics. In this reach of the Snake River, no impairment is identified by Idaho DEQ within the 2004 Subbasin Assessment and TMDL; however, Birch Creek was listed as impaired due to sediments (Idaho DEQ, 2023).

The Idaho Falls WWTP also lies near the boundary between the Idaho Falls Subbasin and the American Falls Subbasin (HUC 17040206). The American Falls Subbasin is approximately 2,870 square miles and the American Falls Reservoir and the Snake River are the predominate water bodies within that subbasin. The designated beneficial uses of the American Falls Subbasin include cold water aquatic life, salmonid spawning, primary and secondary contact recreation, and domestic water supply. That reach of the Snake River is listed as impaired due to nutrients (total phosphorous) and sediments. As described in Idaho Fall's NPDES Fact Sheet, the American Falls TMDL has impacted Idaho Falls permit requirements to include phosphorus limits.

In the American Falls TMDL it was also mentioned that temperature impairment determinations were expected in the American Falls Reservoir and the Snake River in the future, but additional monitoring was needed. Finally, the Upper Snake River near Shelley was identified as being impaired due to mercury concentrations within DEQ's 2022 Integrated Report (Idaho DEQ, 2023).

Ultimately, during the February meeting with DEQ regulators, there was no indication that additional requirements from the American Falls Subbasin TMDL would work upstream as part of the City's next permit cycle. There are also no reported plans to reopen the Idaho Falls Subbasin TMDL in the near future. Overall, at this time there is no indication that changes would be made to the Idaho Falls WWTP IPDES permit based on this TMDL.

1.7.3 Contaminants of Emerging Concern

Within the general wastewater industry, a class of 'emerging contaminants' has been discussed with increasing frequency as the attention of regulators has turned from nutrient pollutants to other constituents. It is not anticipated that limitations will be imposed for these contaminants as part of the City's next IPDES Permit as Idaho DEQ has indicated that requirements in Idaho will initially be based on EPA guidance which is not scheduled to be released until late 2024 at the earliest and will likely take some time after its release to implement; however, the potential for permit implications to be in place within the next ten years is possible. Among these emerging contaminants are pharmaceuticals and personal care products (PPCPs) and 'forever chemicals,' such as per- and polyfluoroalkyl substances (PFAS). A few contaminants of emerging concern are discussed in the following sections.

Metals and Hazardous Substances

Metals and other hazardous substances can have significant effects on a surface water body. The City is monitoring arsenic, cadmium, chromium VI, total chromium, copper, lead, mercury, nickel, silver, zinc, chloroform, dichlorobromomethane, toluene, and whole effluent toxicity during the past permit cycle. As discussed in the February meeting with DEQ regulators, no limits for these substances are expected in the next permit cycle.

PPCPs

PPCPs are becoming more common in surface waters as a result of societal changes and advancement in medical technologies. As the relative concentration of these compounds increase, there is concern regarding the impacts these products may have on aquatic life and communities located downstream of where they're introduced. Municipal wastewater discharge is a known mechanism by which PPCPs are introduced into the environment, and many of the PPCPs which persist after wastewater treatment are included in a class of compounds referred to as endocrine disrupting chemicals (EDCs).

EDCs are compounds which alter the normal function of the endocrine (hormonal) system of organisms and can result in a variety of negative health impacts. Because the nature of these negative health impacts are chronic rather than acute, traditional toxicity tests do not adequately predict nor detect their impacts. The US EPA is working to update current ambient water quality protections to better accommodate these emerging pollutants (US EPA, 2023).

No imminent regulations regarding PPCPs are anticipated, and in the event future regulations are issued, effective treatment mechanisms are being developed – primarily involving oxidizing compounds currently employed within the water and wastewater industry for disinfection.

PFAS

There are currently thousands of known PFAS chemicals that are used in everyday products such as non-stick cookware and waterproof clothing. These substances have become prevalent as emerging contaminants due to their ability to bioaccumulate and persist in the environment. The US EPA specifically calls out point source dischargers and municipally generated biosolids as sources of PFAS contamination; however, the principal parties responsible for these compounds are those industries involved in their manufacture and use. The EPA has identified a strategic roadmap that will lead to future regulatory guidance regarding PFAS within the next several years.

It is likely that the greatest impact to municipal wastewater treatment plants will be in regard to biosolids handling. The following statement provides some context on the intended strategic roadmap regarding PFAS contamination resulting from biosolids application. As of the writing of this WWFPS, no definite details have been released.

> *"EPA is working to complete a full risk assessment on PFOA and PFOS in biosolids for release in 2024. The Agency is set to reach a milestone in its biosolids efforts in late 2022 by releasing a draft biosolids risk-assessment screening framework for scientific peer review, which will estimate high end exposures for a wide range of chemical contaminants due to use and disposal of biosolids. PFAS in biosolids is an issue that requires enhanced coordination, and the Agency commits to working with key partners across the federal government, states, and the water, solid waste, and agricultural sectors".* (US EPA, 2023)

Ultimately, discharge limitations associated with PFAS are not anticipated to be included in the next IPDES permit.

1.7.4 Other Permits and Regulatory Requirements

Air Quality Permit(s)

Idaho Falls is not considered to be within an air quality non-attainment area or maintenance area, and air quality is also not listed as an area of concern. An air quality permit is not anticipated to be a requirement for any project alternatives discussed within this WWFPS.

Biosolids Management Plan

The City of Idaho Falls is permitted to land apply liquid biosolids under its current biosolids management plan. Historically, the City has worked with local farmers to distribute their liquid Class B biosolids, and the intention is to continue to provide this benefit to the local community. As the City is currently working through the installation of a screw press dewatering system, it is anticipated that liquid application of biosolids will transition to dry application and require an update to the City's Biosolids Management Plan.

Future EPA guidance on PFAS compounds could have implications for biosolids handling and disposal which could require further modification of the City's plan. No known modifications due to PFAS are known at this time and will be based on EPA Guidance scheduled to be released after 2024.

This condition is likely to continue and may require the City to establish long-term lease agreements with landowners or purchase additional fields on the outskirts of the City to ensure land is available for biosolids application. Other alternatives that could be considered could be to pursue Class A biosolids designation which would allow the biosolids to be used in areas where primary public contact is likely such as at City parks, golf courses, etc. Many cities have pursued composting operations as growth necessitates transitioning to Class A solids and these are used to both divert green waste from area landfills and also utilize the municipally generated biosolids in a beneficial manner. Solids which cannot be land applied may also be disposed of in area landfills.

Reuse Permit

The City has not indicated any plans to pursue a reuse permit to grant the ability to land apply treated wastewater. Due to the low potential for more stringent discharge limitations in the near future, and the limited municipal benefit of pursuing aquifer recharge, it is not likely that wastewater reuse would provide a substantial benefit to the City. In the future, reuse could potentially be pursued as a means to divert a portion of the City's treated wastewater, if needed.

Idaho DEQ has permit authority for reuse permits for treated wastewater discharge and associated rules are documented in IDAPA 58.01.17.

1.8 EFFLUENT CHARACTERISTICS

The following section will evaluate the historic ability of the existing treatment works to meet the current discharge criteria imposed upon the City of Idaho Falls WWTP. Discharge limitations and potential future discharge criteria were previously discussed. Effluent data collected between January 2019 and December 2022 was provided to the Planning Team for use in this planning study.

1.8.1 Effluent BOD_5

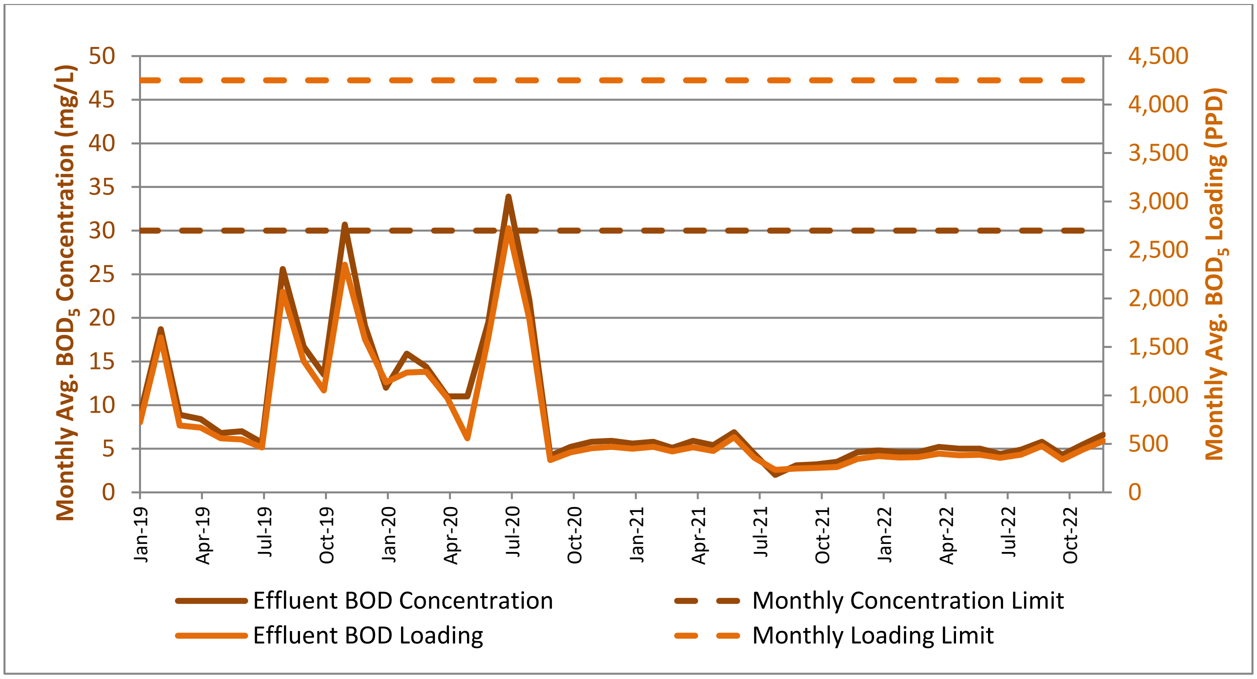
Regarding BOD_5, the City's 2012 NPDES permit requires an average monthly limit of 30 mg/L (4,250 PPD) and an average weekly limit of 45 mg/L (6,380 PPD). A minimum of 85% removal must also be achieved. The loading rates identified as part of the permit are functions of the concentration and design flow of the WWTP. Permit limits and WWTP performance are summarized in Table 1-9.

Table 1-9 – Effluent BOD_5

	Loading (PPD)		Concentration (mg/L)		Monthly Avg. % Removal
	Monthly Avg.	Weekly Avg.	Monthly Avg.	Weekly Avg.	
Current Limit	4,250	6,380	30	45	85% min
2019 - 2022 WWTP Performance					
Average	748	978	9	12	96%
Minimum	232	260	2	3	85%
Maximum	2,725	3,861	34	47	99%

A trend of monthly average effluent BOD_5 concentration and loading is summarized graphically in Figure 1-10. Permit limits were also identified for context and convenience.

Figure 1-10 – Monthly Average Effluent BOD₅



1.8.2 Effluent TSS

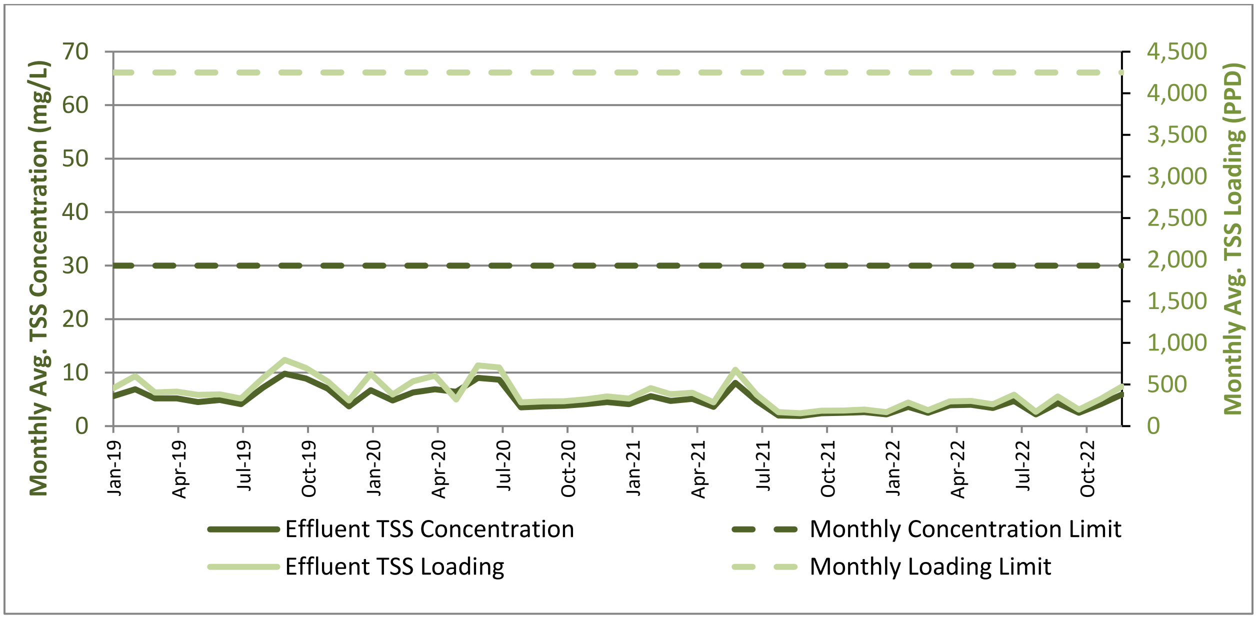
The 2012 NPDES permit requires average monthly effluent TSS to be less than 30 mg/L (4,250 PPD) and an average weekly TSS be less than 45 mg/L (6.380 PPD). A minimum of 85% removal must also be achieved. Permit limits and WWTP performance are summarized in Table 1-10.

Table 1-10 – Effluent TSS

	Loading (PPD)		Concentration (mg/L)		Monthly Avg. % Removal
	Monthly Avg.	Weekly Avg.	Monthly Avg.	Weekly Avg.	
Current Limit	4,250	6,380	30	45	85% MIN
2019 - 2022 WWTP Performance					
Average	387	440	5	5	98%
Minimum	155	159	2	2	95%
Maximum	796	993	10	13	99%

Based on the data shown in Table 1-10, the treatment plant has historically been able to comply with effluent TSS limits. Monthly average effluent TSS trends from January 2019 through December of 2022 are provided in Figure 1-11 along with identified effluent limits for context.

Figure 1-11 – Monthly Average Effluent TSS



1.8.3 Effluent Ammonia

Effluent ammonia limits are based on the percent of critical flow within mixing zones of the Snake River. For the periods of June through September mixing zones are estimated to encompass 5% of critical flow and correspond with the period of the higher discharge limit. For the periods of October through May, mixing zones are estimated to encompass 15% of critical flow and correspond with a lower limit. Additional discussion regarding the mixing zones and how they were established is available within the 2012 NPDES Permit and the associated Fact Sheet (US EPA, 2012; US EPA, 2012).

Due to the more stringent ammonia limits imposed upon the Idaho Falls WWTP, the City completed a substantial upgrade to the secondary treatment process in 2013. From January 2019 to July 2022, the treatment plant has generally been able to comply with effluent ammonia limits; however, the biological treatment process has experienced upset conditions and nitrification has particularly been impacted. This occurred at least once in 2021 and multiple times in 2022 when effluent ammonia increased significantly. A summary of the effluent ammonia requirements and performance is provided in Table 1-11, Table 1-12, and Figure 1-12.

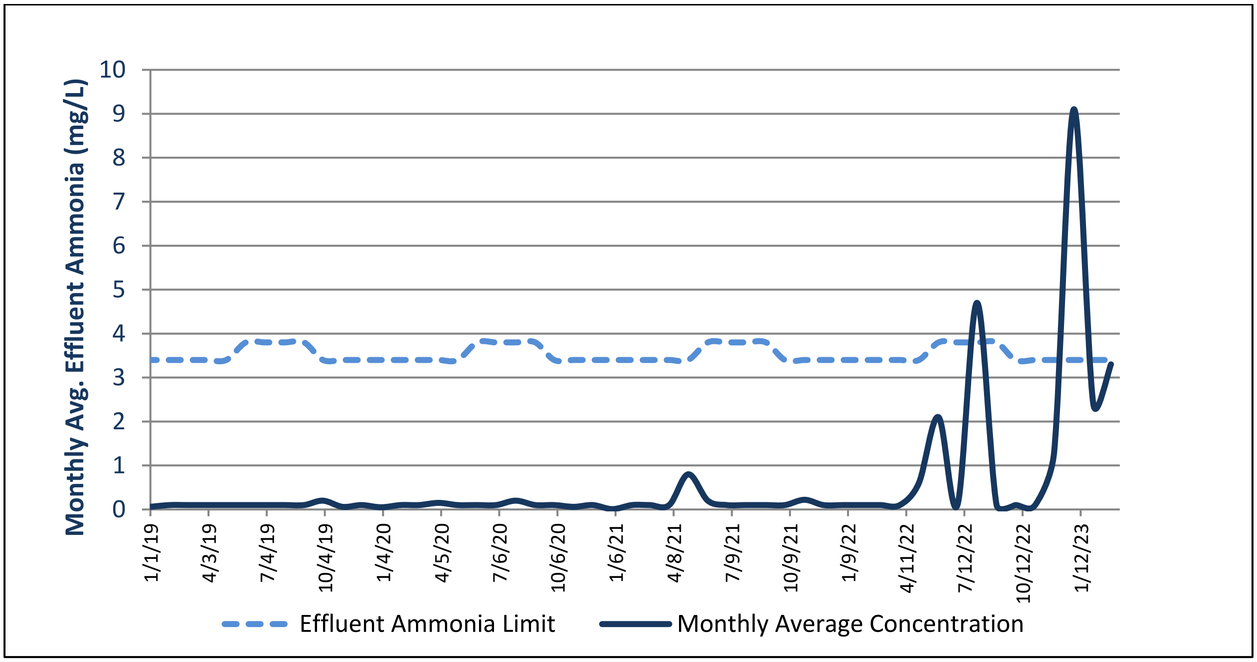
Table 1-11 – Effluent Ammonia, June - September

	June - September			
	Monthly Avg. (mg/L)	Monthly Avg. (PPD)	Max Daily (mg/L)	Max Daily (PPD)
Current Limit	3.8	539	14.1	1,999
2019 - 2022 WWTP Performance				
Average	0.5	40	1.4	112
Minimum	0.1	4	0.1	6
Maximum	4.7	372	9.1	722

Table 1-12 – Effluent Ammonia, October - May

	October - May			
	Monthly Avg. (mg/L)	Monthly Avg. (PPD)	Max Daily (mg/L)	Max Daily (PPD)
Current Limit	3.4	482	12.3	1,744
2019 - 2022 WWTP Performance				
Average	0.1	10	1.1	80
Minimum	0	0	0	0
Maximum	0.2	12	1	74

Figure 1-12 – Effluent Ammonia Trends



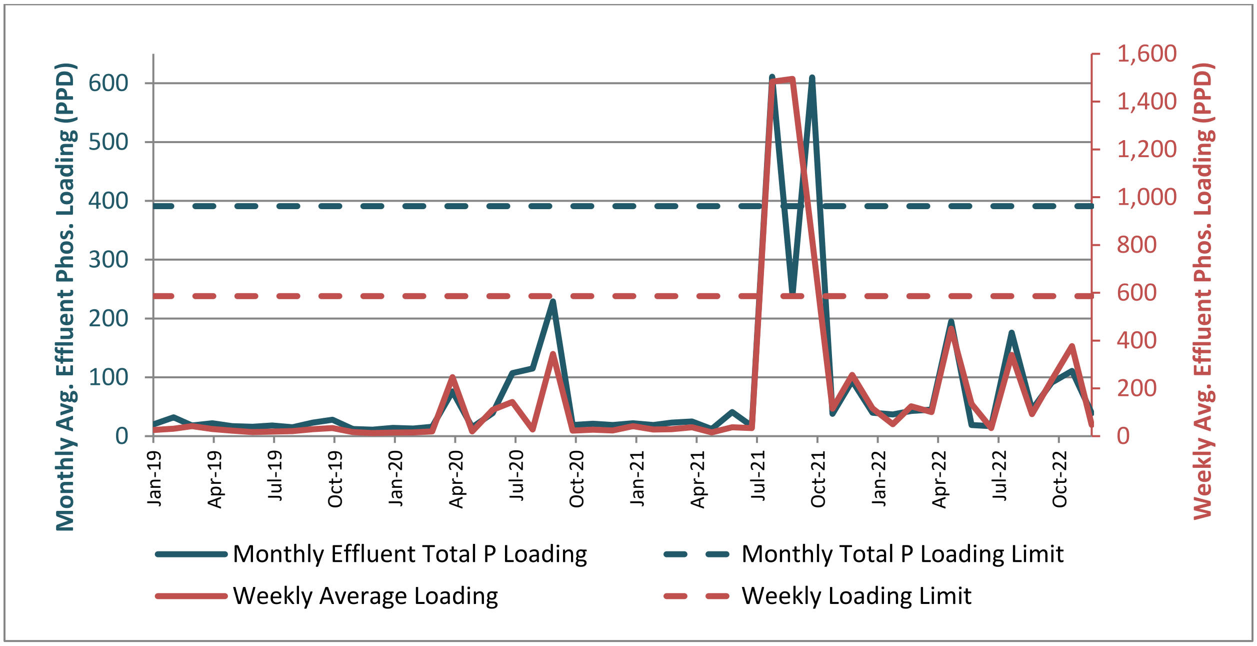
1.8.4 Effluent Phosphorus

Effluent phosphorous is governed by monthly and weekly average loading limits as detailed in Table 1-13. Since January 2019, the treatment plant has generally been able to comply with the effluent phosphorous limit; however, significant variability was recorded in 2021 and several instances were noted (August – October 2021) which violated discharge requirements and was tied to decanting from Sludge Lagoon #3. Effluent phosphorous data since January 2019 are provided in Figure 1-13.

Table 1-13 – Effluent Phosphorous

	Monthly Loading (PPD)	Weekly Loading (PPD)
Current Limit	391	586
2019 - 2022 WWTP Performance		
Average	73	163
Minimum	11	13
Maximum	611	1,495

Figure 1-13 – Effluent Phosphorous Trends



Based on the variability in effluent phosphorous loading, it may be worth considering potential optimization of the biological phosphorous removal system or supplementing the biological removal process with chemical addition to more reliably produce effluent of sufficient quality to consistently comply with discharge requirements. Additional phosphorous loading is anticipated in the future as the dewatering process comes online and the service population continues to grow.

1.8.5 Other Effluent Constituents

Other effluent constituents of concern for which discharge limitations are in place include *E. coli* bacteria, pH, and total residual chlorine (TRC). Over the period considered, no concerns were identified with the effluent performance for pH, *E. coli,* and TRC.

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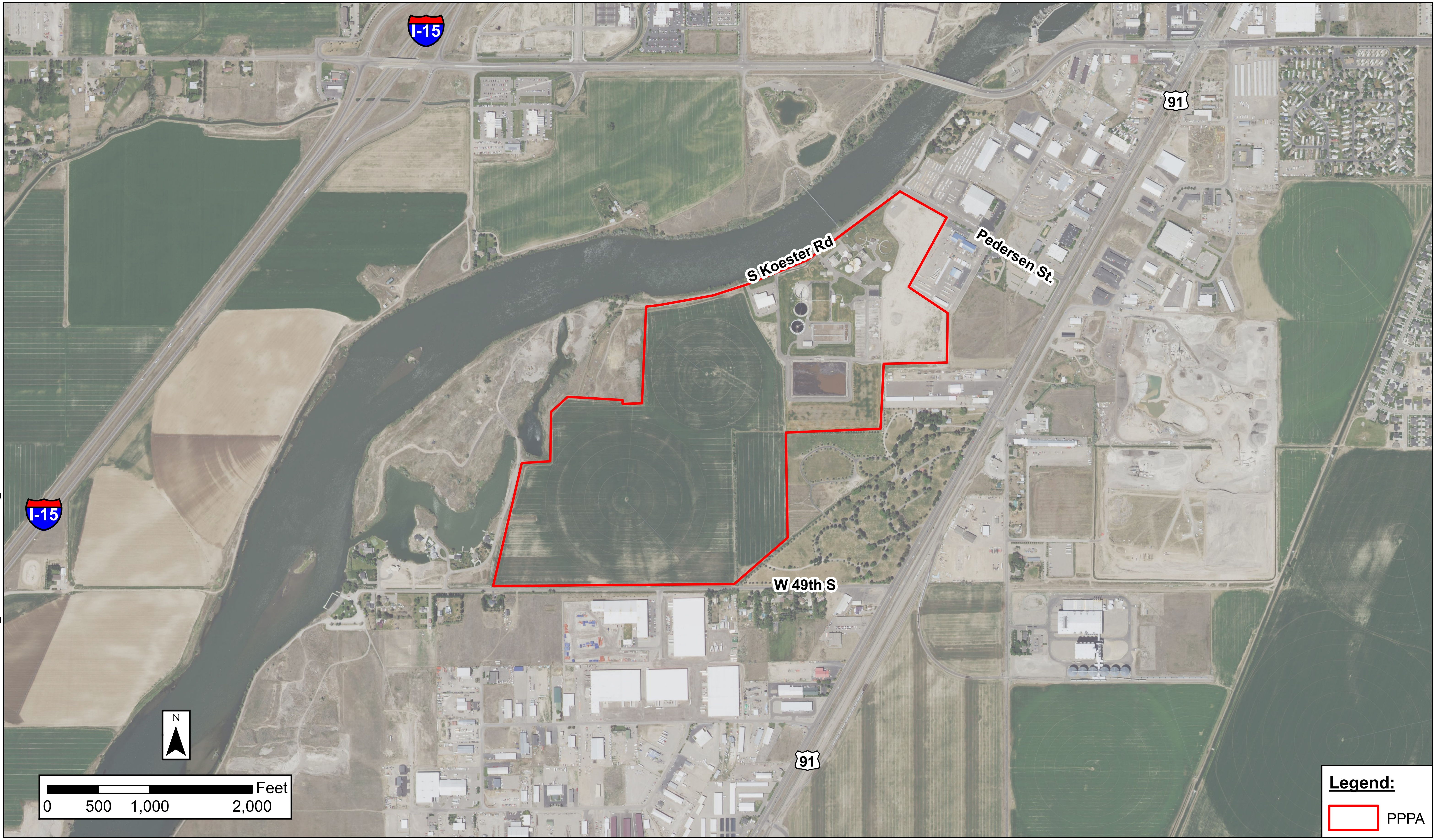

KELLER ASSOCIATES

Stantec

Proposed Project Planning Area (PPPA)

IDAHO FALLS WWTP

IDAHO FALLS

FIGURE 1-14

CITY OF IDAHO FALLS

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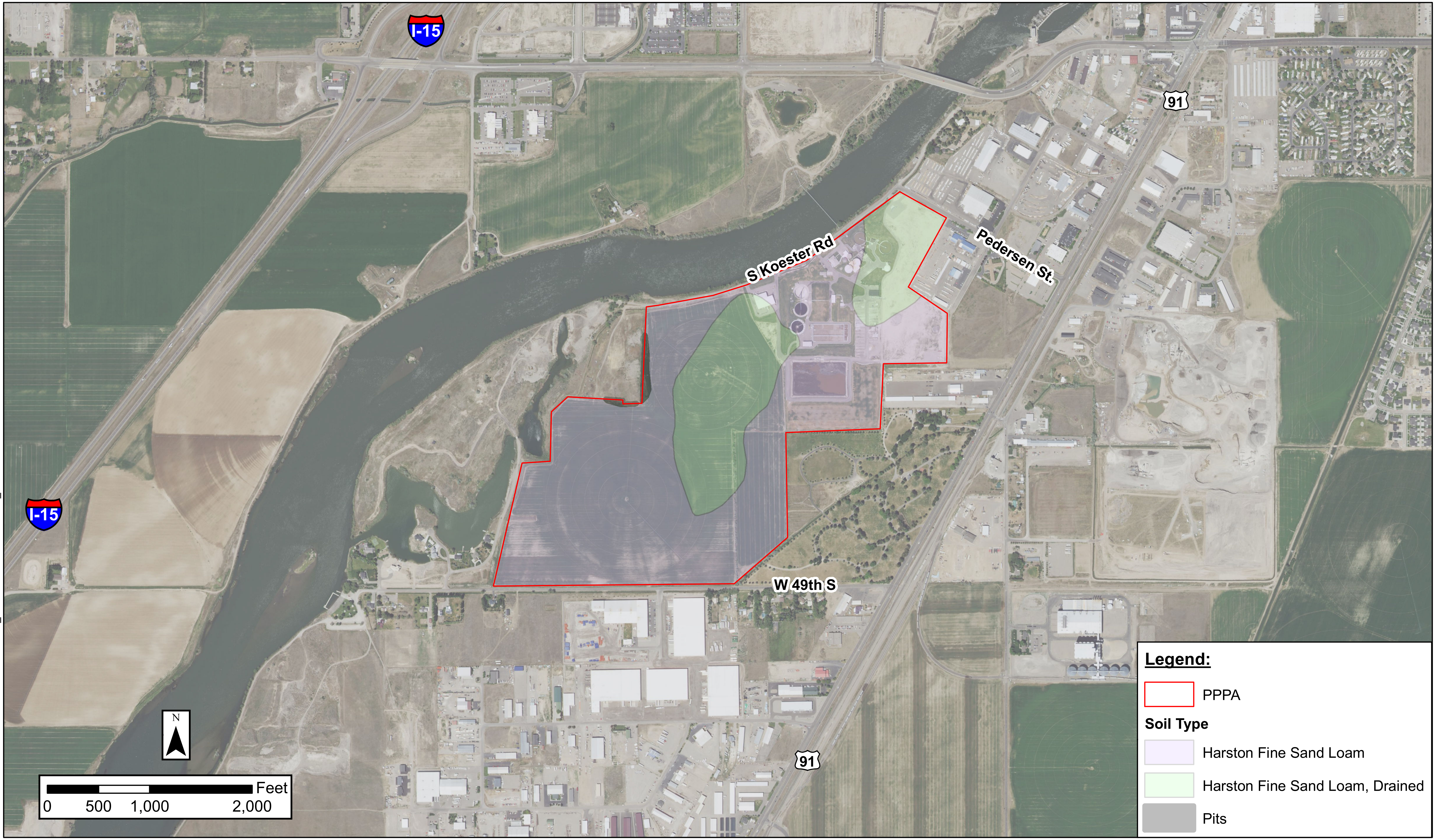
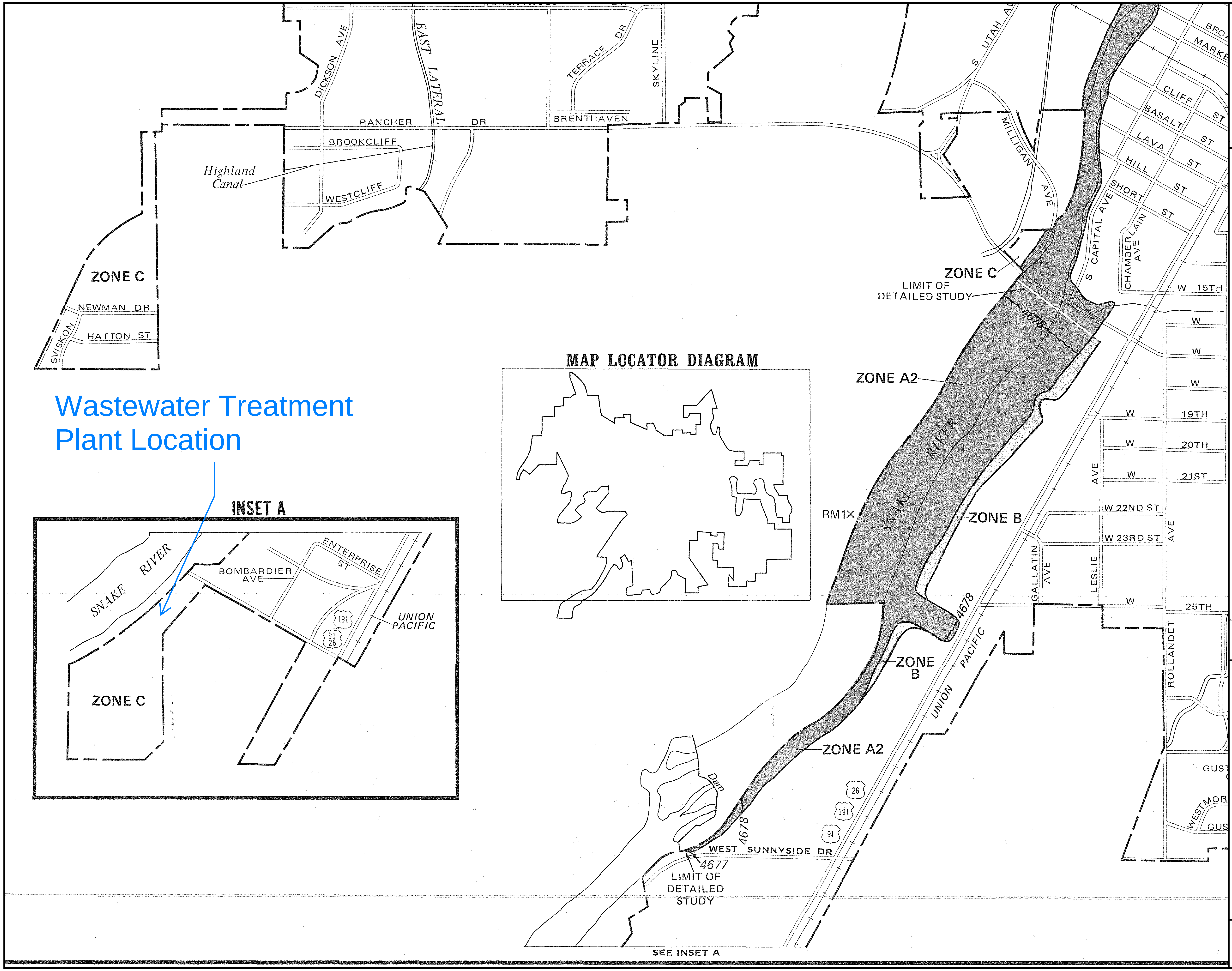


Area Soils

IDAHO FALLS WWTP

FIGURE 1-15

CITY OF IDAHO FALLS


Wastewater Treatment Plant Location

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
IDAHO FALLS, IDAHO
BONNEVILLE COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
160029 0005 B

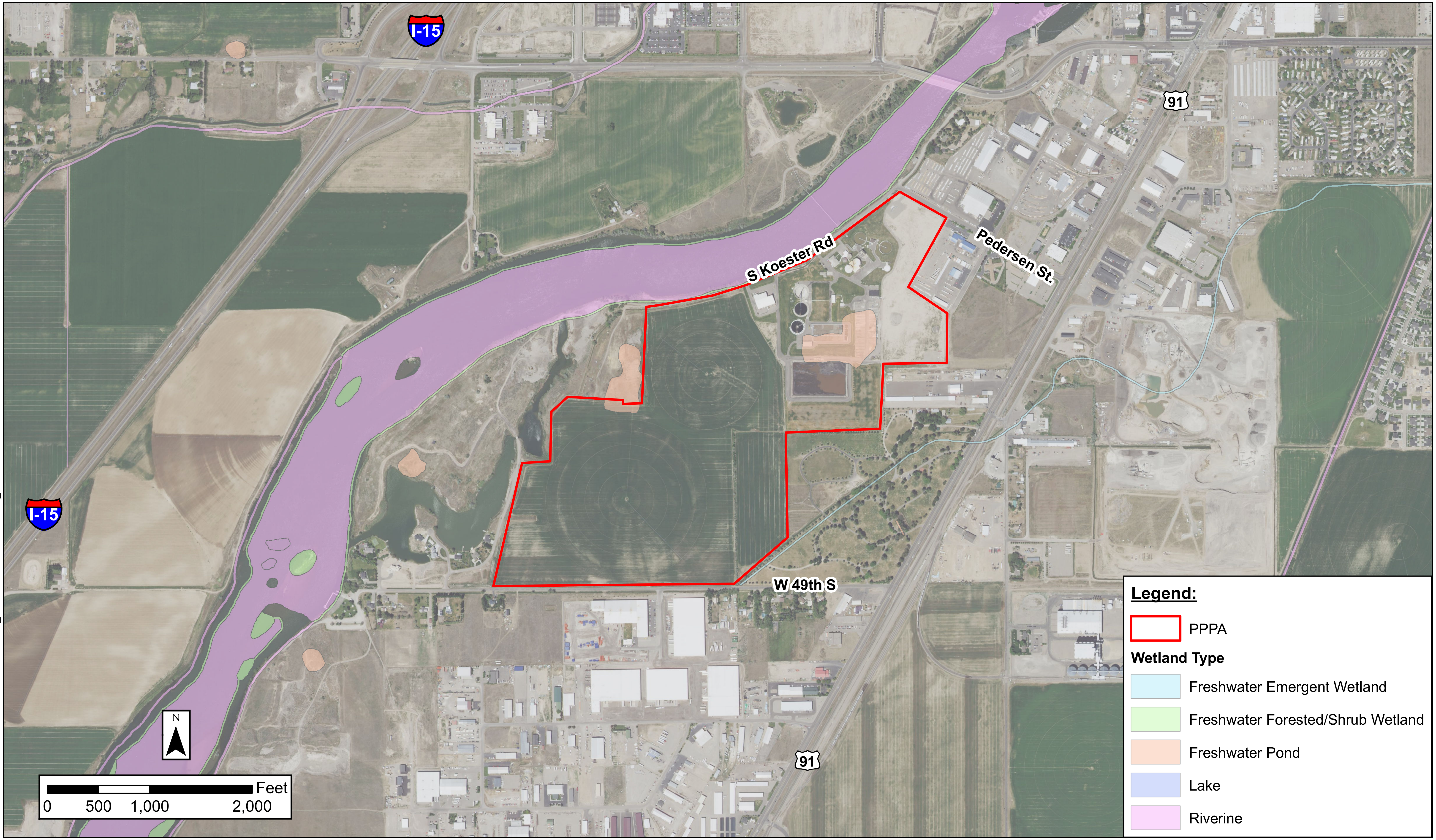
EFFECTIVE DATE:
OCTOBER 15, 1982

Federal Emergency Management Agency

Idaho Falls Flood Zones (FEMA)

Figure 1-16

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.



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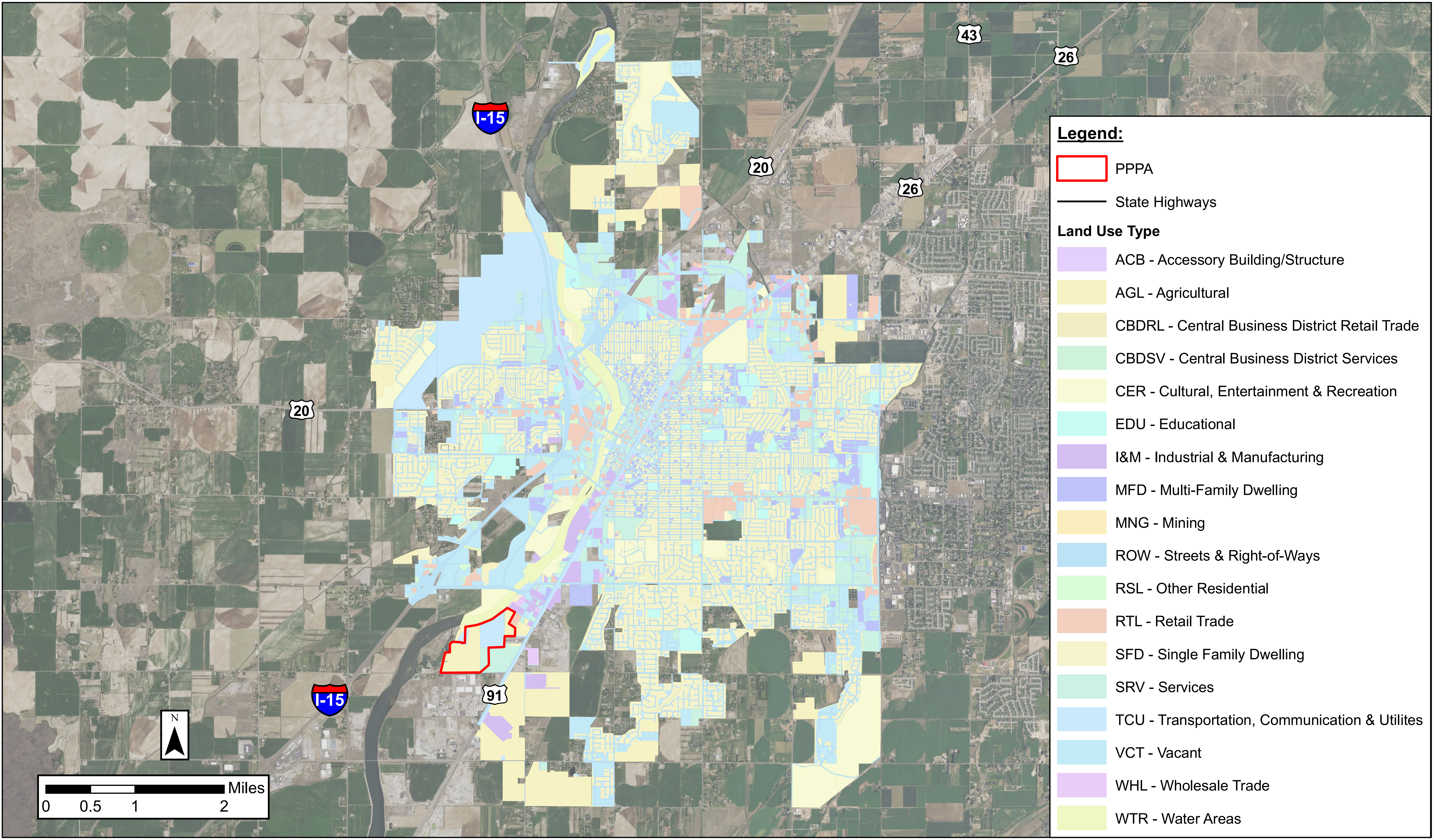
Wetlands

IDAHO FALLS WWTP

FIGURE 1-17

CITY OF IDAHO FALLS



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KELLER ASSOCIATES

Stantec

Land Use

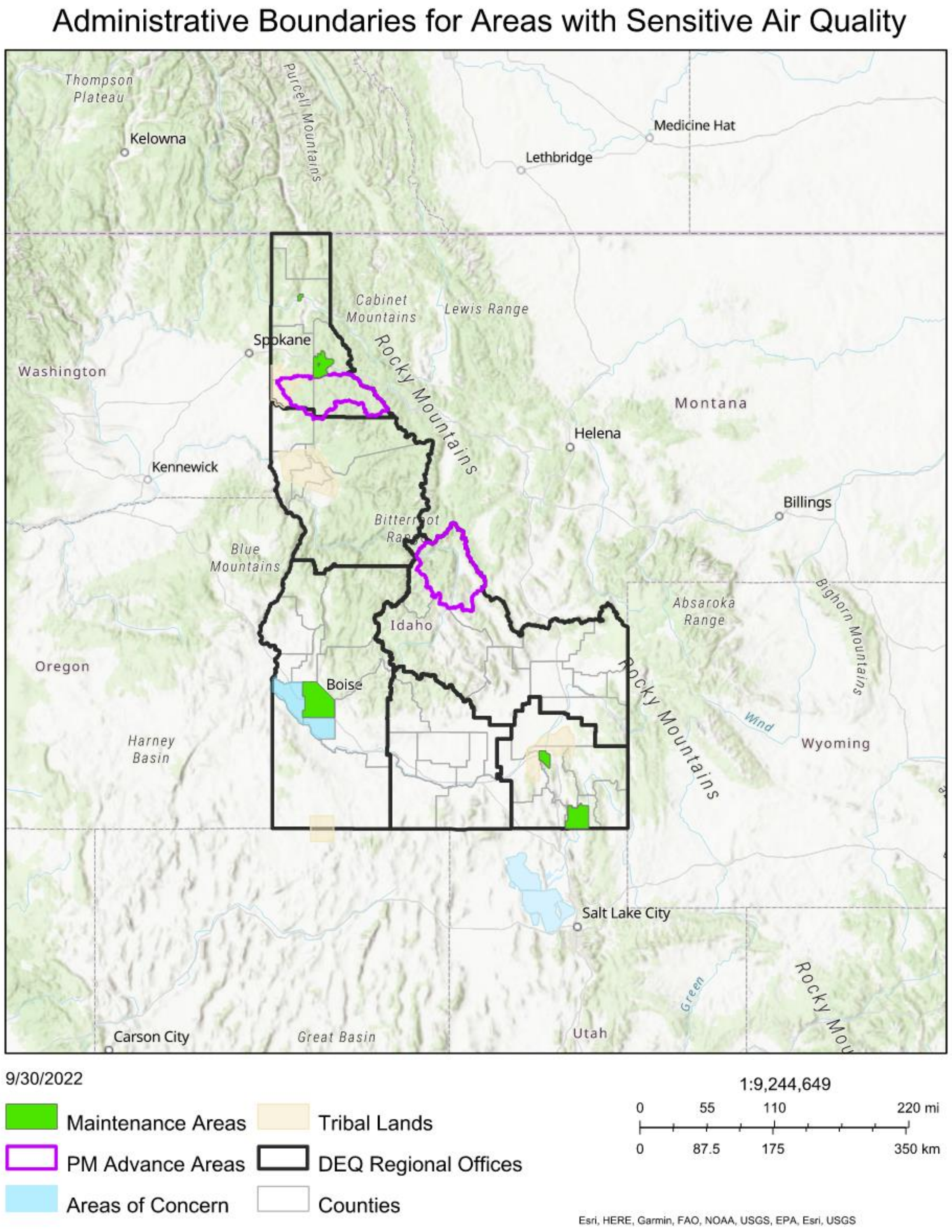
IDAHO FALLS WWTP

IDAHO FALLS

FIGURE 1-18

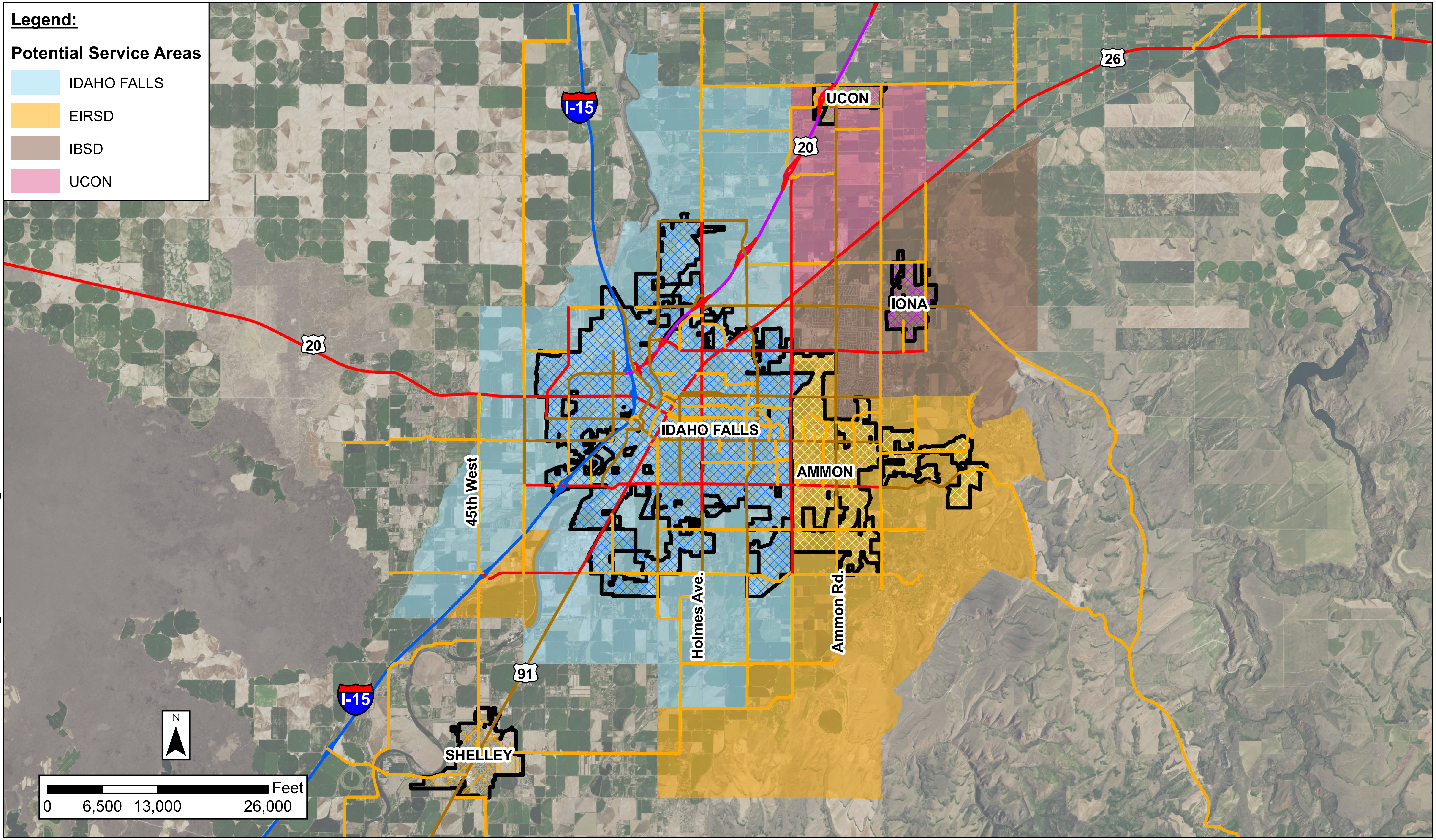
CITY OF IDAHO FALLS

Figure 1-19 – Administrative Boundaries for Areas with Sensitive Air Quality



9/30/2022

Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, Esri, USGS



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KELLER ASSOCIATES

Stantec

POTENTIAL SERVICE AREAS

IDAHO FALLS WWTP

IDAHO FALLS

FIGURE 1-20

CITY OF IDAHO FALLS

CHAPTER 2 EXISTING CONDITIONS AND FUTURE PROJECTIONS

2.1 EXISTING SYSTEM LAYOUT

In its current configuration, flow enters the facility and passes through a rock trap intended to remove rock and gravel which may be entrained within the influent flow. Flow then enters the headworks, passes through the screens, and is sent to the primary clarifiers. Clarified influent then gravity flows to the primary effluent lift station (PELS) which pumps flow to the secondary treatment system.

The secondary treatment process begins in a biological selector basin which is used to optimize the process for biological phosphorus removal. Downstream of the selector basin flow can be split between one of three aeration basins before transitioning to the secondary (final) clarifiers. Chlorine is dosed to the clarified secondary effluent in contact chambers located along the perimeter of the secondary clarifiers and is discharged to the Snake River after receiving a dose of sodium bisulfite to reduce residual chlorine levels.

Solids are removed from the process at various stages. Primary solids removed within the primary clarifiers are pumped to a grit removal process before being transferred to the gravity thickener/fermenter and ultimately to the facility’s anaerobic digesters. Grit removed from the primary solids is transferred to dumpsters and leaves the facility as part of the landfilled solid waste stream along with captured screenings. Wasted secondary solids from the secondary treatment system are transferred to gravity belt thickeners (GBTs), which provide thickening before the secondary solids are transferred to the anaerobic digesters.

Digested solids are currently transferred to the facility’s sludge lagoon for storage between periods of liquid land application; however, the City is currently in the process of completing a dewatering project which includes substantial modifications to the solids handling process. As part of the project, new mechanical dewatering presses are being installed and digested solids will be processed through the dewatering presses. Dry solids will be stored onsite and eventually land applied. Filtrate from this new dewatering process will drain back to the main forward flow of the facility.

The City of Idaho Falls’ WWTP complies with the limits of the current (2012) discharge permit and the treatment plant is well maintained by City staff. Discussions of each treatment process are presented in the subsequent sections of this report and an overall flow diagram for the facility is presented in Appendix A.

2.2 WWTP CONDITION ASSESSMENT

2.2.1 Headworks, Septage Receiving, and Pre-Treatment

The City of Ucon and the Iona-Bonneville Sewer District (IBSD) discharge wastewater to the City of Idaho Falls. Influent from the City of Ucon enters the Idaho Falls system near E Iona Rd and N 5th East through a metered connection. Influent from IBSD combines with the Idaho Falls wastewater collection system at two metered connections throughout the City.

Most of influent flow received at the WWTP enters the facility on the northern extent of the facility. The remaining flow, collected in areas to the west of the Snake River is routed through a suspended sewer line and combines with the rest of the influent at the rock trap. The suspended sewer line is shown in Figure 2-1.

The rock trap is comprised of baskets intended to catch any entrained rocks and prevent them from passing through to the facility as shown in Figure 2-2.

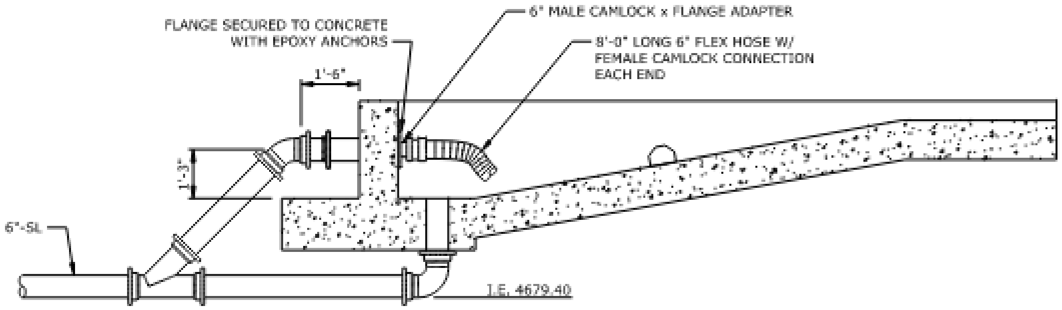
Figure 2-1 – Suspended Influent Line

Figure 2-2 – Rock Trap

The recently improved septage receiving station shown in Figure 2-3 is located at the North end of the WWTP footprint to provide access 24 hours a day. A section view of the improved facility is included as Figure 2-4. A future surveillance system will allow the staff to monitor the septage receiving area. No plans are in place to provide a means for sampling each load.

Figure 2-3 – Existing Septage Receiving Station

Figure 2-4 – Installed Septage Receiving Station[8]



Raw influent and septage contributions are combined ahead of the main influent channel and continue to the headworks.

While an effluent flow meter is required for regulatory reporting, it is recommended to provide an influent flow measurement ability for additional data collection. Various design flows must be considered for effective operation of a WWTP and for efficient design of treatment plant improvements. This data is most accurate when collected at the inlet to the wastewater treatment plant before the residence time within the plant dampens potential flow spikes and side stream flows begin influencing measurements. When integrated with a facility's supervisory control and data acquisition (SCADA) system, this information can also be used to give advance notice to operators of critical flow conditions coming into the plant.

Before flow enters the headworks, it first passes through the influent diversion box shown in Figure 2-5. Grit in the influent flow can plug drain lines which enter the box if allowed to accumulate. The box sits lower than the inlet channels into the headworks which restricts the ability to flush the box or inlet channels so settled materials must be physically removed. Gates within the diversion box allow for flow to bypass the headworks, if needed, and be sent directly to Primary Clarifier #1. However, under its typical flow path, influent flow is directed into the headworks building from this diversion box.

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[8] (MSA, Inc., 2022)

Figure 2-5 – Influent Diversion Box

Within the four-story headworks building, flow can be split into one of three screening channels on the ground floor of the building. Two mechanical perforated plate screens are installed within two of the screening channels and a manually cleaned coarse bar screen is installed in a third redundant channel as backup to the two mechanical screens. The manual screen can act in place of a mechanical screen or, if needed as an overflow system, to provide redundant capacity during extreme flow events. The manual coarse screen has a bar spacing of approximately 0.5 inches.

The mechanical screens shown in Figure 2-6 are Andritz Perforated Plate Screens and have a nominal opening size of 6-millimeters (mm, 0.25 inches). The screens remove entrained material from the influent channels on the ground floor and lift screenings to a washer/compactor on the second floor. While the nominal perforation size is 6 mm/0.25 inches, it appears that the gap between each screening plate is greater than the nominal opening size which will allow larger materials through the screen. Rags making their way into downstream processes is an issue reported by City Staff. Screen plates and side seals are shown in Figure 2-7.

The screens were installed between 2002 and 2003 as part of the installation of the entire headworks building. At the same time, two new JDV Equipment Corporation screening washer/compactors were also installed. The washer/compactors each have a wet screening capacity of 30 ft^3/hr. Since they were installed, the City has made numerous adjustments to the washer/compactors to improve performance. Slippage of material within the compactor can lead to clogging of the compactor drain which contributes to wash water overflows and flooding of the headworks building.

Figure 2-6 – Headworks Screen and Classifier

Figure 2-7 – Screen Side Seal

Screenings transferred to the washer/compactors are lifted to the top floor of the headworks building where horizontal shaftless screw conveyors transfer the material laterally to floor penetrations where it drops to waiting dumpsters (Figure 2-8). Directional changes occur at each of the 3 conveyors operating in series and there is no other means to transfer screenings in the event of a failure in any of the three conveyors.

Figure 2-8 –Screening and Grit Dumpsters

Structurally, the headworks building appears to be well maintained and there were no visible signs of structural deterioration. Odors and humidity within the building could be improved with additional positive air pressure.

The four-story headworks configuration and the associated four conveyor systems required to raise screenings to a disposal location presents several unique operational challenges. Reliance on the complicated screening conveyor runs introduces single point of failure concerns where a failure in a single conveyor will impact the whole operation. Washdown water from upper levels trickles down to lower levels which contributes to unsanitary conditions, makes cleaning challenging, and extends the duration required to complete routine activities. The venturi-style sump system in the basement reportedly works well; however, the capacity of the system is relatively low and can be exceeded if washdown activities are completed within a short duration or when the screening compactors overflow due to plugging.

Electrical and controls components are nearly 20 years old and are approaching the end of their useful life. Summarized areas recommended for improvement include:

- Improve Rock Trap performance
- Install an influent flow meter for data and alarm purposes
- Address diversion box concerns
- Address solids accumulations in the influent channel
- Improve washer/compactor performance
- Improve gates in the screening channels to mitigate flooding
- Improve screening to mitigate ragging issues in downstream processes
- Improve HVAC in the headworks lead to humidity and odor issues
- Address air exchanges in winter to mitigate using outside air
- Check some electrical equipment for hazardous area rating
- Provide an arc flash study for WWTP as a whole and place stickers on electrical equipment
- Electrical panels and VFDs are 20+ years old and reaching end of life

2.2.2 Primary Clarifiers

Two primary clarifiers follow the headworks and act as de facto grit removal systems for the forward flow path through the WWTP. A splitter box is used to divide the flow to the two primary clarifiers, the flow split appears to be approximately equal. Due to the flow path through the splitter box, it is likely that grit will accumulate within the box itself and require periodic removal.

Primary Clarifier (PC) #1 is original to the plant (circa 1958), while PC #2 was constructed in 2017. Once PC #2 was online, the mechanism within PC #1 was replaced. Both mechanisms are epoxy coated mild steel and the City observed mild corrosion and recoated the mechanisms two years after the mechanisms were installed (approximately 2019). The City is working to implement an annual cleaning and maintenance program to monitor corrosion on the clarifier mechanisms. Both primary clarifiers are 115 feet in diameter. PC #1 has a sidewall depth of 9.5 ft, and the newer PC #2 has a sidewall depth of 10 ft. The primary clarifiers are shown in Figure 2-9 and Figure 2-10.

The City staffs the facility 24 hours a day. The scum beach within the primary clarifiers requires monitoring as they plug regularly. Storm flows appear to contribute to the scum clogging issue.

A long-term solution to the scum beach plugging would best serve the City, but the appropriate solution is ultimately dependent upon the root cause of the issue, which remains unclear. If excessive fats, oils, and grease (FOG) is entrained within the City's influent, a grease interceptor between the headworks and the primary clarifiers could help mitigate the issue. A physical deficiency which causes the issue could be corrected with adjustment of the scum skimmer arm, scum beach, and/or scum trough. Upsizing the scum line between the scum beach and scum pit may also help resolve the problem. Ultimately, it is recommended that the issue be investigated in detail and that additional data on influent FOG be tracked. FOG is not presently tracked in the influent or in the discharge received from area industries, the City of Ucon, or IBSD.

Figure 2-9 – Primary Clarifier #1

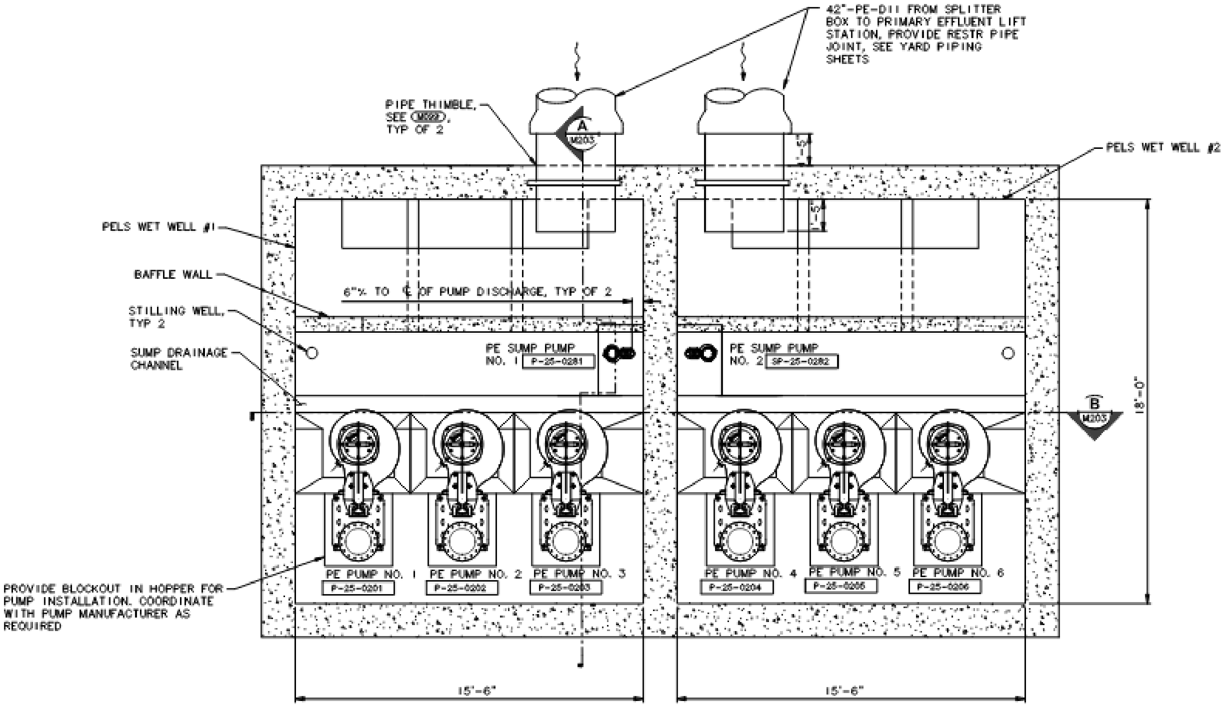
Figure 2-10 – Primary Clarifier Scum

Solids removed from the primary clarifiers are transferred to the grit removal system while the primary effluent flows via gravity to the primary effluent lift station (PELS). Solids handling, including primary solids and the fermentation process, are discussed in Section 2.2.6.

Installed as part of the secondary upgrades completed between 2013 and 2015, the PELS conveys clarified primary effluent to the secondary treatment system. The PELS consists of two parallel wet wells, each consisting of a dual-chamber design, with three 60-HP submersible pumps (six total pumps) installed. Each pump is rated for a capacity of 7,200 gpm (43,200 gpm total) at 20 feet of total dynamic head (TDH). Typically the PELS is operated automatically based on level within the wet wells; however, operation can be controlled manually if needed. At typical flows, only one wet well (3 pumps, 21,600 gpm total) is needed. Flow apportioning is provided at the PELS Splitter Box where gates are used to split flow to one wet well or the other. City Staff indicated that the pumps are working well.

An excerpt from the design drawings for the PELS, which best illustrates the overall station layout, is included as Figure 2-11. Primary effluent is pumped from the PELS to the secondary treatment process.

Figure 2-11 – Primary Effluent Lift Station Wet Wells, Plan View[9]



Operational challenges and concerns within the primary treatment facilities are summarized below:

- Grit will accumulate within the primary clarifier splitter box and requires periodic removal
- Spalling concrete was observed in several locations on the inside face of Primary Clarifier #1
- Primary clarifier scum troughs plug constantly and do not have lighting

2.2.3 Secondary Treatment Process

The secondary treatment process underwent significant improvements between 2013 and 2015. The improvements included the installation of an anaerobic biological selector basin, three new parallel aeration basins, a new secondary clarifier splitter box, one new secondary clarifier, a new blower building with new aeration blowers, and new return activated sludge (RAS), waste activated sludge (WAS), and Internal Recycle (IR) facilities. The secondary treatment process is optimized for biological phosphorus removal and has recently shown signs of natural sludge granulation which, at the time of this writing, is being studied by Ovivo USA, Inc. Preliminary results suggest that high volatile fatty acids (VFAs) in the primary effluent, is a principle driver of the sludge granulation within the secondary treatment process and ultimately yields substantial benefits for performance of the WWTP.

Primary effluent from the PELS first enters the secondary process within the anaerobic selector basin. The anaerobic selector is divided into four principal cells. Cell 1 has a net volume of 0.255 million gallons while each subsequent cell has a volume of 0.272 million gallons. Under normal operation, primary effluent is diverted to the second cell while the first cell allows for conditioning of RAS. These cells provide the oxygen- and nitrate-free environment necessary to optimize the biological treatment process for phosphorus and nitrogen removal. Each cell is separated by a

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[9] (MSA, Inc., 2013)

baffle wall which allows sequential flow and limits backflow. The selector basin is shown in Figure 2-12.

Top-mounted mixers provide a continuously mixed environment within each cell. From the selector basins, flow continues traveling via gravity into the aeration basin swing zones. Flow into each aeration basin train is controlled by nine gates installed in the inlet channel feeding each train. Three gates are dedicated to each train and, under normal operation, two aeration trains are online at any given time.

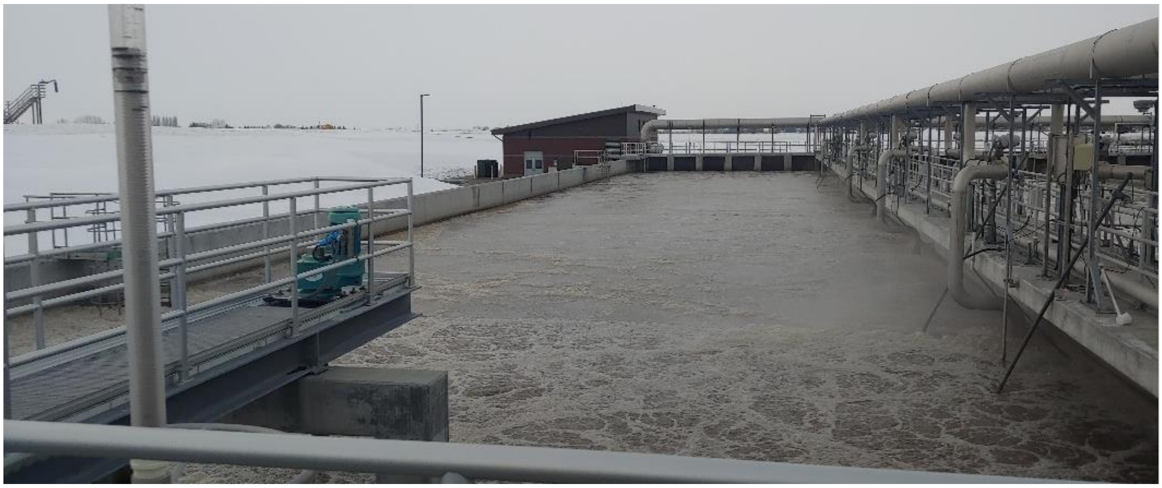
Figure 2-12 – Anaerobic Selector Basins

The first zone of each aeration basin is operated as a swing zone, allowing plant operators to toggle between aerobic and anoxic conditions, depending on the needs of the process. Fine-bubble diffusers (membrane style) provide mixing and aeration which is supplemented by a top-mounted mixer as needed depending on the operational target (aerobic vs. anoxic) of the swing zone. A pumped internal recycle (IR) allows for additional return flow to be introduced to the swing zone from the end of each aeration basin.

From the swing zone, mixed liquor flows through three additional aerated zones. Each zone is separated by an intermediate wall to provide three distinct zones of treatment. Each zone contains additional fine-bubble diffusers (also membrane style), which become less dense within each subsequent zone. Blowers for the diffusers are controlled based on dissolved oxygen levels that are monitored throughout the aeration process. The design capacity of each train is approximately 2.33 million gallons, but the design mixed liquor suspended solids (MLSS) concentration is unclear. At the time of January 2023 site visit, TSS probes installed in Aeration Basin #3 were reading approximately 4,000 mg/L. Aeration Basin #3 (Train 3) is shown in Figure 2-13.

Downstream from the aeration basins, flow is directed into the secondary clarifier splitter box. The water surface elevation within the box was intended to be controlled to allow for the use of a helical scum skimmer at the inlet to the splitter box. A flow under energy dissipation wall was included to create a quiescent zone within the box and improve the operation of the scum skimmer. Scum issues within the secondary treatment process have not been reported by the City. A section view of the splitter box is provided for clarity as Figure 2-14.

Figure 2-13 – Aeration Basin #3



Flow from the splitter box is transferred to one of three 130-foot diameter secondary clarifiers. Secondary Clarifiers (SC) #1 and #2 were installed in 1972, and the third (SC #3) was added as part of the 2013 – 2015 secondary process upgrades. While the original design criteria for SC#1 and #2 is not known, if loading is evenly split among each clarifier, roughly equivalent overflow and solids loading rates would be experienced. SC #3 has a design maximum month overflow rate and solids loading rate of 452 gpd/ft^2 and 25.7 lbs/day/ ft^2, respectively. SC #1 and #2 are both rim-fed style clarifiers and have a side wall depth of 13 feet. SC #3 is center fed and has a side wall depth of 16 feet. Secondary Clarifier #3 is shown in Figure 2-15.

Improvements were completed on SC #1 in 2021 and included new grout in the clarifier bottom and a new clarifier mechanism. The mechanism within SC #2 was also replaced in 2022. Both mechanisms are epoxy coated carbon steel and have shown no evidence of corrosion since their installation. The City's annual maintenance includes removing clarifiers from service to clean and inspect each mechanism. The scum troughs in both SC #1 and SC #2 were not replaced during the 2021 and 2022 improvements projects and that the City is planning on their future replacement due to their age and condition.

Figure 2-14 – Secondary Clarifier Splitter Box, Section View[10]

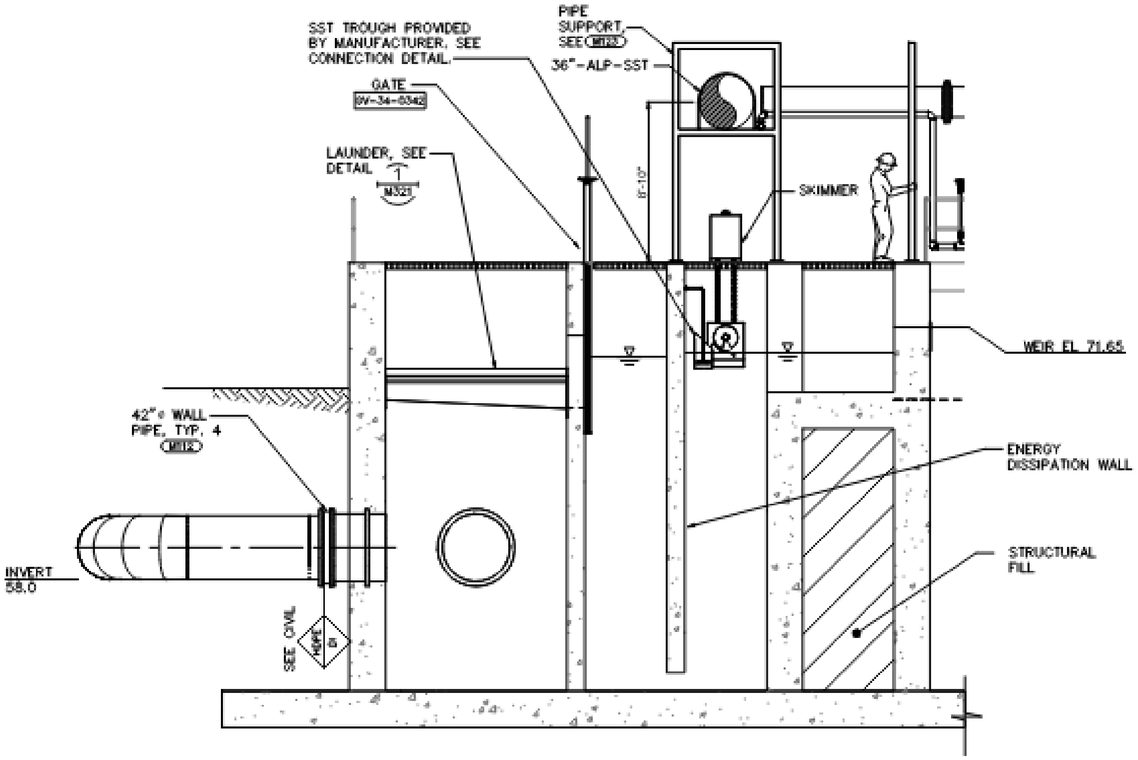


Figure 2-15 – Secondary Clarifier #3

Solids removed within the secondary clarifiers are transferred to the RAS/WAS pumping area and ultimately returned to the secondary treatment process or wasted to the solids handling process. RAS/WAS pumping is discussed within Section 2.2.5 and the solids handling process, including wasted secondary solids is discussed in Section 2.2.6. Secondary Effluent from the secondary clarifiers is disinfected prior to discharge as discussed within Section 2.2.4.

Summarized items recommended to be addressed within the secondary treatment process are provided below:

- Influent BOD_5 loading has decreased significantly over the past decade due to changes in domestic and industrial contributors. The fermentation process has helped mitigate the loss of biological substrate.

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[10] (MSA, Inc., 2013)

- Influent TKN is approaching the design criteria of the secondary treatment process and will be further elevated by side stream contributions from the dewatering process and future population growth.
- Provide new scum troughs for Secondary Clarifiers #1 and #2

2.2.4 Disinfection and Discharge Facilities

The Idaho Falls WWTP currently disinfects treated secondary effluent using chlorine gas. Chlorine gas is drawn from the chlorine storage cylinders in the chlorine building to the contact chambers located along the periphery of the secondary clarifiers. Induction mixers are installed in the inlet box of each chlorine contact chamber (outlet box of each secondary clarifier) to draw the chlorine gas from the chlorine building and provide flash mixing with the secondary effluent. Under automated control, a redox probe immediately downstream of the chlorination point is used to pace the chlorine dose. The chlorination building and chlorine cylinders are shown in Figure 2-16 and Figure 2-17. Some foaming is experienced at the injection point but quickly subsides. Chlorinator #1 and the chlorine injection point are shown in Figure 2-18 and Figure 2-19. The contact chambers provide 83 minutes of contact time at a maximum month design flow of 17 MGD when all three channels are online.

Chlorine injectors are available as backup to the induction mixers and allow for chlorine gas to be mixed with plant W2 water to create a concentrated chlorine solution for dosing. Each chlorinator contains a feed rate meter which is manually adjustable or can be run in an automatic mode. A redox potential probe is used downstream of the chlorination point to pace the chlorination system.

The chlorination system was largely installed in its current configuration as part of upgrades to the facility in 1993. Two chlorinators were installed at that time, one dedicated to each of the two secondary clarifiers which were then installed. As SC #3 came online between 2013 and 2015, an additional chlorinator was installed within the chlorination building. Each chlorinator has a 1,000 lb/day capacity, and the chlorination system for SC #3 operates in the same manner as the systems for SC #1 and SC #2.

Figure 2-16 – Chlorination Building

Figure 2-17 – Monorail and Chlorine Cylinders

Figure 2-18 – Chlorinator #1

Figure 2-19 – Chlorine Injection Point Foam

Safety concerns inherent to chlorine gas operations have been expressed. Twelve 1-ton chlorine cylinders are stored in the gas storage area of the chlorination building. Six cylinders are online at any given time while six other cylinders are on standby. An electric monorail system facilitates handling of the chlorine cylinders and chlorine gas detectors are installed which activate a chlorine scrubber system in the event of detected chlorine gas.

Prior to final discharge, residual chlorine is removed using sodium bisulfite. Dosing pumps located within the dechlorination building are fed from two 3,000-gallon storage tanks that provide 3-4 weeks of capacity, each, at current average dosing rates of approximately 7 gph. A single tank is in service at a time. The bulk chemical tanks are located within the dechlorination building and are shown in Figure 2-20.

Dosing pumps are controlled manually. Effluent from SC #1 and SC #2 combine ahead of the effluent Parshall flume used for flow measurement prior to the installation of SC #3. Sodium bisulfite is dosed to the flume, but effluent from SC #3 is combined with the remaining flows after the flume. The flume and dosing point are shown in Figure 2-21. An electromagnetic (mag) flow meter is used to measure final effluent flow. This is the only point of measurement for flow through the facility.

Figure 2-20 – Sodium Bisulfite Tanks

Figure 2-21 – Parshall Flume and Bisulfite Dosing

No total residual chlorine (TRC) compliance issues were noted within the WWTP effluent record. Final effluent is discharged to the Snake River.

Summarized area recommended to be addressed within the chlorination/dechlorination process is provided below:

- Chlorine contact gates should be replaced. Gates are large, get stuck, and cracking/spalling of concrete was present below grating

2.2.5 Blower Building, RAS, and WAS Facilities

The blower building was constructed between 2013 and 2015 as part of the secondary treatment upgrades that included the aeration basins and SC #3. The blower building houses the aeration basin blowers, RAS pumps, and WAS pumps. Blowers are located on the ground floor of the building while RAS and WAS pumping facilities are housed in the basement.

Four high-speed turbo blowers are installed in the blower building and there is space to house two additional blowers. Each 300-HP blower is rated for 5,000 cfm at 10 psi. The blowers are shown in Figure 2-22.

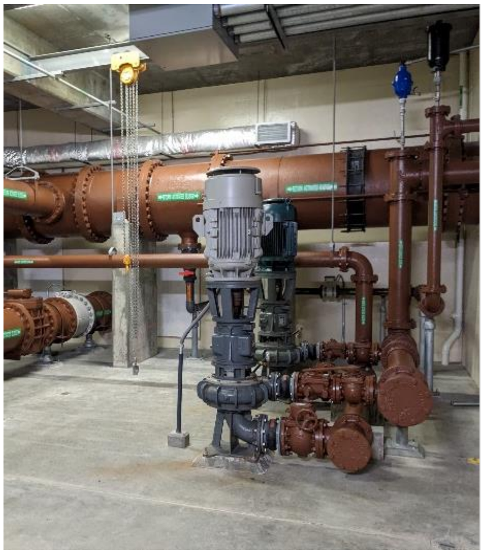
Figure 2-22 – High Speed Turbo Blowers

Four 75-HP screw-induced centrifugal RAS pumps (3 duty, 1 standby) are located in the basement of the blower building. Each RAS pump is capable of pumping 5,530 gpm at 25 feet of total dynamic head (TDH). The RAS pumps were installed between 2013 and 2015. No major issues have been experienced. The RAS pumps are shown in Figure 2-23.

Two 60-HP WAS pumps (1 duty, 1 standby) are installed adjacent to the RAS pumps. The WAS pumps are fed from the same suction line as the RAS pumps. The WAS pumps are both rated for 600 gpm at 46 feet of TDH and are shown in Figure 2-24. The motor of one of the WAS pumps has been replaced since the pumps were initially installed.

Figure 2-23 – RAS Pumps

Figure 2-24 – WAS Pumps



A floor hatch in the ground level floor and a rolling gantry crane are available to facilitate installation and removal of the RAS and WAS pumps from the basement. The basement area was also sized to allow an additional RAS and WAS pump to be installed. RAS is returned to the anaerobic selector ahead of the aeration basins while wasted secondary solids are transferred to the solids handling process and thickened prior to digestion. The secondary aerobic process is described in Section 2.2.3 and the thickening and digestion process is discussed in Section 2.2.6.

Summarized area to be addressed within the blower building or regarding the RAS and WAS pumping facilities is provided below:

- Confirm that sufficient air exchanges are provided in the blower building.

2.2.6 Solids Handling Facilities

Primary Solids

Primary and secondary solids are removed from the facility’s forward flow path at the primary and secondary clarifiers. Within the primary clarifiers, suspended solids not removed by the headworks screens are allowed to settle and are then transferred to one of four (2 duty, 2 standby) 18-inch diameter hydro-cyclones located on the top floor of the headworks building. Three 25 HP recessed impeller primary sludge pumps (2 duty, 1 standby) are installed to provide transfer capacity to the hydro-cyclones. Each primary sludge pump is rated for 255 gpm at 83 feet of TDH.

Because no grit removal is provided prior to the primary clarifiers, they act as de facto grit chambers for the forward flow stream. The hydro-cyclones remove entrained grit from the primary solids before it can impact downstream processes. The cyclones, shown in Figure 2-25, were installed in 2017 and two grit classifiers (1 duty, 1 standby) transfer removed grit to the screenings dumpsters shown in Figure 2-8.

From the hydro-cyclones, primary solids continue into the fermenter/thickener which has a design SRT of 2 days at an overflow rate of 352 gal/day/ft^2. The fermenter/thickener (Figure 2-27) was installed in 2017 and includes an odor control system due to the potential for odor production as part of the fermentation process. The odor control is a challenge and a detailed evaluation is provided in Section 2.3.

Overflow from the fermenter/thickener recombines with the primary effluent as it flows towards the PELS. The fermentation process is used to convert a portion of the volatile solids (VS) entrained within the primary solids to volatile fatty acids which help to fuel the secondary biological treatment system. It is anticipated that the fermentation process plays an important role in the secondary sludge granulation as indicated in Section 2.2.3.

Figure 2-25 – Hydro-Cyclone Grit System

Figure 2-26 – Thickened Primary Sludge Pump

Thickened primary sludge pumps, shown in Figure 2-26, transfer the thickened and fermented solids to the anaerobic digesters. Two (1 duty, 1 standby) 5-HP progressive cavity pumps, installed in 2020, are used and an additional 15 HP peristaltic hose pump is available if needed. The progressive cavity and hose pumps are rated for 42 gpm and 124 gpm, respectively, at 83 feet of TDH. Thickened and fermented primary solids are combined with thickened secondary solids in the anaerobic digesters.

Figure 2-27 – Primary Solids Thickener/Fermenter

Overall City staff have reported that the primary solids facilities are relatively new and functioning well.

Secondary Solids

A more detailed evaluation of the solids handling and treatment process is provided in Section 2.4, but preliminary information is provided here for context. MLSS is removed from the secondary effluent within the secondary clarifiers. A majority of these secondary solids are returned to the secondary treatment process as RAS. Wasted secondary solids (WAS) are removed from the return stream and transferred by the WAS pumps to gravity belt thickeners (GBTs). Two GBTs (1 duty, 1 standby) were installed in 2013 and provide thickening of the secondary solids prior to their transfer to the anaerobic digesters. Polymer, stored in totes is added to the secondary solids to facilitate thickening. Average design loading to the GBTs was between 238 and 460 gpm at 1.8% - 7.5% TS (MSA, Inc., 2012).

Underdrain from the GBTs is returned to the headworks via the influent diversion box, while thickened WAS (TWAS) drops from the GBTs to an adjacent thickened sludge pit. Submersible chopper pumps installed within the pit transfer the thickened secondary solids to the anaerobic digesters. Two chopper pumps (1 duty, 1 standby) are capable of pumping 400 gpm at 25 feet of TDH. Thickened primary solids combine with the TWAS in a common pipeline leading to the digesters. The GBTs and thickened sludge pit are shown in Figure 2-28 and Figure 2-29.

Figure 2-28 – GBT

Figure 2-29 – TWAS Pit

Anaerobic Digesters

Two mesophilic anaerobic digesters were constructed in the late 1950’s as part of the treatment process installed at that time. As loading to the digesters increased, two larger mesophilic anaerobic digesters were constructed to service the greater demand in the 1970’s. Since that time, the original 1950’s era digesters have been operated primarily as holding tanks without heating or mixing. A significant quantity of gas appears to be generated within the holding tanks; however, this has not been captured nor quantified and roof vents are reportedly left open to reduce gas concentrations within the tank ullage and the biogas piping from these tanks was capped (Stantec Consulting & Keller Associates, 2022). This is being addressed currently with the solids dewatering project. City Staff have also indicated that the holding tank covers are heavily deteriorated and that nuisance odors emanating from within are a concern. The digester complex is shown in Figure 2-30.

Figure 2-30 – Digester Complex

In total the 1970's era digesters have an approximate operating volume of 2.25 million gallons (1.125 MG each) while the smaller sludge holding tanks have an approximate operating volume of 0.64 million gallons (0.32 MG each). The digesters are equipped with external draft tube mixers, as shown in Figure 2-30, and staff indicated that struvite precipitation and grit buildup occurs immediately downstream of the draft tube discharge outlet. A pump mixing system retrofit for Digesters No. 1 and 2 is being installed as part of a project being constructed from 2023 – 2024. No other struvite accumulation issues were cited other than the granular buildup in the digesters. One digester is removed from service annually for cleaning and maintenance.

Biogas generated within each digester is captured and much of the gas is processed through the facility's boilers. Water heated by the boilers is used to provide heat to the digester complex and the buildings in the immediate vicinity of the digesters. Spiral heat exchangers are used to transfer heat from the boiler system to the digestate within each digester. Heat exchangers and boilers are shown in Figure 2-31 and Figure 2-32.

Figure 2-31 – Heat Exchangers

Figure 2-32 – Boilers

In an emergency or if excess biogas is produced, biogas can be diverted to an adjacent flare. As documented within the 2022 Cogeneration Technical Memoranda developed by the Stantec/Keller planning team, in 2021 between 57% and 78% of the biogas generated by the City was processed through the flare and average biogas production within the digesters ranged from 156,350 cubic feet (CF) to 213,900 CF per day (Stantec Consulting & Keller Associates, 2022).

Lab analyses of the biogas conducted at the time of the Cogeneration Memoranda indicated relative concentrations of approximately 55% methane and 35%-40% carbon dioxide with 5%-10% nitrogen, oxygen, and hydrogen sulfide. Heating values also ranged between approximately 550 British Thermal Unit (BTU)/CF and 670 BTU/CF (Centek Laboratories, LLC, 2019; Energy Laboratories, 2019; Energy Laboratories, 2009).

The lab analyses also indicated that siloxanes are present in the biogas generated at the WWTP. Combustion of siloxane can lead to buildup on burner nozzles which ultimately reduce performance and over time can lead to equipment failure. Staff have indicated that burner nozzles experience buildup of the white residue which is typical of siloxane deposition. This can be mitigated by scrubbing the gas ahead of the boiler system/flare.

In 2010, the digesters were reported to have an approximate solids retention time of 31-days and it was estimated that the gravity belt thickeners would expand capacity by approximately 30% (MSA, Inc., 2010). More recent estimates have indicated acceptable digester volumes until 2028 when redundant digester capacity becomes a concern based on an estimated 2020 solids loading rate of 43,300 gpd which yields a theoretical retention time within a single digester of approximately 26 days (Stantec Consulting & Keller Associates, 2022).

By 2040, estimates indicate a reduction in hydraulic retention time to 12-days based on a projected digester loading rate of 93,000 gpd which does not satisfy the requirements for Class-B biosolids (MSA, Inc., 2021).

Digested Sludge Storage and Disposal

Digestate from the anaerobic digesters is transferred to the sludge holding tanks before being stored within the 18-million-gallon storage lagoon. Two sludge transfer pumps (15-HP) located within the solids handling building are available to transfer digested solids from the primary digesters to the secondary digesters (holding tanks) and from the holding tanks to the sludge storage lagoon. The pumps are operated intermittently, as needed.

Sludge is stored until weather permits the City to land apply the biosolids, which generally occurs spring through fall. Solids are removed from the lagoon using a dredge system and transferred to trucks for spreading on fields. The remaining lagoon decant is recycled back to the plant. The City maintains agricultural fields adjacent to the WWTP for biosolids land application and has also made agreements with local farmers to land apply the biosolids. Average haul routes are reported to be 32 miles per trip (maximum of 44 miles). As development has occurred in the area, the City has had a harder time finding locations near the WWTP for application.

The City is also in the process of installing a major overhaul of the solids storage and disposal process. Beginning in 2023, a dewatering facility is being constructed which is comprised of three mechanical screw presses to provide the ability to dewater digested solids rather than transfer solids to the sludge lagoon. A portion of the existing sludge drying beds will house these improvements and be used to store the dry solids. One of the existing sludge holding tanks will act as an equalization tank for the dewatering pressate.

Summarized areas to be addressed within the solids handling and digestion process are provided below:

- Fermenter air quality and odor control system should be improved
- Ragging within the digester heat exchangers should be mitigated by screen improvements.

- Struvite can accumulate and block draft tubes, but the City is installing a pump-mix system that is anticipated to be more effective
- Redundant digester capacity could become limiting in near future
- Currently the City has year to year agreements for biosolids land application which poses a risk if landowners sell their property or decided against farming/application
- The non-structural brick veneer around the digesters appear to have vertical expansion cracks
- The metal catwalk framing on the roof of the digesters has visible signs of corrosion
- Siloxane deposition on the boilers could be mitigated by scrubbing the biogas.

2.2.7 Other Facilities

Numerous other facilities are required for the successful operation of the WWTP. These are briefly described herein, and recommendations are made where applicable.

Operations and Control Building - SCADA

The original Operations and Control Building was constructed in the 1950's and features office and break areas for the plant staff in addition to some storage spaces. The WWTP Laboratory (Figure 2-33) is also housed within the original Operations Building and the building is connected to the digester complex via an enclosed hallway. As the operational needs of the WWTP increased, a new Operations Building was constructed to the west of the WWTP which provides additional office and training spaces.

Figure 2-33 – Operations Laboratory

The main control and SCADA hub is housed within the original Operations and Control Building. Individual electrical and control rooms are located within each process building. A plant-wide arc flash study is recommended.

Plant Reuse (W2) Pump Station

The plant reuse (W2) pump station is in the basement of the ABF pump building and is critical to supporting operations at the WTTP. The backbone of the W2 system is comprised of a 4-inch waterline. Three FlowServe Model MK3 STD pumps are installed to feed the facility. All process buildings have W2 water connections and the W2 system is also responsible for feeding the irrigation system at the WWTP. Reuse water is diverted from the final effluent prior to dechlorination. Plans are moving forward to install a fourth W2 pump to supplement system capacity. W2 pumps are shown in Figure 2-34.

Figure 2-34 – W2 Pumps

Truck Garage

The WWTP Truck Garage is used to house and maintain vehicles critical to plant operations. Agricultural equipment used on the City's adjacent fields as well as trucks used to haul sludge are parked near the facility when not in use. The Garage is comprised of six narrow maintenance and/or wash bays and was constructed in the 1970's. As plant operations have increased in size and complexity, the facility is now undersized for the City's needs. The Truck Garage is shown in Figure 2-35.

Figure 2-35 – Truck Garage

Summarized areas to be addressed throughout the site or within the auxiliary plant facilities are provided below:

- Some older sections of asphalt throughout the facility are exhibiting signs of degradation and will continue until repair (mill and inlay or overlay) is made
- Increase general storage for equipment and vehicles
- Plant-wide arc flash study is recommended to be completed
- Improved automation throughout the plant will improve performance

2.2.8 Site Security

The WWTP features basic security measures to manage unauthorized access. A chain link fence surrounds the entire facility. The plant is staffed 24 hours a day, so in the event of a security concern, staff are onsite to address the situation. Gates and buildings are locked when not in use and some site and exterior building lighting is installed to provide illuminated areas throughout the facility.

2.2.9 Emergency Operation

A majority of the processes at the Idaho Falls WWTP are fully redundant to allow routine operation to continue in the event individual trains or units of equipment need to be removed from service. In some cases, individual processes may be nearing their redundant capacity limit (such as the digesters) and may require expansion in the near future.

While several backup power generators are located throughout the facility, the WWTP is also unique in that the facility can be fed through switchgear tied to two separate sub-stations. Two primary site transformers are located on the site, one of which receives power from the west side of the City while the other is energized from the east side of the City. Due to the redundant power connections, in the event of a local outage, the facility has historically been able to route power through the opposite transformer.

2.3 ODOR CONTROL EVALUATION

As part of the City WWTP facility planning study processes, the City requested the Facility Planning Team evaluate the odor control system that is part of the fermenter facility (fermenter). While there are other odors generated at the WWTP, this evaluation focused solely on this system and fugitive odors from the fermenter. During the evaluation effort, it was determined that the environment within the fermenter was compromised due to high concentrations of odorous compounds and should also be included within the study. This section provides an analysis of the existing odor control system and makes recommendations for future improvements.

2.3.1 Existing Odor Control System

The fermenter’s odor control system removes odorous air from the primary sludge fermentation process. The fermenter is used at the WWTP to thicken primary sludge, and the process is known for generating various gases, odors, and moisture. Both the fermenter and its odor control system are approximately five years old. A fiberglass dome encloses the airspace above the water surface of the thickening unit and concentrates odorous compounds including total reduced sulfur and volatile organic compounds. An exhaust blower discharges these compounds from the fermenter’s interior into the odor control system to minimize the concentration of the compounds within the dome. This exhaust system is also intended to minimize corrosion.

The exhaust blower conveys the fermenter’s interior air to a granular activated carbon (GAC) adsorption odor control unit located adjacent to the fermenter. When configured correctly, the GAC can remove most odorous compounds from the air before discharge into the atmosphere. Figure 2-36 shows the odor control system connected to the fermenter.

Figure 2-36 – Odor Control System

The GAC media capacity and lifespan within carbon adsorption units is finite. As odorous compounds are absorbed onto the media, they are slowly expended. Therefore, periodic testing is required to determine if the media still has odor adsorption capacity. Since installation of the unit in 2018, the media was reported to have been replaced once in April 2021. Hydrogen sulfide (H_2S) is the main constituent monitored for effectiveness of odorous compound treatment for this system. Original design criteria listed in the primary treatment upgrades specifications targeted treating H_2S to levels below 0.1 parts per million (ppm). The technical data for the GAC media lists minimum removal efficiency of 99.5%. At a concentration of 20 ppm within the fermenter's headspace, this equates to removal of H_2S to levels below 0.1 ppm.

The exhaust blower for the odor control system operates at two speeds to remove odorous air from within the fermenter's dome. Gas sensors within the dome are installed to provide a warning alarm that air may be unsafe for staff to enter the space. Combustible gas and H_2S detectors are set to alarm at 20 ppm. Original design criteria for the odor system are based on an average H_2S concentration of 10 ppm with peak H_2S concentrations of approximately 20 ppm. Table 2-1 provides characteristics of the odor control system as provided to the planning team in the system's operation and maintenance manual.

Table 2-1 – Odor Control System Equipment

Equipment	Description
Activated Carbon Unit	
Carbon Vessel Dimensions	7’-2” diameter, 5’-10” height (plus 2’-0” exhaust cap)
Carbon Media Type	Purafil Odorcarb Ultra Media
Carbon Media Volume	114 ft^3 (4,560 lbs) with bed depth of 3’-0”
Minimum H_2S Treatment Efficiency	99.5% at design average and peak loading
Odor System Exhaust Blower	
Type	FRP Backward-inclined exhaust fan, belt-driven
Rated (Nameplate) Airflow	2,450 cfm at 8” water column
Design (Operational) Airflow	2,100 cfm at 9.2” water column
Motor Size	7.5 hp
Pre-Filter	
Size	2’-0” by 2’-0” by 4”

2.3.2 System Operations

Historical airflows through the system has not varied by season or in response to operational needs. The system’s blower was originally designed to run at 50% speed unless occupied. When occupied, the system blower was designed to operate at full speed. However, due to high odor concentrations and concerns over harmful gaseous compounds within the fermenter, the City will typically run the blower at full speed for several hours to reduce gaseous concentrations before operations staff are allowed to enter the fermenter. There are three motorized louvers on the fermenter’s dome which remain open when outside temperatures are above 40º F. At temperatures below 40º F, the louvers are closed. This minimizes the generation of fog and condensation inside the fermenter. The reduced visibility in the fermenter from the fog and condensation pose significant issues for operations staff. However, the closure of the louvers increases the pressure through the ventilation system and reduces the rate at which the foul air is removed from the fermenter. This adds to gas-related safety concerns because lower airflow means less reduction of H_2S and any other constituents or odors.

2.3.3 Airflow Evaluation

The ventilation and odor control systems are intended to perform the following functions:

- Reduce corrosion within the fermenter by reducing H_2S and humid environments
- Minimize buildup of odorous and hazardous compounds within the headspace of the fermenter, particularly H_2S
- Reduce fugitive nuisance odors outside of the fermenter
- Reduce fog and condensation in the fermenter, which reduce visibility for staff working in the space

Under the current ventilation scheme, the exhaust blower moves 2,100 cfm, which is approximately six air changes per hour. The makeup air is supplied through three louvers that are closed in cold weather to reduce fog generation.

Existing Conditions and Corrosion

City operations staff expressed operational issues with the existing system. The exhaust blower creates excessive vibration. City staff largely attribute the vibration to improper balancing during servicing. However, some of the vibration issues have been recently mitigated by City staff adjustments to the blower. Freezing of moist air around the exhaust blower's fan blade has forced City staff to shut down the system during freezing conditions. These historical issues have resulted in increased system downtime and maintenance efforts for the City. The inoperability of the odor control system during these downtimes causes a buildup in hazardous and corrosive odors, creating a safety concern and promoting corrosion.

Observed corrosion in the fermenter was found on bolts and electrical conduit. An example of corrosion is shown on a local control panel within the fermenter in Figure 2-37 below where it is likely that the material used for the bolts is inappropriate for the environment. The highly corroded materials appear to be carbon steel. Other metal parts in the fermenter that are type 304 or 316 stainless steel did not appear to be corroding. Thus, corrosion can be prevented with proper material selection.

Figure 2-37 – Corrosion within Fermenter

H_2S Concentrations (Odor and Safety)

During the field investigation, fugitive odor emissions were noted outside the fermenter's dome. However, much higher concentrations of odorous compounds were observed within the fermenter's interior. In addition, WWTP staff reported that odors within the fermenter have been both a nuisance and a concern. During June 2023, H_2S concentrations were measured within the fermenter's headspace by the City. With the odor control system in operation, H_2S concentrations ranged between 15 and 19 ppm. Without the odor system in operation, concentrations of H_2S exceeded 90 ppm and carbon monoxide was measured at 15 ppm. All testing occurred after allowing the headspace conditions to stabilize over a 16-hour period. In both cases, the doors to the fermenter's dome were shut.

Table 2-2 provides an overview of safety concerns and side effects for various H_2S concentrations and National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and

Health Administration (OSHA) exposure limits. For both the scenarios with and without the odor control system in operation, the NIOSH recommended exposure limit was exceeded. Without the odor system in operation, airspace conditions exceed OSHA's General Industry Peak Limit and are near the NIOSH level for immediate endangerment to life and health. For carbon monoxide, the permissible exposure limit is 50 ppm; observed concentrations were considerably lower than this concentration threshold.

Data from only one sampling event are available, and the sampled concentrations are at the edge of the OSHA industry ceiling limit. The odor control system should be run constantly at full speed to ensure safety of operations staff at all times until upgrades to the system occur. Additional recommendations for upgrades are provided in Section 3.2

Table 2-2 – Overview of H2S Concentrations and Exposure Limits

Concentration (ppm)	Symptoms/Effects	Exposure Limit
0.01 to 1.5	Odor threshold: concentration at which H_2S can first be detected	--
2 to 5	Prolonged exposure can cause tearing, nausea, headaches, and/or loss of sleep; airway problems have been noted for asthmatic patients	10 ppm = NIOSH Recommended Exposure Limit 10 ppm = OSHA 8-hour Construction Limit
20	Potential fatigue, headache, memory loss, dizziness, irritability, and/or loss of appetite	20 ppm = OSHA General Industry Ceiling Limit
50 to 100	Slight conjunctivitis ("gas eye") and irritation of respiratory tract after period of 1 hour; also causes digestive upsets	50 ppm = OSHA General Industry Peak Limit; OSHA allows up to 10 minutes if no other H_2S exposure during shift 100 ppm = NIOSH level for immediate endangerment to life and health
100 to 150	Loss of smell (olfactory fatigue or paralysis)	--
500 to 700	Staggering; collapse in 5 minutes; death likely after 30 to 60 minutes.	--
700 to 1000	Rapid unconsciousness or collapse within 1 to 2 breaths: death within minutes	--
1000 to 2000	Nearly instant death	--

For the system's design airflow, the three inlet louvers and 14-inch exhaust blower suction ductwork appear to be appropriately sized. Velocities through the foul air duct currently range from 980 to 1,960 feet per minute (ft/min), while velocities through the louvers range from 90 to 180 ft/min. Duct and louver sizing is in accordance with engineering best practices and recommendations provided by the Sheet Metal and Air Conditioning Contractors' National Association. The electrical equipment inside the dome is rated Class 1 Division 1. Because of this, there is no specified ventilation rate required under National Fire Protection Agency (NFPA) 820 (2020).

Fog and Humid Interior Environment

When the louvers are closed during the winter, the ventilation rate is reduced due to increased headloss through the system caused by the limited openings for air to enter the dome. In addition, temperature differentials from the exterior and interior also increase. These conditions not only add to the odors and hazardous gases buildup, but also contribute to a foggy and humid atmosphere within. No field analysis was conducted to verify current supply or exhaust airflows; evaluation was based on City provided data from the system's original installation. Further testing of current airflows is recommended.

One option to reduce fog and increase airflow overall is to remove the current louvers and provide a heated makeup air supply. Heating the air entering the fermenter in winter will increase the ability of the air to hold moisture and increase the air's saturation humidity ratio. The heater must be capable of heating the makeup air by at least 20º F or to a minimum of 40º F, whichever is greater. Details of recommended changes can be found in Section 3.2.

Treatment Technology Evaluation

When the exhaust blower is run at full capacity for an extended period of time, H_2S concentrations were shown to be reduced to below 20 ppm (ranged between 15 to 19 ppm). For H_2S levels in this range, there are several additional treatment technology options available, including the following:

- GAC adsorption unit (currently in use)
- Bioscrubber or biotrickling to reduce H_2S followed by a GAC carbon adsorption unit or biofilter as a polishing step
- Photoionization
- Chemical wet scrubber

The current GAC adsorption system has several functional challenges. When the exhaust blower is running constantly, H_2S concentrations can be reduced to levels below 20 ppm. However, consistent operation of the blower is often not achievable. Vibration and freezing in the blower unit has resulted in downtime of the entire odor control system. Further investigation efforts are required to determine the exact cause(s) of these issues and the best operational or design mitigation measures for reducing future downtime.

GAC media needs to be replaced regularly as elevated H_2S concentrations will limit the life of the activated carbon media. Based on the media's capacity and current H_2S concentrations (15 to 19 ppm when the blower is run constantly at full speed), the media is expected to last 12 to 15 months. The City confirmed that the media needs to be replaced about once per year. Media life can be increased by placing an additional odor system, such as a bioscrubber, upstream of the GAC adsorption unit to remove H_2S.

Saturated air going to the GAC adsorption unit can also reduce odorous compound removal efficiency. The upgraded treatment system should target average H_2S concentrations within the fermenter's interior below 10 ppm rather than the 20 ppm that can be achieved currently.

Furthermore, there is no redundancy or bypass of the foul air during system maintenance. The existing system must be offline for media replacement and cleaning of the grease pre-filter upstream of the media. Even when considering the need for a second carbon unit, odor system alternatives to a larger GAC adsorption system will involve more significant capital investments and will either have similar or greater annual operations and maintenance costs. The media for the current GAC adsorption system was replaced once since the system was installed after about two years of operation. Media replacement costs depend on the type of media and whether the replacement is performed by facility staff or contracted to an independent supplier. Estimated costs for media replacement typically range from a minimum of $20,000 to $40,000 depending on media type and who performs the work. Historically, media replacement was performed by the City.

Based on the data obtained from the City, odor control and odorous compound reduction within the fermenter via GAC media is the appropriate technology. However, an additional GAC adsorption unit would be required to achieve H_2S concentrations below 10 ppm and improve safety. An alternative technology type (e.g., bioscrubber) should not be considered until more data are obtained during follow-up investigations. By adding a second carbon unit, downtime is reduced. Without the additional unit, operations staff should never enter the fermenter during exhaust blower downtime due to safety concerns associated with H_2S.

Final recommendations for odor control are discussed in subsequent sections based on the results of the Odor Control Evaluation.

2.4 BIOSOLIDS TREATMENT EVALUATION

The City WWTP processes wastewater residuals in a mesophilic, anaerobic digestion process. Following digestion, Class B biosolids are stored in sludge holding tanks followed by lagoon storage prior to disposal to local agricultural fields. This section evaluates the existing biosolids treatment and handling system and makes recommendations for future improvements to handle ensuing flows and loadings. This section addresses the following:

- Existing and future capacity requirements
- Future options for solids treatment and biosolids handling and disposal
- Compliance with permit and agency requirements
- Recommendations for the City's future planning

2.4.1 Existing Biosolids System

The Digester Complex, as it exists today, is shown in Figure 2-30. Primary solids are initially processed within a primary fermenter which in turn feeds the digesters along with thickened waste activated sludge (TWAS). Prior to 2013, foaming within the digesters was reported to be a significant issue, likely occurring as a result of overloading the digesters. Since the City installed two gravity belt thickeners (GBTs) to thicken the waste activated sludge (WAS) prior to sending it to the digesters, conditions have significantly improved. The GBTs installed in approximately 2013 are shown in Figure 2-38.

Figure 2-38 – Gravity Belt Thickener

The Digester Complex is comprised of four total digesters with two larger, 1970s era digesters which function as primary digesters and two smaller, 1950s era digesters which currently are used as sludge holding tanks. In total the primary digesters have an approximate operating volume of 2.25 million gallons (MG) (1.125 MG each) while the smaller sludge holding tanks have an approximate operating volume of 0.64 MG (0.32 MG each). The primary digesters are equipped with external draft tube mixers.

At the completion of digestion, solids are stored in an open lagoon which is used to hold the solids until land application sites become available for disposal. A new dewatering building with screw press units and a polymer makeup and activation system is currently under construction, Figure 2-39, which will allow the City to transition from liquid solids application to dry solids application, reducing the biosolids volume requiring disposal for the WWTP.

Figure 2-39 – Construction of New Dewatering Building

The City experienced a reduction in solids loading to the WWTP from various sources leaving the system. In addition, the City installed GBTs to thicken WAS and it was estimated that the installation of the GBTs would further expand capacity by approximately 30% (Murray, Smith & Associates, 2010). More recent estimates have indicated acceptable digester capacity will last until 2028 before redundant digester capacity becomes a concern. This was based on growth from the estimated 2020 sludge loading rate of 43,300 gallons per day (GPD) which yielded a theoretical retention time within a single primary digester of approximately 26 days. Using a projected sludge production volume of 93,000 GPD by 2040, retention time was estimated to be down to 12 days which does not satisfy the 15-day retention time requirements for Class B biosolids per 40 CFR Part 503, Standards for the Use or Disposal of Sewage Sludge (Murray, Smith & Associates, 2021).

2.4.2 Current and Projected Biosolids Production

Current Biosolids Production

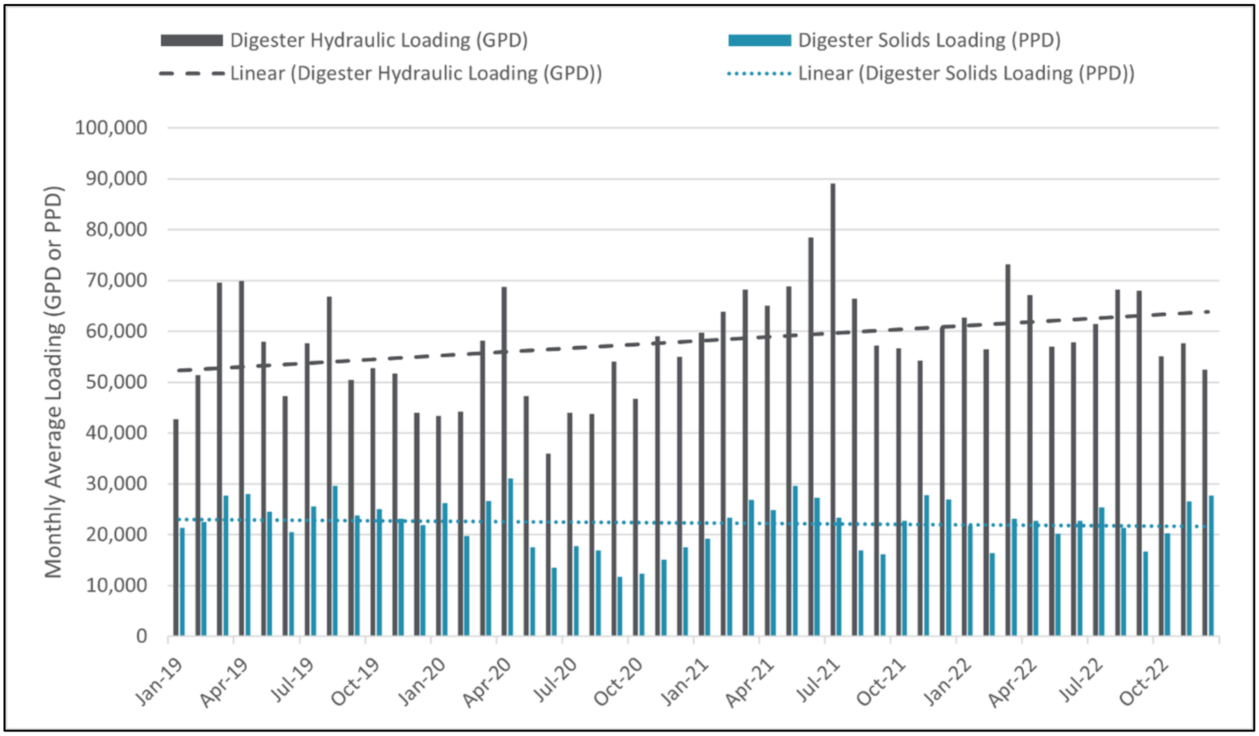
City operators track daily loading to the digesters from the fermenter and GBTs. Primary solids are first processed through the thickener/fermenter while WAS is transferred to the GBTs for thickening. Average daily hydraulic loading to the digesters was 65,700 GPD or 23,700 pounds per day (PPD) in 2021 and 61,500 GPD or 22,100 PPD in 2022. This is significantly greater than the 43,300 GPD that was reported previously for 2020. At a hydraulic loading rate of 65,700 GPD, retention times within the digesters when both are operating would be approximately 34.2 days.

If one digester were removed from service, the retention time would decrease to approximately 17.1 days which remains above the 15-day standard for Class B biosolid production.

The average feed solids concentration to the digesters was approximately 4.3% total solids (TS) during both years with primary solids averaging 3.9% TS and WAS averaging 5.4% TS. Assuming 80% volatile solids (VS) and one digester offline, the maximum month VS loading rate for 2021 and 2022 was 0.16 and 0.15 lb VS per day per cubic feet (CF), respectively. These values are within the range of typical high loading rates for mesophilic digesters (0.12 to 0.16 lb VS per day per CF). A limiting value of 0.20 lb VS per day per CF is often used for digester design (Water Environment Federation, 2018).

Figure 2-40 presents the historic monthly average loading rates to the digesters from 2019 to 2022 and indicates a general increase in hydraulic loading. However, it is interesting to note that a similar increase in solids loading has not been observed.

Figure 2-40 – Historic Digester Loading Rates



Projected Solids Production

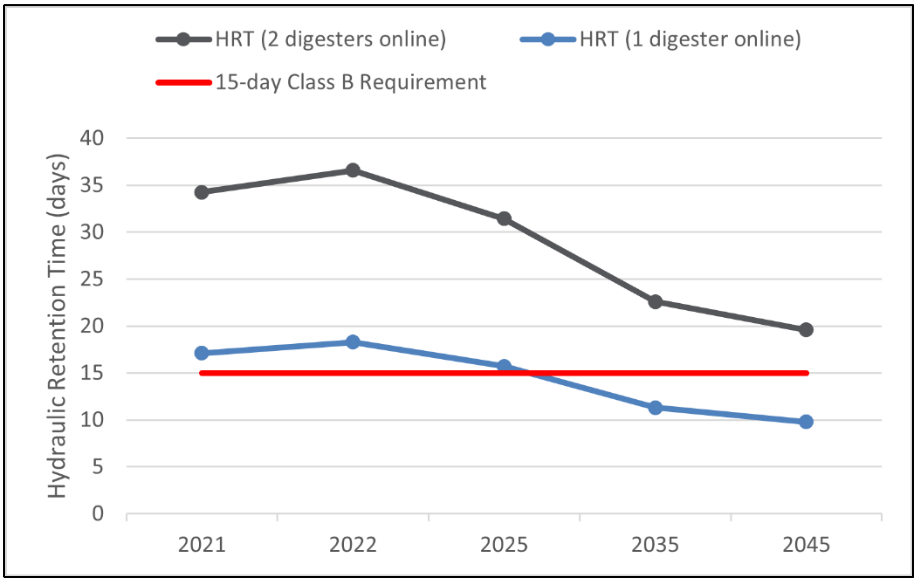
In order to provide a conservative estimate of the future conditions, the digester loading from 2021 was used as the growth baseline for planning. It was assumed that the loading to the digesters would increase at the same rate as the influent flows and loadings as described in Table 1-4 and Table 1-5 (62% increase by 2045). Projected hydraulic loadings to the digesters are shown in Table 2-3.

Table 2-3 – Projected Digester Hydraulic Loading

Hydraulic Loading[11]	2021 (GPD)	2022 (GPD)	2025 (GPD)	2035 (GPD)	2045 (GPD)
Average Loading	65,700	61,500	71,600	92,000	106,500
Average Ferric Solids[12]	0	0	0	7,500	8,400
Total Average Loading	**65,700**	**61,500**	**71,600**	**99,500**	**114,900**
Max Month Loading	89,100	73,200	97,100	124,700	144,300
Max Month Ferric Solids [12]	0	0	7,500	10,300	11,200
Total Max Month Loading	**89,100**	**73,200**	**104,600**	**135,000**	**155,500**

The corresponding digester retention times for the projected flows in Table 2-3 at total average and maximum month loadings are presented in Figure 2-41 and Figure 2-42, respectively. The retention times when both digesters are operating is expected to remain above the 15-day standard through 2045 for the average condition and go below the 15-day standard between 2040 and 2045 for the maximum month condition. The retention time when only one digester is online is expected to go below the 15-day standard between 2025 and 2030 for the average condition and within the next year for the maximum month condition.

Figure 2-41 – Digester Retention Time Projections (Average Conditions)



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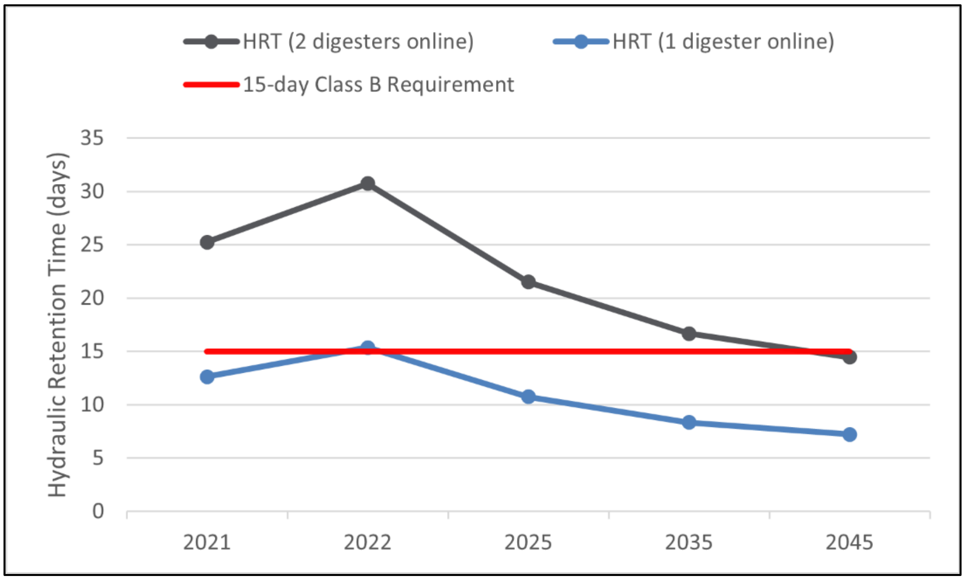
[11] Tabulated values are rounded to the nearest 100 GPD.
[12] Based on 4.3% TS.

Figure 2-42 – Digester Retention Time Projections (Maximum Month Conditions)



Dosing coagulant (ferric chloride) to the return stream from the dewatering process currently under construction will increase solids production and lead to an increase in solids loading within the digesters. Based on assumptions documented by Murray, Smith and Associates (MSA) in the Preliminary Engineering Report, an approximate 10% increase (approximately 2,700 PPD) in total solids production should be anticipated (Murray, Smith & Associates, 2021). Projected solids loadings are presented in Table 2-4 assuming a similar 4.3% TS concentration and with the addition of ferric solids.

However, the MSA assumptions are based on balancing phosphorous loading from the pressate return stream with the capacity of the biological phosphorous removal process which is anticipated to present a significant operational challenge. A lower than typical molar ratio of iron to phosphorous was used than is otherwise recommended by standard of practice design manuals; therefore, the loading identified herein could be an underestimate of the actual increase in solids production depending on how the coagulant is actually dosed (Bowker, 1987; Water Environment Federation, 2018). As this return stream is entering the liquid forward stream downstream of the primary clarifiers, the overall effectiveness of the coagulant dosing process is being reduced, placing further stress on the secondary treatment process. Assuming a similar concentration of total solids loading to the digesters moving forward, projected solids loadings are presented in Table 2-4 along with simulated contributions of ferric solids.

Table 2-4 – Projected Digester Solids Loading @ 4.3% Solids

Solids Loading[13]	**2021 (PPD)**	**2022 (PPD)**	**2025 (PPD)**	**2035 (PPD)**	**2045 (PPD)**
Average Loading	23,700	22,100	25,700	33,000	38,200
Average Ferric Solids[14]	0	0	0	2,700	3,000
Total Average Loading	**23,700**	**22,100**	**25,700**	**35,700**	**41,200**
Max Month Loading	29,600	27,700	34,800	44,700	51,800
Max Month Ferric Solids[14]	0	0	2,700	3,700	4,000
Total Max Month Loading	**29,600**	**27,700**	**37,500**	**48,400**	**55,800**

Overall solids production and loading to the digesters will also be impacted if the City were to implement a side-stream treatment solution for nitrogen loading from the dewatering process and could also be impacted if the City were to utilize a different coagulant for mitigation of phosphorous loading. A different coagulant may be recommended if the City were to move towards a UV disinfection system since ferric chloride can contribute to staining of the UV lamps which would degrade the overall performance of a UV disinfection system.

2.5 INTERNAL PLANT RECYCLE AND SIDESTREAM TREATMENT

The City of Idaho Falls WWTP is in the process of installing a biosolids dewatering process and transitioning from drying beds and storage lagoons to a more efficient screw press dewatering system. The dewatering screw presses will be operational in 2024 and generate liquid and solid streams that have not heretofore impacted the biological treatment process. This section focuses on the nutrient-laden liquid stream exiting the screw press, referred to as filtrate, and evaluating the potential impact on the overall liquid treatment system and potential related sidestream treatment.

Due to the City's enhanced biological nutrient removal system within the wastewater treatment plant, followed by anaerobic digestion upstream of the dewatering process, the filtrate stream is expected to have high concentrations of ammonia and phosphorus. A filtrate storage tank, or equalization basin, is being constructed as part of the dewatering project. The basin allows a controlled return of nutrient-laden water back into the plant's liquid treatment stream. This provides operational flexibility to return high-nutrient filtrate when the WWTP influent loading is low. Filtrate will be returned to the mainstream process via gravity, after the primary clarifiers, at the Primary Effluent Lift Station (PELS).

A process flow diagram of the process, post-improvement, from the design drawings is found in the 2022 MSA Dewatering Plan Set (MSA, Inc., 2022) To mitigate adverse effects of the phosphate-rich filtrate, ability to dose chemical coagulant is included in the dewatering project. When needed, the coagulant, ferric chloride, can be injected directly to the filtrate return stream. However, coagulant is not anticipated to mitigate high ammonia load.

Based on the projected flows and loadings documented in Section 1.5 the secondary treatment system may be nearing capacity to remove nitrogen in the next ten years. This high-level analysis was based on projected influent loading only and did not include loading from filtrate return. Depending on operation and actual nutrient concentrations, this combined load may accelerate the need for secondary treatment capacity upgrades. We recommend additional evaluation of filtrate characteristics once the dewatering project is complete, and furthermore update

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[13] Tabulated values are rounded to the nearest 100 PPD.

[14] Ferric solids are estimated using the assumptions documented by (MSA, Inc., 2021) within the Dewatering Preliminary Engineering Report. It was further assumed that coagulant would be dosed to control maximum month loadings earlier than average loadings.

projections based on the data. The purpose of this section is to evaluate sidestream treatment to mitigate projected nutrient loading from the filtrate.

The City has identified granular struvite buildup in their digesters and plans to mitigate by installing additional mixers as part of the upcoming dewatering project. The City intends to re-evaluate the struvite issue after the new mixing system has been installed. High-level mitigation strategies are included in this study.

Table 2-5 summarizes the WWTP design capacity and is referred to throughout this TM (MSA, Inc., 2022).

Table 2-5 – WWTP Facility Design Capacity

Parameter	Value	Unit
Daily Average Flow	17	MGD
Peak Month Flow	18	MGD
Peak Hour Flow	49	MGD
BOD_5	44,600	lb/day
TSS	44,750	lb/day
TKN	3,560	lb/day
TP	1,000	lb/day

2.5.1 Sidestream Characterization

The current improvements being constructed as part of the WWTP dewatering upgrades project are shown in dark line type in the process flow diagram (MSA, Inc., 2022). The Dewatering Project includes repurposing of an existing secondary digester to be used as filtrate equalization tank (Figure 2-43). Design criteria from the *Preliminary Engineering Report* (PER) *for Dewatering Improvement Project* (MSA, Inc., 2021) is summarized in Table 2-6. The required filtrate storage volume is 150,000 gallons based on the assumptions shown in Table 2-7. The repurposed tank has a capacity of 315,000 gallons, and therefore will provide sufficient volume to equalize the filtrate. A recirculation pump will feed four 3-inch eductor jet mixers.

Filtrate will be conveyed from the equalization basin back to the treatment process downstream of primary clarification. Typically, the return of filtrate is preferred upstream of primary clarification, however return locations upstream of primary clarification were deemed unfeasible at the Idaho Falls WWTP site by the engineers delivering the Dewatering Project. Equalized filtrate will be governed by an inline magnetic flowmeter with flow control valve. Located prior to metering of ferric chloride, the flow control valve will include a chemically compatible coating as a safety measure. A static pipe mixer with an injection quill will facilitate mixing of ferric chloride with filtrate equalization tank discharge. The filtrate was modeled for the 2021 PER to determine design criteria for chemical phosphorus reduction by ferric chloride addition, see Table 2-7. Data on filtrate ammonia and total nitrogen loadings were not provided in the 2021 PER.

Figure 2-43 – Repurposed Secondary Digester (New Filtrate Equalization Tank)

Table 2-6 – Dewatering Upgrades Design Criteria[15]

Design Parameter	Value	Unit
Anaerobically Digested Solids	2.5-3.0	%TS
Dewatered Solids Discharged	13-15	%TS
Polymer Addition	30-40	lbs/dry ton of solids

Table 2-7 – Filtrate Storage Assumptions[16]

Parameter	Value	Unit
2040 Annual Average Influent Flow	17	MGD
Total Filtrate Volume per Week	517,500	gallons
Dewatering Days of Operation per Week	5-7	days
Wash Water[17]	4,800	gpd
Continuous Equalized Filtrate Return	77,400	gpd
Cake Solids Concentration	16	%

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[15] (MSA, Inc., 2021)
[16] (MSA, Inc., 2021)
[17] Wash water assumes 33 gpm for three minutes, twice per hour

Table 2-8 - Design Criteria for Chemical Phosphorus Removal

Parameter	Unit	2020	2040 (Min – Max, if applicable)
Influent Flow	MGD	10	17
Influent TP	lb/day mg/l as P	651 7.8	1008-1106 7.8
Influent OP	lb/day mg/l as P	250 3.0	388-425 3.0
Effluent TP	lb/day mg/l as P	158 1.9	142-220 1.0-1.7
Sidestream Return Flow	gpd	55,600	79,000
Filtrate TP	lb/day mg/l as P	531 1,146	557-650 846-987
Filtrate OP	lb/day mg/l as P	521 1,123	309-358 469-544
Ferric Chloride Dose	gpd of 33% solution	0	421-633
Filtrate OP – after Ferric Chloride Dosage	lb/day mg/l as P	521 1,123	72-201 109-305

2.5.2 Anticipated Sidestream Characteristics

The WWTP sidestream is comprised of the filtrate produced from the new dewatering process. The 2021 PER provides estimates of total suspended solids (TSS), biochemical oxygen demand – five day (BOD_5), total phosphorus (TP), orthophosphate (OP) prior to ferric chloride addition, and OP after ferric chloride dosage concentrations within the filtrate (Table 2-8). As previously stated, ammonia and total nitrogen were not estimated in the PER. Results from sampling efforts in February and March 2022 were analyzed to estimate filtrate ammonia concentration, where all ammonia is expressed as total Kjeldahl nitrogen (TKN). Samples were collected at six locations, as shown in Figure 2-46. Relevant results from February/March 2022 sampling events are summarized in Table 2-9.

Table 2-9 – February/March 2022 Sampling Results

Sample Location	Date	TSS		TKN		TP	
		mg/l	lb/day	mg/l	lb/day	mg/l	lb/day
Primary Effluent (Location 2)	2/23/2022	68	5,293	38	2,958	12.7	989
	3/2/2022	86	7,271	39	3,297	4.0	338
	3/9/2022	78	6,132	39	3,066	20.1	1,580
	3/16/2022	72	6,119	36	3,059	5.5	467
Secondary Influent (Location 3)	2/23/2022	82	6,383	41	3,176	15.5	1,207
	3/2/2022	98	8,285	32	2,672	4.1	350
	3/9/2022	70	5,503	38	3,003	20.2	1,588
	3/16/2022	96	8,159	NA	NA	NA	NA
Dewatered Digested Solids – Simulates Filtrate (Location 5)	3/1/2022	2,330	1,069	1060	486	969	444
	3/8/2022	2,150	986	1150	528	1074	492
	3/15/2022	2,290	1,050	1000	459	1002	459

Jar testing of digested sludge was completed to simulate the dewatering process and estimate parameters in the filtrate at sample location 5. Since organic material is generally considered degraded during anaerobic digestion, TKN was used as a direct proxy to estimate ammonia concentration at 1,070 mg/L, an average of the three available data points from sample location 5. Due to design capacity basis provided as TKN, this section will now refer to ammonia load within filtrate as TKN load returned to the mainstream treatment process. It is assumed that the total capacity is design capacity, rather than firm capacity.

Current sidestream characteristics were projected by a few methods: 2021 PER, analysis of February/March 2022 analytical results, and comparison to similar facilities. It was assumed the secondary system and digesters will continue to provide the same level of treatment throughout the planning period. Therefore, filtrate nutrient concentrations are anticipated to remain constant, while loading will increase as a result of increased flow. Table 2-10 summarizes the current and projected sidestream characteristics, where the maximum value is given for most conservative design projections, indicating seven days of operation.

Table 2-10 shows phosphorus projections given based on information in the PER document. Both OP and TP decrease between the current date and design year, 2040. This phenomenon was explained as a footnote within the PER: Biowin modelling of the proposed filtrate chemical trim has produced some results which indicate a molar dosing ratio of less than 1.0. Consultation with Envirosim (Biowin parent company) determined the model is not calibrated to phosphate concentrations in the 900 mg/L range. In order to conservatively design the facilities chemical storage requirements, additional hand calculations were performed between a molar ratio of 1.0 and 2.0. These calculations are included in the MSA 2021 report (MSA, Inc., 2021)

The phosphorus concentrations given by simulated filtrate from Table 2-9 are higher than typical for a sidestream return. It is recommended to conduct testing on filtrate characteristics once dewatering is in start-up to best dose ferric chloride as means of chemical phosphorus reduction.

Table 2-10 – Anticipated Sidestream Characteristics

Parameter	Unit	Current Value in 2023	Maximum Value in 2040	Source
Filtrate Return Flow	gpd	55,600	79,000	2021 PER
Filtrate OP (prior to chemical dosing)	lb/day mg/l as P	521 1,123	358 544	2021 PER
Filtrate TP (prior to chemical dosing)	lb/day mg/l as P	531 1,146	650 987	2021 PER
Filtrate OP (after chemical dosing)	lb/day mg/l as P	521 1,123	201 305	2021 PER
Filtrate TP (after chemical dosing)	lb/day mg/l as P	531 1,146	493 748	Assuming all TP removed is from OP fraction
Filtrate BOD$_5$	lb/day mg/l	466 1,500	1,000 1,500	2021 PER
Filtrate TSS	lb/day mg/l	430 1,385	918 1,377	2021 PER
Filtrate TKN	lb/day mg/l as N	496 1,070	705 1,070	Feb/March 2022 Sampling Efforts

As part of the Facility Plan, City is considering an alternative solids treatment approach using the CleanB® system from BCR. CleanB® is a plug-flow, chemical oxidation/aeration process for WAS which would be operated in parallel with the existing digesters prior to dewatering. Use of this process would change the sidestream quantity and characteristics from that shown above. For purposes of evaluating sidestream treatment, it is assumed that future solids handling will use anaerobic digestion and dewatering consistent with the PER.

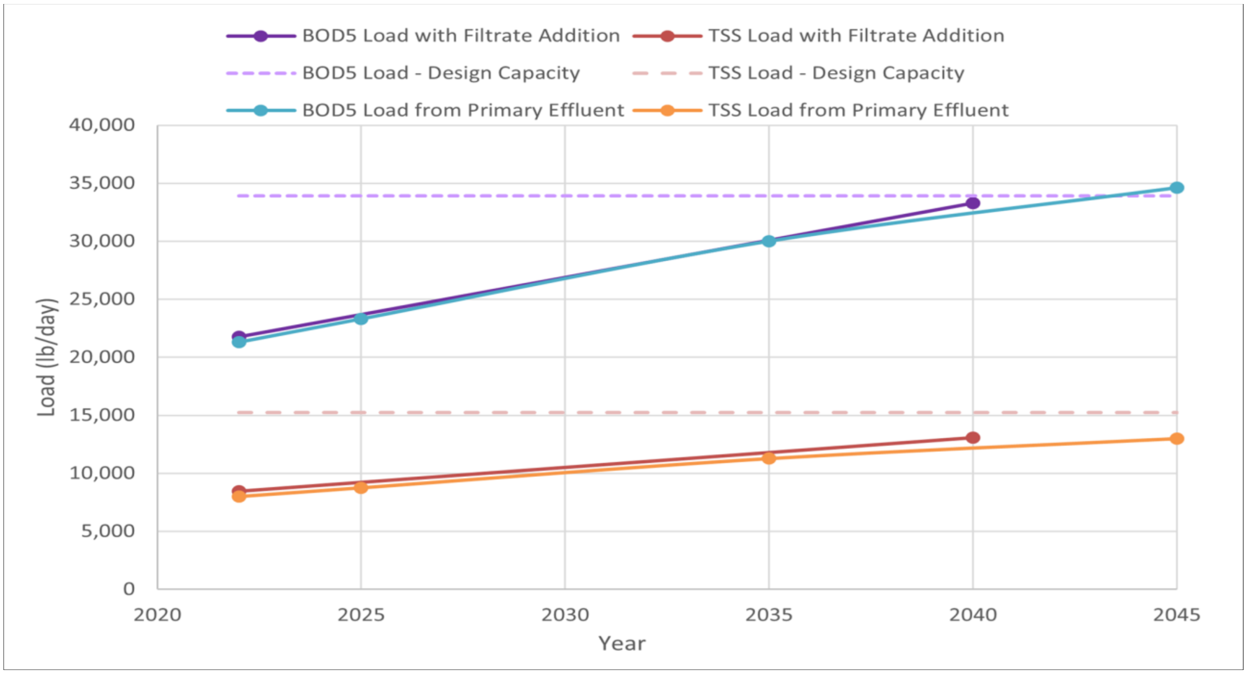
2.5.3 Impact on Secondary Influent

The filtrate return stream will impact the secondary system due to its high nutrient loading. To conservatively estimate projected load to the secondary treatment process, Figure 2-44 and Figure 2-45 were generated using maximum values from Table 2-10. Flow and load projections from primary effluent were estimated using the projections documented in Section 1.6.6, where years projected were 2025, 2035 and 2045. Data from the PER focuses on design year 2040 and today, resulting in differing years on these graphs. Filtrate TP and OP before ferric chloride addition are in gray type because the City has decided coagulant will be utilized. Therefore, after-chemical-dosing values are applied in projections.

To calculate secondary influent characteristics from the primary effluent stream before filtrate addition, it is necessary to determine removal through primary treatment. Conventional Primary Treatment typically removes 25-40 percent of BOD_5 load and 50-75 percent of TSS load (WEF, 2017). From 2022 City data, it was calculated that primary treatment removes 24 percent of BOD_5 and 66 percent of TSS on average. Secondary system design capacity was estimated using the City’s measured removal rates. All analysis of the impact to secondary influent includes the addition of ferric chloride as coagulant for chemical phosphorus reduction in filtrate.

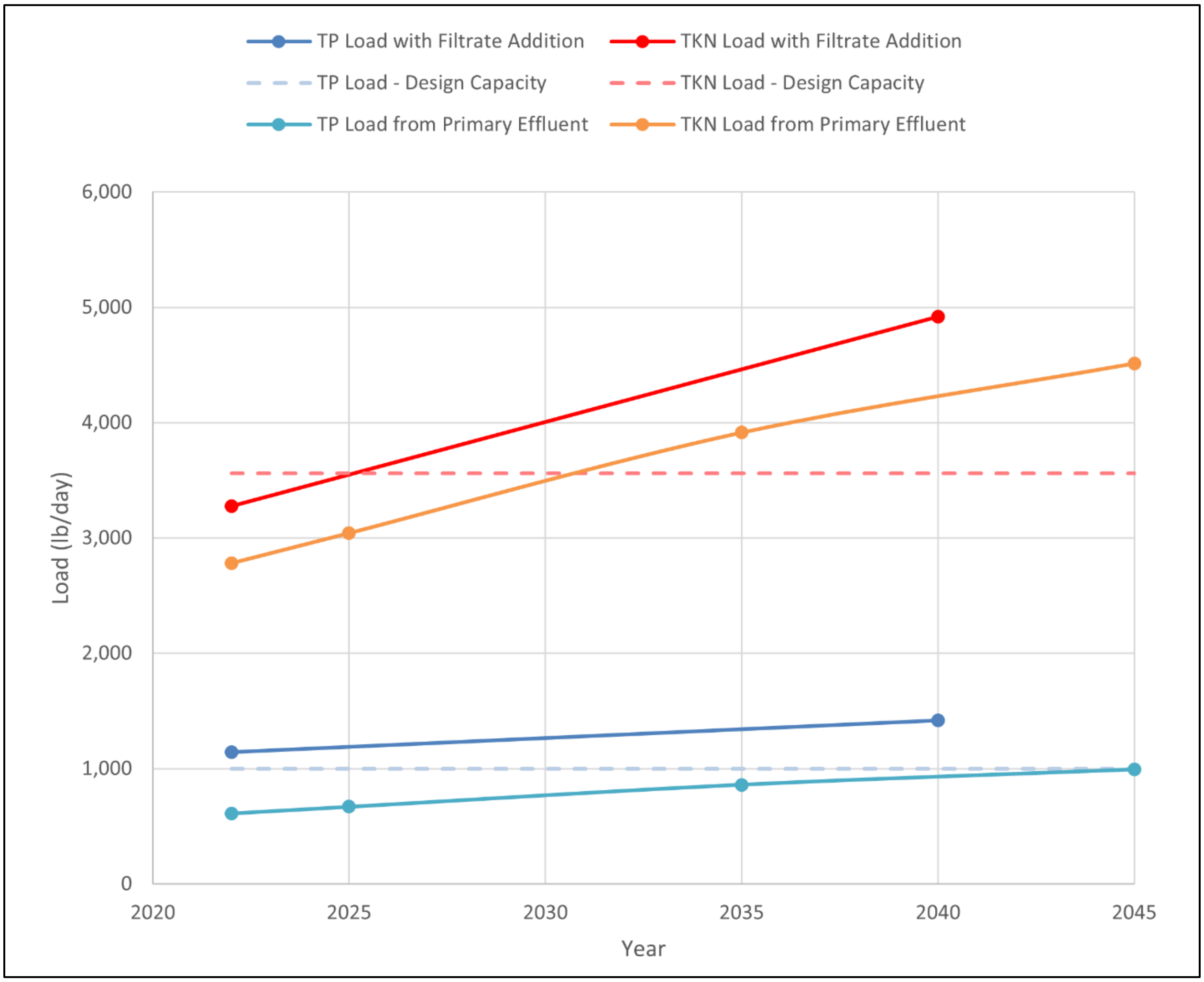
Figure 2-45 shows projected secondary influent load compared to reported design capacity, with and without filtrate return. Near the end of the planning period, BOD_5 and TSS loadings approach design capacity, with BOD_5 load approximately at design capacity. If actual conditions vary from projected and BOD_5 loading is higher than expected, the secondary system may exceed design capacity before 2040. The BOD_5 and TSS load from filtrate addition do not have much of an effect on the secondary influent loading; a majority of BOD_5 and TSS load is from the main process stream in primary effluent.

Figure 2-44 – Impact of Filtrate on Secondary Influent (BOD_5 and TSS)



Analytical results from the February/March 2022 sampling event suggest there is no TKN or TP reduction through the primary system. Therefore, nutrient loading to the secondary system is estimated to be the sum of WWTP influent load and filtrate return load. Figure 2-45 shows projected nutrient (TKN and TP) load to the secondary system compared to its design capacity. Based on these projections, secondary sewer system TP load is estimated to be near capacity at startup and will exceed capacity without mitigation. Upon startup of the dewatering project, TKN will likely be near the design capacity of the secondary system and exceed design capacity within the next several years.

Figure 2-45 – Impact of Filtrate on Secondary Influent (Nutrients)



The nutrient load projections on Figure 2-45 emphasize that even without the filtrate return stream, the plant is projected to be over capacity due to high influent nutrient loads. With filtrate addition to the process stream, our conservative estimate shows TP exceeds design capacity immediately and TKN exceeds design capacity around 2025.

High nutrient loads received in the influent exert pressure to take filtrate nutrient load mitigation measures, particularly for nitrogen, to slow down exceedance of design capacity. The primary mitigation strategy of high TP load in the filtrate return stream is addition of ferric chloride, where dosage is flexible; Figure 2-45 shows maximum TP loads for conservative design. Ferric chloride dosages were found in the 2021 PER; however, the City may need to adjust dosage for increased chemical phosphorus reduction. Sidestream treatment is evaluated as an approach to reduce TKN load from the filtrate return stream.

Based on the projected increased filtrate return loading, the secondary system may reach or exceed design capacity in the next five years. Providing sidestream treatment would reduce TKN loads to the secondary system and delay the need for larger capacity upgrades.

2.6 COLLECTION SYSTEM EVALUATION

The purpose of this section is to evaluate the current state of the City's wastewater collection system by identifying potential capacity challenges, rehabilitation priorities, documenting completed capital improvements, and identifying knowledge and/or data gaps. The following information was used as the basis for this effort.

- GIS Database: The City maintains a Geographic Information System (GIS) database of their collection system. O&M staff regularly update the database based on field activities and observations
- *Collection System Hydraulic Modeling and Capital Improvement Analysis*[18]*:* The most recent modeling analysis of the collection system was completed over 10 years ago. This effort utilized a model to assist in identifying various capital improvements projects
- O&M Staff Interviews: The Idaho Falls Facility Planning Team met with City staff on March 8, 2023, to discuss existing condition of the collection system, verify compiled information, and identify capacity challenges and capital improvement projects

2.6.1 Overview

The City owns and operates its collection system, serving residential, commercial, and industrial customers. There are several neighboring collection systems, also mapped in the City's GIS database: Ammon, Eastern Idaho Regional Sewer District (EIRSD), Iona-Bonneville Sewer District (IBSD), Private, and Ucon. However, the City only accepts flow from IBSD, Ucon, and some Private systems. The majority of Ammon is part of the EIRSD which is a separate collection and treatment system and does not send flow to the City. Figure 2-47 shows the extent of the mapped collection systems and length of pipe owned by the City. Table 2-11 tabulates the quantity of each asset category for Idaho Falls.

Table 2-11 – Sewer Pipe, Active Manholes, and Active Lift Stations[19]

Sewer (feet)	Sewer (miles)	Number of Active Manholes	Number of Active Lift Stations
1,590,839	**301**	**6,267**	**31**

The collection pipe within the service area ranges from 4-inch diameter to 60-inch diameter and is shown in Figure 2-48. Table 2-12 summarizes the quantity of pipe by size.

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[18] (MSA, 2011)

[19] Based on data provided by the City. Unreported values not included.

Table 2-12 – Sewer Pipe Diameter within Service Area[19]

Pipe Diameter (inch)	Owned by Idaho Falls (feet)
4	6,654
6	19,878
8	1,078,872
10	65,845
12	162,110
15	63,864
18	66,635
20	9,323
21	13,510
24	35,564
27	-
30	40,610
36	17,497
48	7,076
54	2,895
60	192
Total	**1,590,839**

There are 31 active lift stations within Idaho Falls, as tabulated in Table 2-13. Pump quantity and horsepower for each lift station is generally identified.

Table 2-13 – Lift Stations by Horsepower [19]

Reported Horsepower	Lift Stations Owned by Idaho Falls
2	1
3.0	3
5.0	11
5.5	1
7.5	6
10.0	3
15.0	2
23.0	1
30.0	1
100.0	2
Total	**31**

Within the portion owned by the City, there are an estimated 70 – 80 stormwater connections to the sanitary sewer system. It is unknown if there are stormwater connections to the sanitary sewer system within IBSD.

2.6.2 Capacity

Collection system capacity was reviewed to identify significant challenges in the collection system. Because a hydraulic model was not prepared for this evaluation, capacity limitations were assessed based on reported surcharging or overflows and anecdotal information. However, City staff reported there have been no identified capacity challenges or sanitary sewer overflow events within the collection system. This is supported by results of the 2011 hydraulic analysis study indicating capacity challenges are likely associated mainly with future development.

It is assumed the City implemented an incremental phased approach to match growth. Conversations with City staff indicate most of the recent development has been infill. Asset information from the GIS database shows approximately 12% of the Idaho Falls system to be less than 10 years of age which is assumed to correlate to this recent growth.

As part of the 2011 analysis, a list of capital improvement projects was developed for the City, some of which have been completed or modified. The full 2011 project list is provided in the MSA 2011 report while the specific section of capital improvement projects can be found in Appendix E (MSA, 2011).

According to the 2011 hydraulic analysis, various sections of sewers were reported to have low velocity (<2 ft/s) under dry weather conditions, while two force mains were noted to have high velocities, exceeding 6 ft/s. The 2011 hydraulic analysis study recommended flushing the low velocity areas annually and monitoring the high velocity force mains.

During staff interviews, the primary capacity concern occurs during storm events. This is consistent with the 2011 hydraulic analysis which identified a strong correlation between peak flow events and inflow and infiltration (I/I), with rain (storm) events as the primary mechanism of I/I. The City also reported many connections from the stormwater system to the sanitary sewer system utilizing flow restrictors or inlet control devices (ICDs) to limit extraneous peak flows within the collection system and to the WWTP. Despite the ICDs intention to control peak flows to mitigate capacity constraints, the volume of extraneous flows from contributing areas are still conveyed by the collection system and required to be treated at the WWTP. The ICDs also contribute to reports of prolonged stormwater ponding on streets during storm events. Past evaluations completed by the City have deemed construction of an entirely new stormwater system as not feasible. The City has implemented an annual program to prioritize and remove stormwater connections where practical and cost-effective. Future activities to decouple these connections are expected to be more complex and expensive. City staff indicate they have no immediate I/I concerns because, during peak flow, they do not have reported surcharging of manholes or lift stations, and the WWTP has adequate capacity. However, as plant hydraulic capacity approaches its limit an economic evaluation of least-cost improvements may be valid between collection system stormwater connections and plant hydraulic improvements.

2.6.3 Condition

The City has a robust ongoing operation and maintenance (O&M) program, taking a proactive and practical approach to managing its aging sewer infrastructure. The O&M program focuses on some of the oldest sewers and identified condition concerns on an annual basis. In general pipe material within the Idaho Falls collection system varies, with predominately clay sewers located in the downtown core and transitioning to concrete, then PVC as distance from the city center increases. Figure 2-49 shows the breakdown of sewer materials as tabulated in Table 2-14.

Table 2-14 – Sewers by Material Type[19]

Pipe Material	Owned by Idaho Falls (feet)	Estimated Useful Life (years)[20]
Asbestos Cement	423	70
Cast Iron	83	60
Clay	168,567	100
Concrete	863,043	100
Ductile Iron	36,824	100
HDPE	2,473	100
PVC / ABS	509,864	75
Steel	573	55
Total	**1,581,851**	**-**

Figure 2-50 shows the various sewer age ranges as tabulated in Table 2-15. The oldest sewers still in service date back to 1905 and are generally located downtown. Sewer age appears to decrease with increasing distance from downtown, following a similar trend as the sewer pipe material as seen in Table 2-14.

Table 2-15 – Sewers by Age[19]

Pipe Age (years)	Owned by Idaho Falls (feet)
0-9	188,446
10-19	227,231
20-29	174,908
30-39	191,051
40-49	212,592
50-59	107,904
60-69	296,733
70-79	99,188
80-89	9,108
90-99	8,499
100-109	31,046
110-119	36,118
Total	**1,582,827**

In the absence of evaluating physical condition assessment data and ratings, material and age of sewers can be correlated to prioritize inspection areas within the collection system. For each sewer pipe material type, an estimated design life was established. For each sewer segment, the estimated design life was compared to the reported age to estimate remaining useful life, as per the following equation. The asset with the least remaining life would likely be in the poorest condition.

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[20] Estimated based on values used for other municipal system evaluations.

$$Estimated\ Useful\ Life\ Based\ on\ Pipe\ Material - Actual\ Pipe\ Age = Estimated\ Remaining\ Life$$

Figure 2-51 shows estimated remaining life for each section of pipe. This method can be used as a starting point; however, areas identified to be nearing, at, or past useful life should be further investigated to better determine actual condition and prioritize capital improvements. For example, City staff report concrete and clay pipe to generally be in good condition, with isolated breaks. Although the clay pipe is some of the oldest pipe in the City's system, it can last longer than its anticipated useful life of 100 years if left undisturbed. Staff reported most challenges within the City's system have been attributed to tree roots and dead-end mains with low flow.

The City annually maintains and upgrades sections of the collection system, taking a proactive approach to rehabilitate sanitary sewer pipe based on age. The City allocates an annual capital improvement budget to rehabilitate priority areas within the sanitary sewer system. Annual work includes sewer point repairs, lining, and one sanitary sewer lift station upgrade. The City targets priority for sewers over 100 years old for lining projects. City staff design and manage these projects in-house and contract out the construction.

As recorded in the GIS database, the City has used cured-in-place-pipe (CIPP) technology to line over 68,000 feet of pipe and IBSD has reported over 1,000 feet of CIPP rehabilitation. Table 2-16 summarizes the quantity of pipe reported to be rehabilitated from 2017 to 2021. On average, the City rehabilitates approximately 0.2% percent of its total length of sewer pipe per year.

Table 2-16 – Quantity of Idaho Falls Sewers Rehabilitated from 2017 through 2021[19]

Year	Length of Pipe (feet)	% of System
2017	1,549	0.1%
2018	5,389	0.3%
2019	1,926	0.1%
2020	3,908	0.2%
2021	10,100	0.6%

Lift station condition is not reported in the GIS database. Without condition assessment information, a similar correlation between age and condition can be used to prioritize lift station assessment and rehabilitation. Based on the lift station age tabulated in Table 2-17, approximately 90% of lift stations owned by Idaho Falls are over 10 years old, which is the estimated lifespan of typical pumps. If pumps in these lift stations have not recently been assessed or replaced, they may be nearing or at the end of their useful life. Other equipment and concrete infrastructure within the lift stations generally have a longer lifespan; however, should be assessed concurrently with the pumps.

Table 2-17 – Lift Stations by Age[19]

Age (years)	Lift Stations Owned by Idaho Falls
0-9	4
10-19	8
20-29	8
30-39	8
40-49	2
50-59	1
Total	**31**

2.6.4 Operation and Maintenance

Generally, each entity is responsible for the O&M of its own system. IBSD contracts with the City to clean their collection system and hires a private contractor for closed circuit television (CCTV). Ucon oversees its own system, which consists of everything upstream from their flow metering station (point at which Ucon connects to the City collection system).

The City has a cleaning and inspection program and owns flushing and CCTV equipment. Based on information in the GIS database from 2019 to 2022, O&M staff flush an average of 22% of the Idaho Falls sanitary system each year, correlating to an approximate 5-year rotation. Table 2-18 summarizes the quantity of sewer pipe cleaned each year.

Table 2-18 – Length of Pipe Cleaned Each Year[19]

Last Cleaned	Pipe Length (feet)
2022	123,385
2021	429,701
2020	551,913
2019	281,301
5-10 years ago (2013-2018)	51,757
>10 years ago (<=2012)	4,991
Total	**1,443,048**

CCTV work, also performed by City O&M staff, is used to identify improvement projects. Prioritized projects are communicated to other City departments in an effort to synchronize work with other City infrastructure improvements. Staff indicate the City is divided into seven maintenance zones and one zone is inspected each year.

The City's annual budget has typically allocated $600K for all sanitary sewer projects (point repairs, CIPP, lift station upgrades). Table 2-19 summarizes the City-identified sanitary sewer collection system projects for 2023. The projected annual budgets through 2027 match the 2023 budget with $500K allocated for sewer rehabilitation and $100K allocated for lift station upgrades.

Table 2-19 – 2023 City Identified Sanitary Sewer Capital Improvement Projects

Project	Budget	Year
Sanitary Sewer Rehabilitation (Applewood, Fanning)	$500,000	2023
Sanitary Sewer Lift Station Upgrade (Pancheri, Holmes)	$100,000	2023

2.7 HYDRAULICS AND CAPACITY ANALYSIS

The purpose of this section is to investigate the hydraulic capacity of the WWTP and each of the major treatment processes. A hydraulic model was developed as part of the investigation. This section describes the model development, assumptions, and results.

Although a detailed hydraulic survey was not conducted to calibrate the model, the model results provide a planning mechanism for assessing general capacity. This hydraulic analysis looks at the main liquid stream processes in the WWTP. The portions of the WWTP associated with solids treatment, air handling, and chemicals were not investigated.

2.7.1 Model Development

Visual Hydraulics (Version 5.1) by Innovative Hydraulics was the software package used to create the hydraulics model. Visual Hydraulics uses a standard step calculation method to calculate water surface elevations. As is typical, the hydraulic calculations begin from a hard-set discharge elevation (Snake River) and then work upstream through the plant to the headworks. Various record drawing sets were used in the development of the hydraulic model (CH2M, Inc., 1958; CH2M, Inc., 1971; CH2MHill, Inc., 2003; MSA, Inc., 2012; MSA, Inc., 2017).

The modeling analysis focused on the ability of the WWTP to hydraulically pass peak hour flows (PHF) without issue. PHF scenarios were considered due to retention times within a majority of the unit processes which mitigate and equalize the impact of peak instantaneous flows as well as recommendations within the Water Environment Federation's (WEF) Manual of Practice (MOP) #8 (Water Environment Federation, 2018). Other design flows, such as average day or maximum month flows do not accurately account for the peak flow which must be hydraulically passed by the WWTP.

Four model scenarios were developed to analyze the WWTP hydraulics. The first model simulation evaluated the existing WWTP and its ability to accommodate the current 2022 PHF of 27.5 MGD for comparison purposes. A second scenario considered the 2045 PHF of 44.6 MGD based on the projections detailed in Section 1.5.3. After the two PHF scenarios, the capacity of each unit process was investigated, and a model run was developed to consider the firm hydraulic capacity of each unit process (the hydraulic capacity with the largest process unit out of service). The final simulation looked at total WWTP hydraulic capacity with all of the process units online.

2.7.2 Assumptions

The following assumptions were made in developing the 2022 and 2045 peak hour flow models:

1) The estimated flood elevation (based on the 1997 WWTP flood event) of the Snake River near the outfall is 4,663 ft. The water surface elevation of 4,663 was used as the starting point for the models rather than the 100-year flood elevation of 4,678 ft in order to remain consistent with elevations used for past planning and design documents (MSA, Inc., 2012; MSA, Inc., 2017). In the case of the 100-yr flood elevation the entire wastewater treatment plant would be inundated with water.
2) Forward flow:
    a. A forward flow of 27.5 MGD was used in the model based on the 2022 estimated peak hour flow discussed within Section 1.5.3.
    b. A forward flow of 44.6 MGD was used in the model based on the 2045 projected peak hour flow discussed within Section 1.5.3.
3) RAS Flows
    a. For the 2022 model, a return activated sludge (RAS) flow of 22 MGD was used based on the WWTP stated target flow of 80% of the incoming flow (starting in early Summer 2023). The RAS flow was simulated to discharge into the first cell of the anaerobic selector and combine with the primary effluent in the second cell of the anaerobic selector.
    b. For the 2045 model, a RAS flow of 23.9 MGD was used based on the stated target flow of 80% of the incoming flow and the current total RAS pumping capacity. With the current RAS pumps installed, 80% of the PHF cannot be returned to the secondary treatment process. RAS flow was again simulated to discharge into the first cell of the anaerobic selector and combine with the primary effluent in the second cell of the anaerobic selector.

4) No other return or recycle flows were considered within the model:
    a. The reported operational target of the mixed liquor recycle (MLR) system, as reported by City Staff in the Spring of 2023, is 0% of the influent flow and the MLR pumps are not used. If used, MLR would return flow from Cell 3 within the aeration basins to the swing cell at the head of each aeration basin train.
    b. No other significant recycle streams are present in the current treatment process. Future streams were not considered due to unknowns associated with their intended operation.
5) Units online:
    a. Three secondary clarifiers (normal operation Spring 2023)
    b. Two aeration basin trains (1 and 3, normal operation Spring 2023)
    c. Two primary clarifiers
    d. Two headworks screen channels
6) Flow splits between process units were initially assumed to be equal and then refined using an iterative flow split analysis to account for small variations in basin sizing, weir elevations, and other hydraulic differences. This assumption was necessary without a detailed survey investigation.
7) Elevations from obsolete vertical datums (NGVD 1929) were converted to the current City Datum (NAVD 88) using the correction factor (+2.8') indicated on previous design and record drawings for the WWTP site (MSA, Inc., 2017). Where inconsistencies were discovered between elevations called out on past hydraulic profiles and their respective mechanical or structural plan sets, they were corrected in favor of the elevations documented in the design or record drawings.

The following assumptions were made in assembling the firm and total capacity models:

1) A RAS flow of 80% of the incoming flow up to 23.9 MGD with three of four RAS pumps in operation.
2) No other return or recycle flows were considered within the model:
    a. The reported operational target of the mixed liquor recycle (MLR) system, as reported by City Staff in the Spring of 2023, is 0% of the influent flow and the MLR pumps are not used. If used, MLR would return flow from Cell 3 within the aeration basins to the swing cell at the head of each aeration basin train.
    b. No other significant recycle streams are present in the current treatment process. Future streams were not considered due to unknowns associated with their intended operation.
3) Approximately equal flow splits between online units.
4) Units online:
    a. Two secondary clarifiers (1 and 3)
    b. Two aeration basin trains (1 and 3)
    c. One primary clarifier (1)
    d. Two headworks screen channels
5) The capacity of a process unit was defined as the flow at which the predicted hydraulic elevation provides less than 1.0 ft. of freeboard or the manufacturer identified design capacity, whichever is less.
6) Elevations from obsolete vertical datums (NGVD 1929) were converted to the current City Datum (NAVD 88) using the correction factor (+2.8') indicated on previous design and record drawings for the WWTP site (MSA, Inc., 2017). Where inconsistencies were discovered between elevations called out on past hydraulic profiles and their respective mechanical or structural plan sets, they were corrected in favor of the elevations documented in the design or record drawings.

2.7.3 Model Results

A hydraulic profile was developed, showing the 2022 and 2045 peak hour flow models as shown in Figures 1 and 2 of Appendix B. Based on the modeling results, specific areas of concern for the projected 2045 PHF condition are below:

1. The predicted hydraulic grade in the Secondary Clarifier #1 and Secondary Clarifier #2 influent launders is near the top of the interior channel wall (which separates the influent and effluent launders) and is nearly experiencing an overflow condition. Based on the original design drawings, it appears that the original design intent was to routinely operate these launders with less than 1-foot of available freeboard; however, under the predicted flow condition the influent launders are nearly overflowing into the effluent launders.
2. Predicted hydraulic grades upstream of the influent screens within the headworks could encroach on the recommended available freeboard depending on losses through the screens (model assumed 1' of loss based on setpoints observed onsite in January 2023). Control setpoint issues resulted in significant flooding of the headworks facility in May 2023 following a major rain event.

Each unit process was evaluated to determine its respective firm and total capacity based on the assumptions documented in Section 2.7.2. Table 2-20 summarizes the results of the two capacity models.

Table 2-20 – Summary of Hydraulic Capacity

Location / Process	Total Hydraulic Capacity (MGD)[21]	Firm Hydraulic Capacity (MGD)[21]	Future Limiting Factor	Service Population at Total Capacity[22]
Influent Screen Channels[23]	58 MGD	52 MGD	Channel Freeboard	213,000
Primary Clarifiers	52 MGD	26 MGD	Weirs Partially Submerge	191,000
Primary Pump Station	62 MGD	52 MGD	Design Capacity	228,000
Selector Basin (Second Cell)	45 MGD	--	Inlet Channel Freeboard	165,000
Aeration Basins	65 MGD	45 MGD	Inlet Channel Freeboard	239,000
Secondary Clarifiers	44 MGD	29 MGD	SC #1 / #2 Influent Launders	162,000
Chlorine Contact Chambers	49 MGD	32.7 MGD	Design Capacity	180,000

Based on the modeling effort, it appears that the current limiting unit process, on a total capacity hydraulic basis, are the secondary clarifiers. The principal issue are the influent launders feeding SC #1 and SC #2. These clarifiers are rim-fed designs and rely on eccentric launders with floor openings on the influent side. Based on the original design drawings, it appears that the design intent was for these launders to operate with less than 1-foot of freeboard under normal conditions; however as flow through the secondary clarifiers begins to approach the projected 2045 PHF condition, the predicted hydraulic grade within the launders nearly exceeds the top of wall elevation between the influent and effluent.

---

[21] Forward flow hydraulic capacity

[22] Based on a 2022 estimated per capita wastewater generation rate of 272 gpcd from Table 1-6 and Table 1-7

[23] With 1' of operational loss across screens. Maximum allowable screen tailwater is exceeded at 56 MGD with two screens online.

All other unit processes are anticipated to provide sufficient total hydraulic capacity for the projected 2045 PHF; however, the anaerobic selector basin, chlorine contact chambers, and aeration basins all have firm and/or total hydraulic capacities which are projected to be exceeded shortly after the current planning window concludes. In order to ensure sufficient firm capacity, it is likely that improvements to these facilities will need to begin project planning efforts in the latter part of the current the planning period. The phasing of projects is discussed further in Chapter 4

The existing headworks has several hydraulic challenges. Among these challenges are adverse channels slopes and stepped channels where material accumulate. Additional discussion of these challenges and potential solutions is provided in Section 3.1.

As shown in Table 2-20, firm capacity under PHF conditions can become an issue for the primary and secondary clarifiers. The WWTP operational staff should be aware of these concerns. If an extended shutdown is needed, operational strategies should be developed to protect against an overflow. These include scheduling and sequencing maintenance to allow for process trains to be quickly returned to service if needed, maintaining a supply of redundant equipment to eliminate shipping delays, and adjusting internal recycle/return rates to balance hydraulic capacity with biological needs. It is recommended that any extended, planned shutdowns for extensive rehabilitation or repair be sequenced in a manner that accounts for redundant capacity needs. The hydraulic profile results from the peak hour simulations can be found in Appendix B.

2.7.4 Theoretical Pump Station Capacity

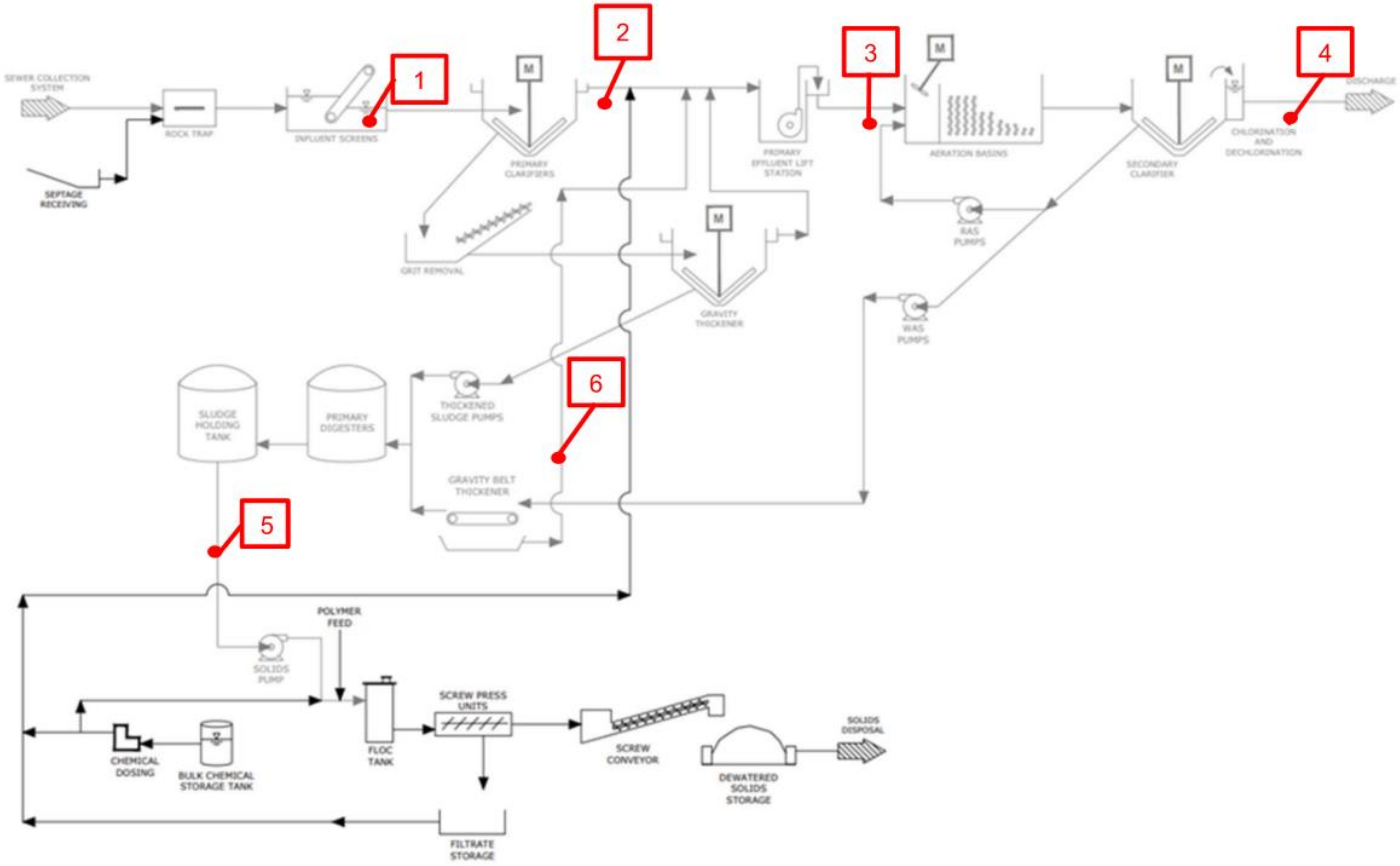
The Primary Effluent Lift Station (PELS) is comprised of six 7,200 gallon per minute (gpm) submersible pumps (at 20.3 ft of total dynamic head or TDH). The lift station is divided into two trains that pump to a common channel which feeds into the secondary treatment system. Normally one side of the lift station (3 pumps) is in operation. The lift station pumps sequence based on level within the wet well. While it appears that there is sufficient capacity for current needs, it is recommended that the primary pump station be pump tested in order to determine actual pumping ability. These pumps tests can be performed by timing the drawdown in the wet well when a pump is on at full speed. Under a PHF scenario, three pumps in operation is not sufficient and a means of alarm is required to alert WWTP Staff of high level within the lift station wet well. As flows increase through the planning period, the City may consider automating this process.

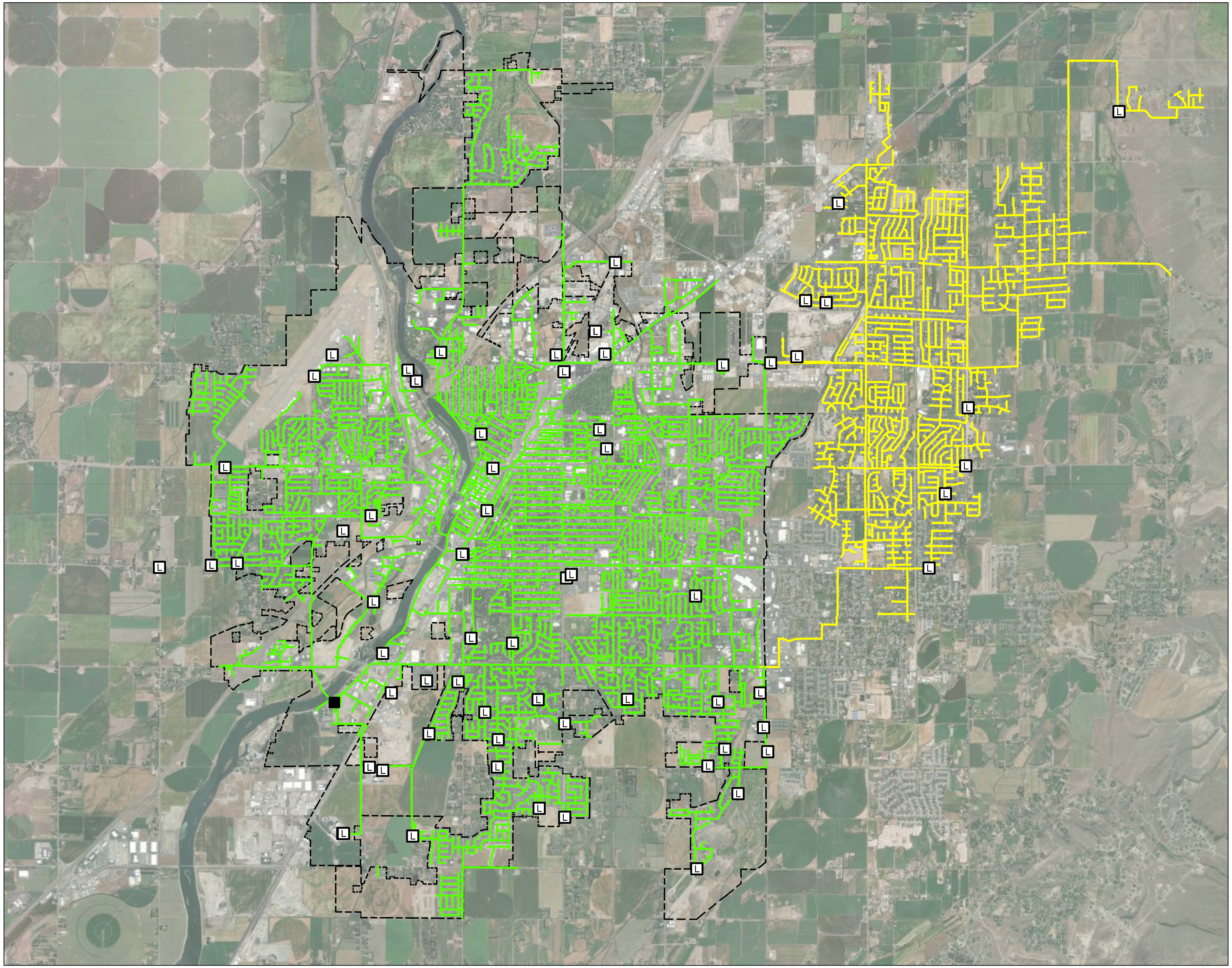
The RAS/WAS pump station is located in the basement of the blower building and is comprised of four dedicated RAS pumps each with a capacity of 5,530 gpm at 25 ft. of TDH. One pump is dedicated to an online secondary clarifier at any given time with one pump remaining redundant. Typical operation of the RAS facility is at a target percentage of effluent flow as measured by the final effluent flow meter located downstream of the secondary clarifiers. At the theoretical total RAS pumping capacity of 16,590 gpm (23.9 MGD), velocities through the 36-inch RAS line would be approximately 5.2 fps which is within typical standards of practice.

Two WAS pumps with a capacity of 600 gpm each at 46.2 TDH are located adjacent to the RAS pumping facilities. Only one WAS pump operates under normal conditions. At 600 gpm, velocity through the 10-inch WAS line is anticipated to be nearly 2.5 fps which is within typical standards of practice.

The secondary process mixed liquor return (MLR) pumps are each rated for 8,350 gpm at 2.5 ft. of TDH. Three pumps serve each aeration basin treatment train and three 24-inch pipelines route flows from Pass 3 of each aeration basin back to the swing zone. Under normal operation the City has not typically operated these pumps; however, due to increased loading and upset conditions there are plans to begin experimenting with MLR in late 2023. With one MLR pump dedicated to each aeration basin, there is no firm capacity if all aeration basin trains are online. At the maximum theoretical pumping rate per return line of 8,350 gpm, velocities within the respective 24-inch MLR lines would be approximately 6 fps, which is within typical standards of practice. It is recommended that MLR targets be sustained at a level which would produce pipe velocities of 2 fps (2,800 gpm) or greater to reduce the potential for settling MLSS within the MLR pipelines.

Figure 2-46 – Sampling Locations (February/March 2022)





Stantec

Legend

■ Idaho Falls Wastewater Treatment Plant

L Lift Station

- - Idaho Falls City Limits

Sewer Pipe by Owner

Owner	Total Length (feet)
🟨 IBSD	613,157
🟩 Idaho Falls	1,590,839

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Data Sources: City of Idaho Falls
3. Background: Esri, TomTom, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, USFWS, Earthstar Geographics, Esri, USGS

N

0 0.75 1.5 Miles

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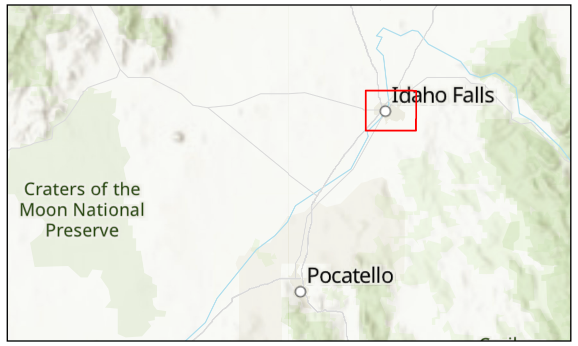
1:63,000



Project Location
Bonneville Co.
& Bingham Co., ID

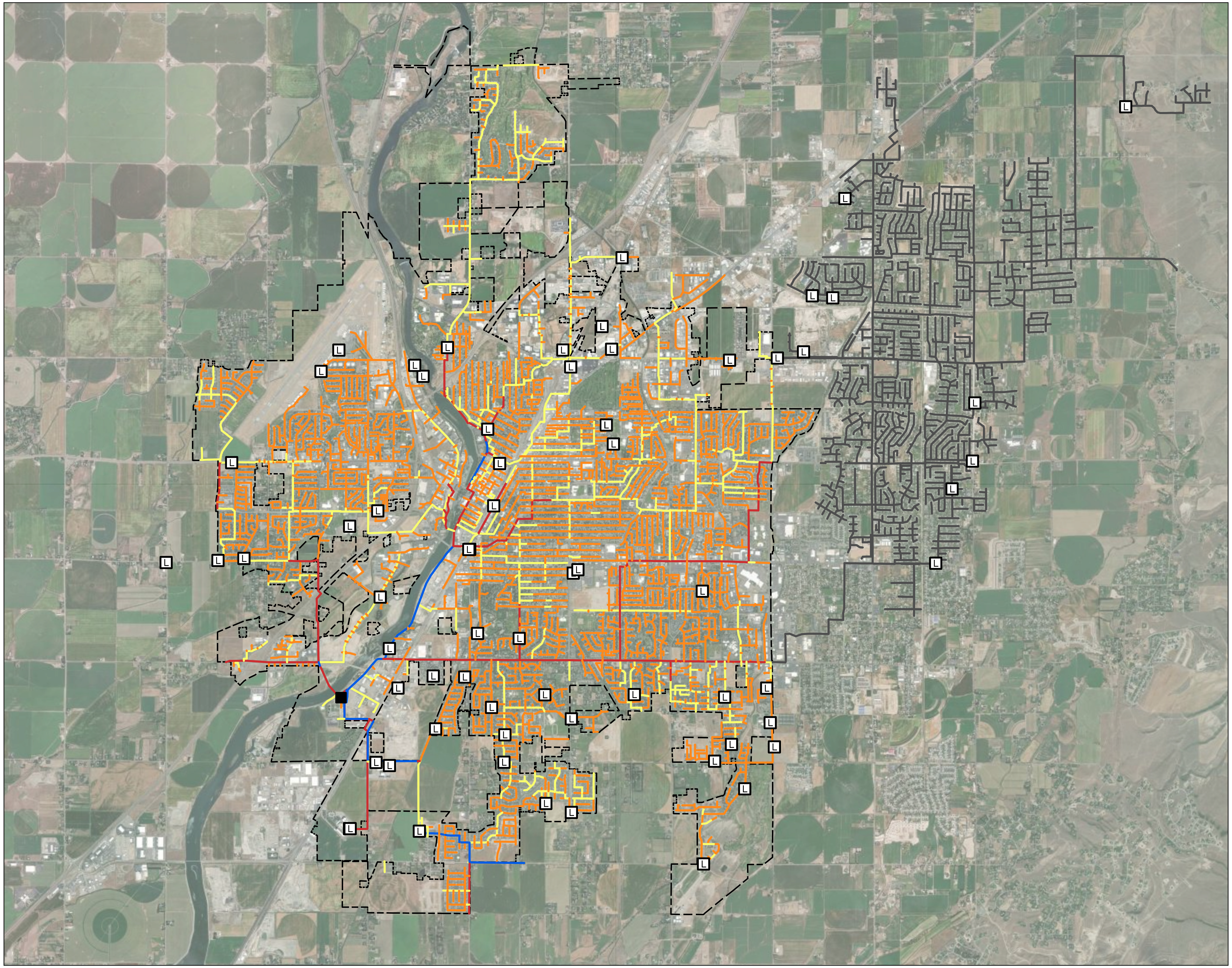
Prepared by TW on 2024-03-21
IR by JA on 2024-03-21

Client/Project
2002006194
City of Idaho Falls, ID
Idaho Falls Facility Plan

Figure 2-47

Title

Collection System Pipe By Owner



Stantec

Legend

■ Idaho Falls Wastewater Treatment Plant

🄻 Lift Station

Idaho Falls City Limits

Sewer Pipe Owned by Idaho Falls

Diameter (in.)	Total Length (feet)
4 - 8	1,105,404
10 - 18	358,454
20 - 30	99,007
36 - 60	27,660
Not Reported	316

Sewer Pipe Owned by IBSD

Total Length (feet): 613,157

Notes
1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Data Sources: City of Idaho Falls
3. Background: Esri, TomTom, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, USFWS, Earthstar Geographics, Esri, USGS

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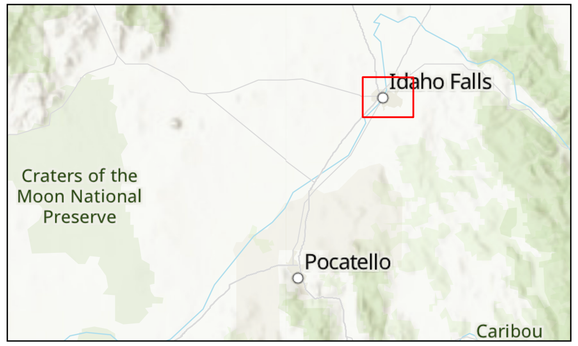


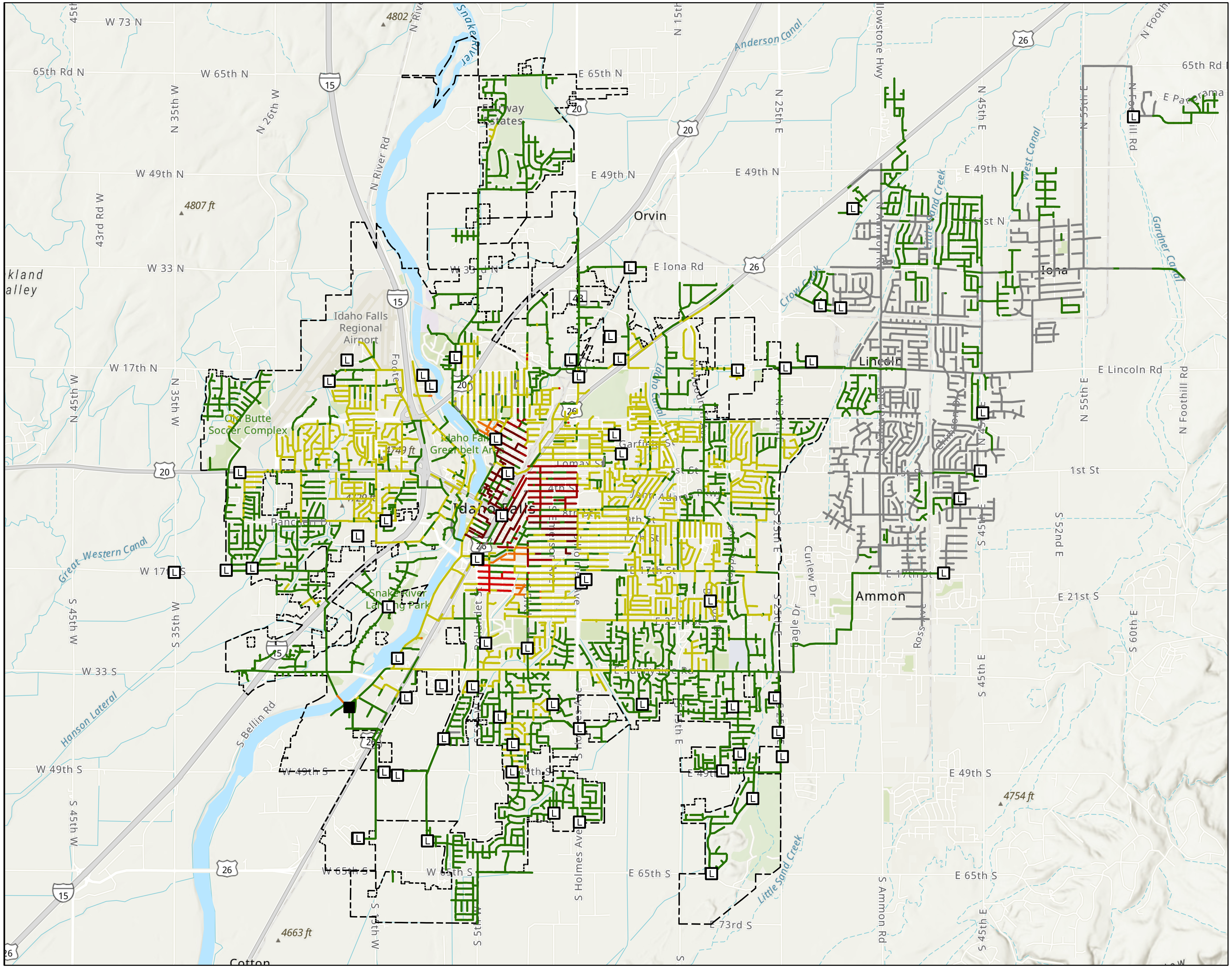
Project Location
Bonneville Co.
& Bingham Co., ID

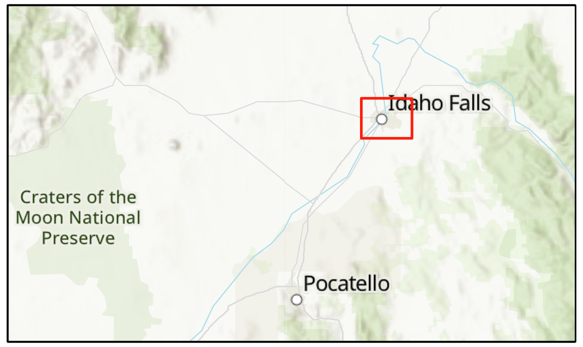
Prepared by TW on 2024-03-21
IR by JA on 2024-03-21

Client/Project
2002006194
City of Idaho Falls, ID
Idaho Falls Facility Plan

Figure 2-48

Title
Collection System Pipe By Size





Stantec

Legend

■	Idaho Falls Wastewater Treatment Plant
L	Lift Station
- - -	Idaho Falls City Limits

Sewer Pipe Owned by Idaho Falls or IBSD

Estimated Useful Life		Total Length (feet)
🟩	More than 50 Years Left	1,091,204
🟨	20-50 Years Left	618,945
🟧	10-20 Years Left	18,442
🟥	1-10 Years Left	100
🟥	0-10 Years Past	46,385
🟫	More than 10 Years Past	20,797
⬜	Estimated Useful Life Not Available	429,602

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

2. Data Sources: City of Idaho Falls

3. Background: Esri, NASA, NGA, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, USFWS, BonnevilleGIS, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, USGS

N

0 0.75 1.5 Miles

(At original document size of 11x17)
1:63,000

Project Location
Bonneville Co.
& Bingham Co., ID

Prepared by TW on 2024-03-21
IR by JA on 2024-03-21

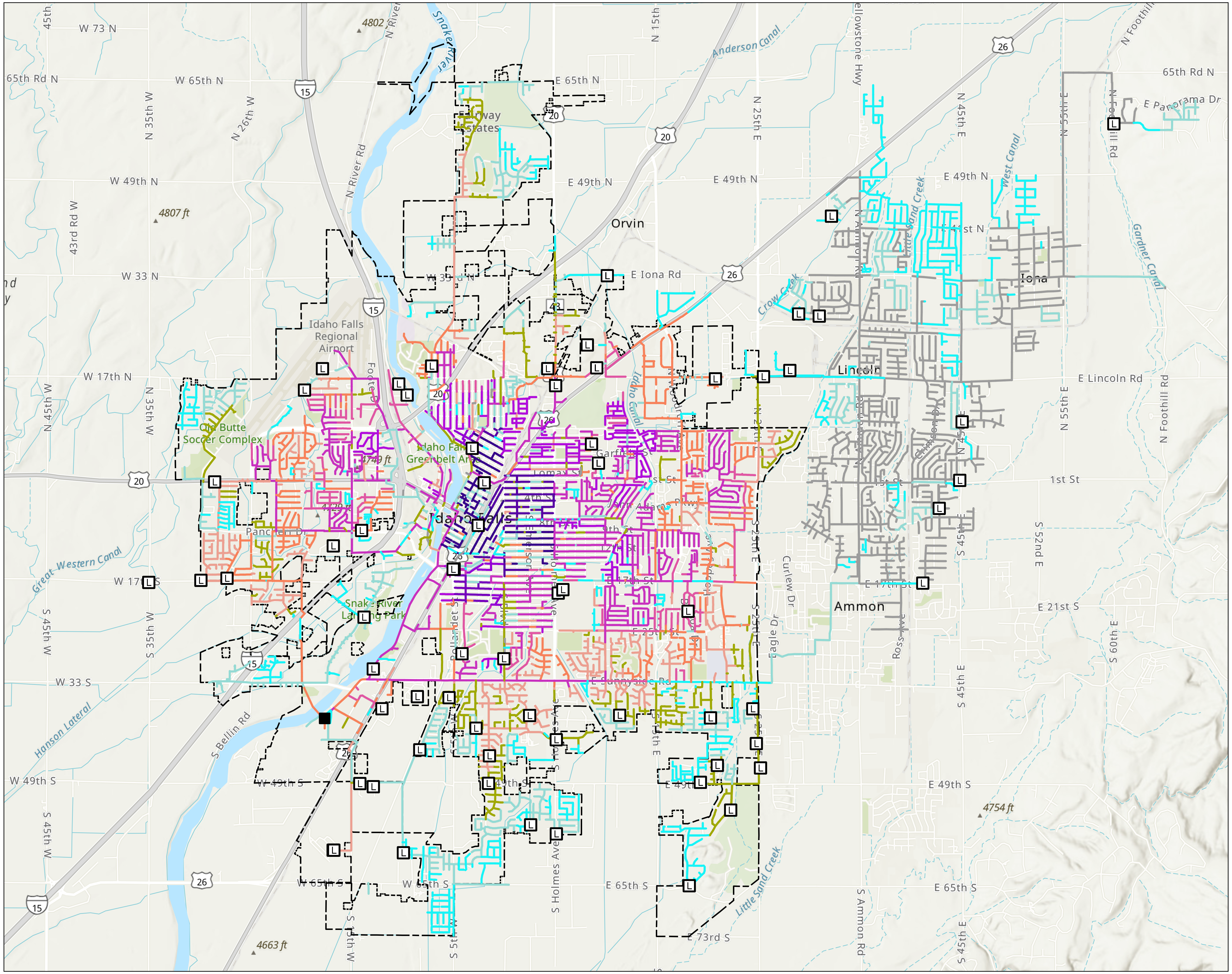
Client/Project
2002006194
City of Idaho Falls, ID
Idaho Falls Facility Plan

Figure 2-49

Title

Collection System Pipe by Estimated Remaining Life

U:\2002006194_ArcPro\Idaho_Falls_Facility_Plan\Idaho_Falls_Facility_Plan_TW.aprx Collection_System_Pipe_by_Estimated_Remaining_Life Revised: 2024-03-21 By: tanwood



Stantec

Legend

■ Idaho Falls Wastewater Treatment Plant

🄻 Lift Station

Idaho Falls City Limits

Sewer Pipe owned by Idaho Falls or IBSD

Age (Years)	Total Length (feet)
1 - 9	317,316
10 - 19	307,742
20 - 29	174,923
30 - 39	212,531
40 - 49	212,592
50 - 59	107,904
60 - 69	296,733
70 - 79	99,188
80 - 89	9,108
90 - 99	8,499
100 - 109	31,046
>110	36,118
Age Not Reported	411,774

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet WGS 1984 Web Mercator Auxiliary Sphere

2. Data Sources: City of Idaho Falls

3. Background: Esri, NASA, NGA, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, USFWS, BonnevilleGIS, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, USGS

N

0 0.75 1.5 Miles

(At original document size of 11x17)
1:63,000

Project Location
Bonneville Co.
& Bingham Co., ID

Prepared by TW on 2024-03-21
IR by JA on 2024-03-21

Client/Project

2002006194

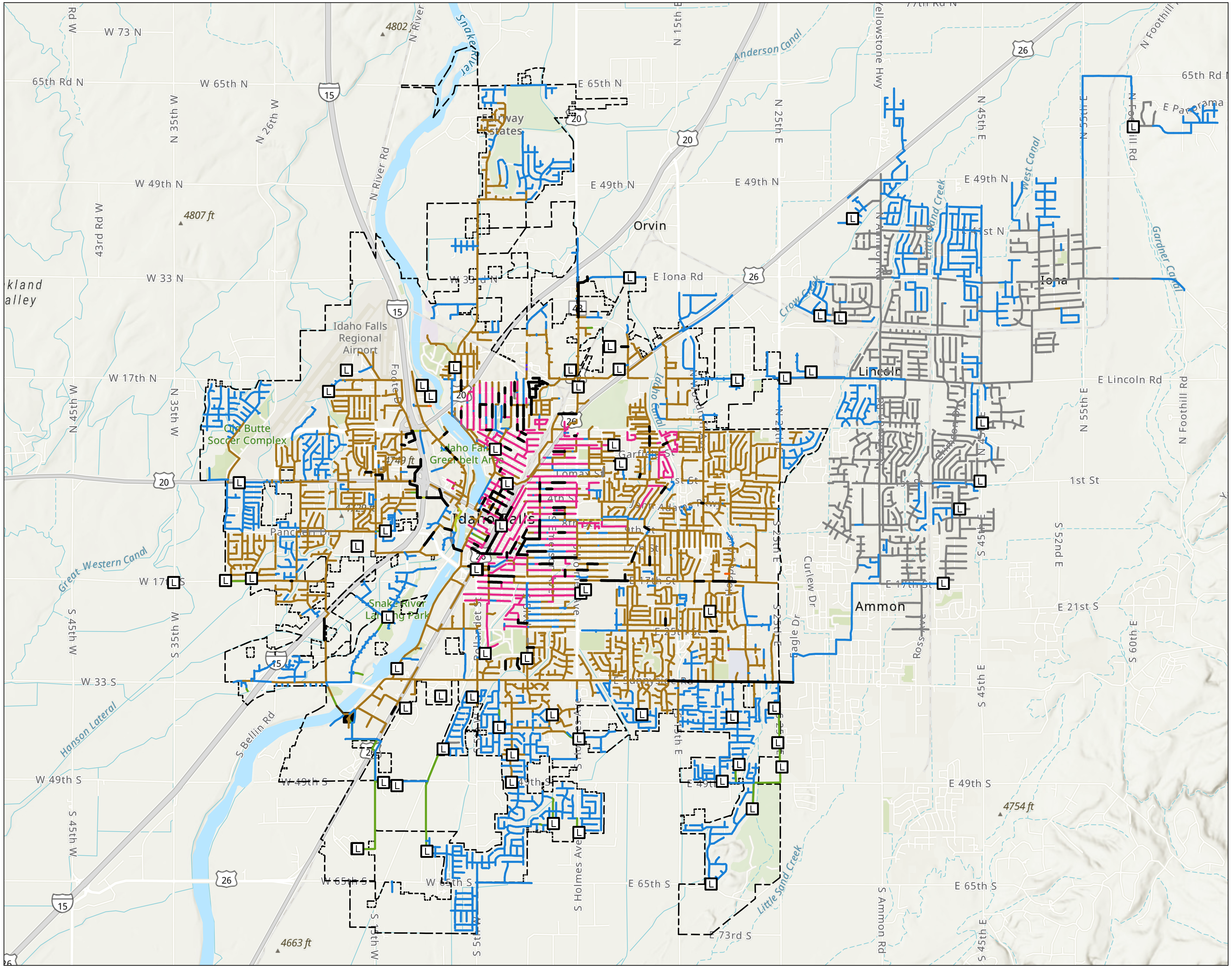
City of Idaho Falls, ID
Idaho Falls Facility Plan

Figure 2-50

Title

Collection System Pipe Age

U:\2002006194_ArcPro\Idaho_Falls_Facility_Plan\Idaho_Falls_Facility_Plan_TW.aprx Revised: 2024-03-21 By: tanwood



Stantec

Legend

■	Idaho Falls Wastewater Treatment Plant
L	Lift Station
⌐⌐	Idaho Falls City Limits

Sewer Pipe Owned by Idaho Falls or IBSD

Material		Total Length (feet)
—	Asbestos Cement / Transite	423
—	Cast Iron	83
—	Clay	168,567
—	Concrete / Reinforced Concrete	863,425
—	Ductile Iron	37,183
—	HDPE	2,473
—	PVC / ABS	717,079
—	Steel	573
—	Material Not Reported	414,189
—	Cured In Place Plastic	69,262

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Data Sources: City of Idaho Falls
3. Background: Esri, NASA, NGA, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, USFWS, BonnevilleGIS, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, USGS

N

0 0.75 1.5 Miles

(At original document size of 11x17)
1:63,000

Project Location
Bonneville Co.
& Bingham Co., ID

Prepared by TW on 2024-03-21
IR by JA on 2024-03-21

Client/Project 2002006194
City of Idaho Falls, ID
Idaho Falls Facility Plan

Figure 2-51

Title
Collection System Pipe Material

U:\2002006194_ArcPro\Idaho_Falls_Facility_Plan\Idaho_Falls_Facility_Plan_TW.aprx Collection_System_Pipe_Material Revised: 2024-03-21 By: tanwood

CHAPTER 3 DEVELOPMENT AND EVALUATION OF ALTERNATIVES

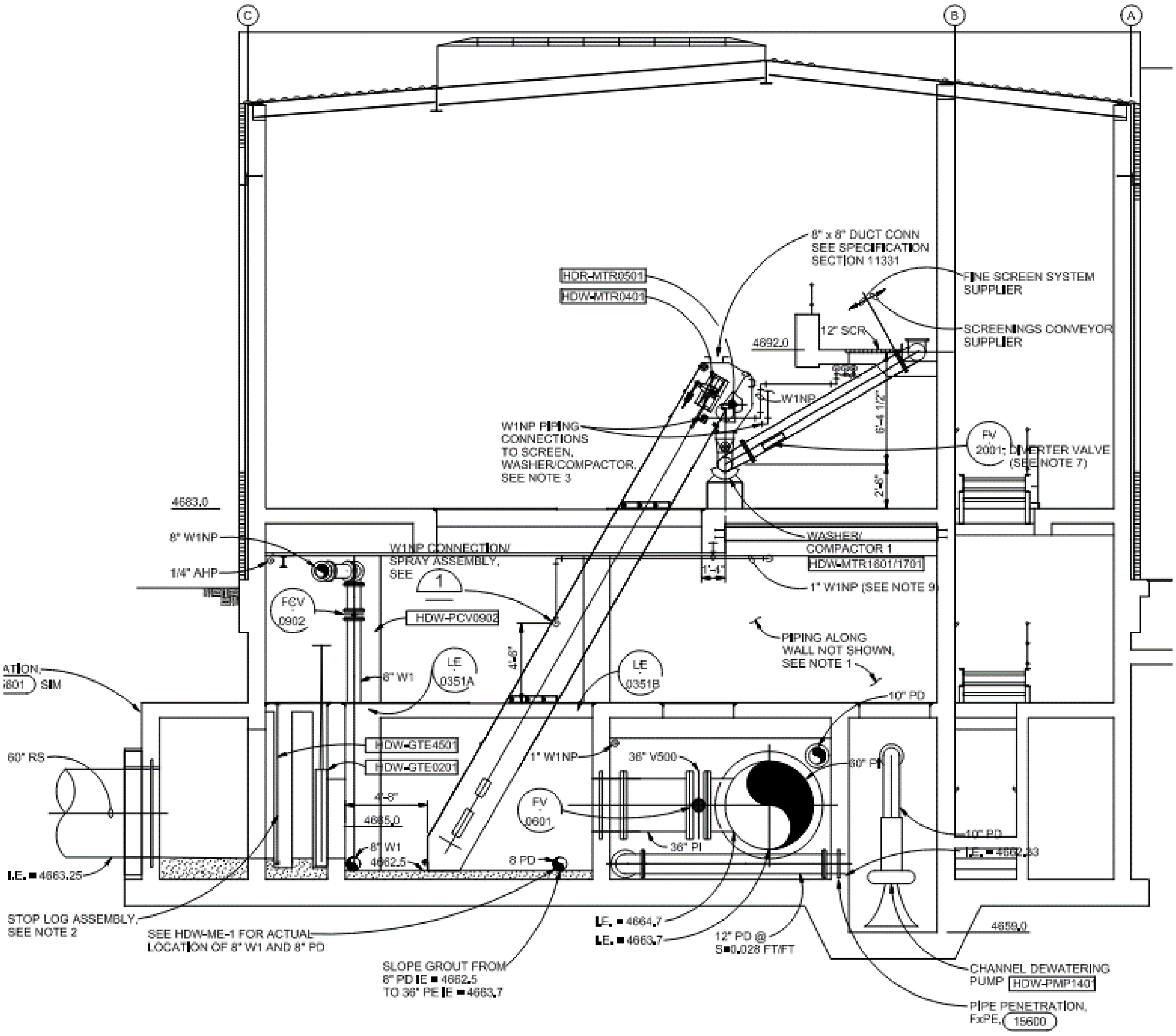
Numerous improvement alternatives were considered to address the concerns and conditions identified in Chapter 2. Alternatives discussed herein are organized by location or unit process (headworks, odor control, biosolids treatment, collection system, etc.). Each section discusses the alternatives considered and provides final recommendations to be included within the Capital Improvements Plan discussed within Chapter 4.

3.1 HEADWORKS

The original intent for this WWFPS was to only consider solutions to the hydraulic challenges faced at the headworks; however, the results of the Hydraulic Capacity Analysis presented in Chapter 2 suggest that there is sufficient physical hydraulic capacity within the headworks for the currently identified design flows. Therefore, it has become apparent that the challenges the City is experiencing at the headworks (or because of the headworks) are tied instead to the condition/control of the headworks screens, the layout of the headworks building, and/or other headworks concerns as documented within Chapter 2.

Figure 3-1 presents a cross section of the existing headworks building channel and the perforated plate screen installed in 2003. The channel does not have a continuous positive slope and instead has several adverse steps near the screens which tend to collect heavy debris (rocks, etc.) and resulting in a maintenance concern. In addition, the current building and channel configuration may limit some of the replacement options as discussed in this section.

Figure 3-1 – Existing Headworks Cross Section[24]



A few primary alternatives to address the documented concerns are discussed herein and include:

0. No Action Alternative – Not considered viable, therefore was not considered further
1. Improved Screening Alternative
2. New Headworks Alternative

3.1.1 Headworks Alternatives

It is apparent that the headworks as currently configured is becoming an increasingly burdensome maintenance issue. Although the current headworks and screening process is sufficient for the total hydraulic capacity through the 2045 peak hourly flow, this alternative is not recommended as the process has caused issues for overall plant operations since being installed (inadequate screening, etc.). It is therefore anticipated that improving the headworks will improve overall

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[24] (CH2MHILL, 2003)

treatment plant performance by reducing the operational burden of the current headworks and also by improving screening efficiencies to mitigate impact to downstream treatment processes.

Alternative 1 – Improved Headworks Screening

The current plant has two perforated plate screens with individual washer/compactors that feed to a third conveyor which receives screenings from both. When the current headworks process was constructed in the early 2000’s, the two mechanical screens were installed along with a third empty channel. After the project was completed, the City added a manual screen, for redundancy, to the third channel. However, the design of the headworks building is such that a third mechanical screen could be added in place of the installed manual screens to accommodate higher flows when needed.

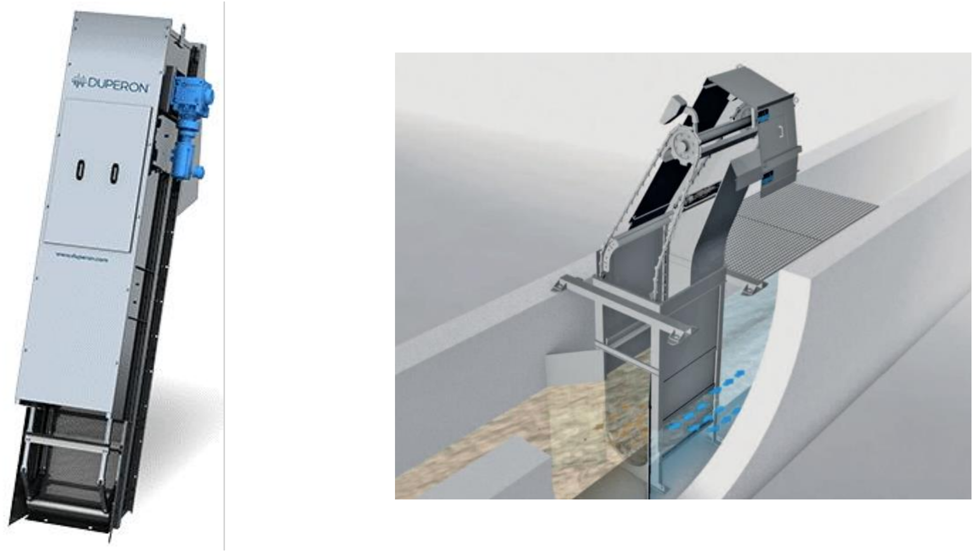
Under this alternative, the City of Idaho Falls would replace the existing perforated plate screens and their associated washer/compactors with upgraded equipment. Multiple styles of influent screens are available, but due to the existing channel geometries and building dimensions, Multi-Rake screens or perforated plate screens are anticipated to be most easily accommodated within the existing headworks. Step screens could also be considered but may not be recommended for retrofit applications due to specific recommendations with channel geometries and the potential for material to collect at the screen base. Because the City is already familiar with perforated plate screens, the discussion herein focuses on different styles of rake screens and how they compare to the perforated plate screens used by the City.

Rake Screens

Multiple rake screen options are available and two potential options are identified in Figure 3-2. Rake screens utilize a bar screen type design and a mechanical rake to trap and then remove suspended material from the incoming flow. The bar style design can be very durable which is anticipated to be a benefit for the City due to the amount of gravel that can impact the headworks. The bar style design has hydraulic benefits and rake screens generally experience less headloss across the screen and can be more efficiently cleaned during high flows than other screening types. This is also anticipated to provide significant benefits for the City due to the potential for high flows and overflows within the headworks. A centerflow design can allow any material which settles at the base of the screen during normal flows to be removed more easily than with other screening technologies – such as perforated plate or step screens.

A principal difference between rake screens and the existing perforated plate screens installed at the Idaho Falls WWTP is that rake screens can be installed vertically or near vertically (typically 60° - 90°). Ultimately this reduces the footprint required within the building and would free up space on the washer/compactor level for additional optimizations that would help simplify the existing screening process.

Figure 3-2 – Potential Rake Screen Options



Duperon FlexRake (Duperon, 2023)

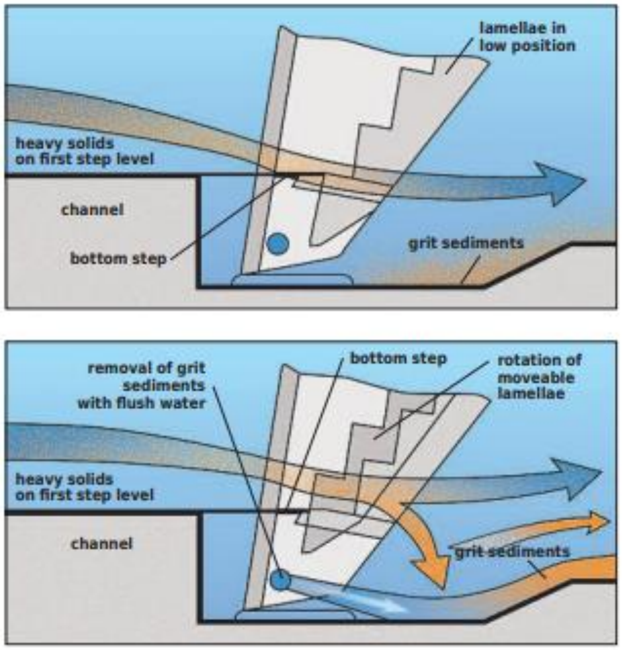
Huber RakeMax (CF) Center Flow (HUBER RakeMax CF, 2023)

Step Screens

Step screens are another option that could be considered. Similar to rake screens, step screens utilize a bar screen type design that is ‘stepped’ in order to convey screened materials upwards to a discharge point. Step screens also generally have low hydraulic losses which would be a benefit for the City; however, the stepped configuration of the screen is critical to its operation and in order to accommodate the stepped design, the screens must be installed at more of a horizontal angle than is typical for rake screens (typically 40° - 70°).

Figure 3-3 shows the recommended channel section for step screens. Some step screen configurations require them to be pivoted out of the channel for maintenance which limits the effective height that the screens can service. As a result, this significantly increases the building size required when transporting screened materials vertically. Step screens are also generally prone to issues with clearing settled material from the foot of each screen unless the channel design allows for the foot of the screen to extend below the incoming channel floor. Therefore, while step screens could be considered, they are not recommended for a retrofit at the Idaho Falls Headworks.

Figure 3-3 – Recommended Channel Bottom for Step Screens[25]



Perforated Plate / Band Screens

The Idaho Falls WWTP has been using perforated plate screens since the headworks building was constructed over two decades ago. Plant Staff are already familiar with perforated plate screens which would be a benefit if the screens were replaced ‘in kind.’ However, perforated plate screens generally experience greater headloss than the other options discussed which will contribute to overflows during peak flow events. A principal benefit to perforated plate/band screens is that screen openings can generally be reduced to capture smaller sized particles but doing so further increases the headloss across the screen. Center-Flow options are also available which can improve screenings capture efficiencies since all screened material remains on the upstream side of the screen until it is removed by the screen itself. A center flow band-screen is depicted in Figure 3-4.

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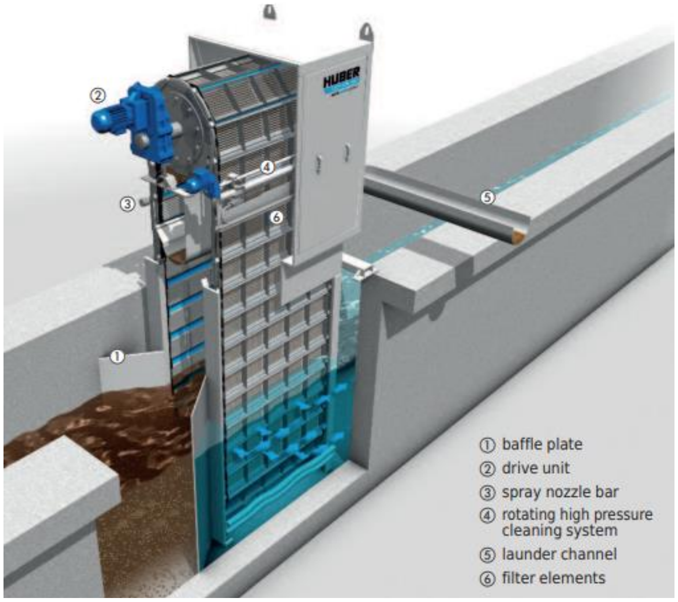
[25] (Huber Technology, Inc., 2023)

Figure 3-4 – Center-Flow Band Screen Illustration[26]



Summarized advantages and disadvantages to the screen types identified herein are identified in Table 3-1.

Table 3-1 – Summarized Advantages of Potential Screening Options for Retrofit

Multi-Rake Screens	Step Screens	Perforated Plate / Band Screens
Advantages		
- High hydraulic conductivities - Multiple rakes facilitate cleaning under peak flows - Can have smaller footprints - Less debris carry over with center feed style - Can lift larger debris that settles in bottom on rakes	- High hydraulic conductivities - Able to clear material from screen base	- Less debris carry-over with center feed band screen - High screening capture rate - Screenings can be washed/compacted in the unit as an option by some manufacturers (band screen) - Smaller footprint (band screen)
Disadvantages		
- Some screens can have lower removal efficiencies - Some screens require bottom sprockets which can impact maintenance	- Larger footprint due to angle requirements - Special channel geometries required - Rock and gravel is most adverse in this design - Must be pivoted out of channel for maintenance – makes tall installations difficult	- Higher power requirements - Large solids removal may be an issue - Can have higher headloss than other options in some configurations

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[26] (Huber Technology, Inc., 2023)

The estimated cost for screenings and washer/compactor upgrades is anticipated to be between $3.0 Million and $4.0 Million, depending on the total project scope and the specific screen and washer/compactor that is preferred. This cost estimate is based on the perception of current conditions at the project location and reflects an opinion of probable costs as of the Summer of 2023 which is subject to change as the project design matures.

The project team has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices, or bidding strategies. The project team cannot and does not warrant nor guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein. All costs discussed herein are considered to be Class 5 cost opinions, as defined by the Association for the Advancement of Cost Engineering (AACE). These estimates include approximated construction costs with markups of 10% for general conditions, a contingency of 30%-50%, 15% contractor overhead and profit (OH&P), and general and administrative services of 25% (including design administration, construction observation, funding support, legal services, etc.) based on a percentage of total estimated construction cost.

Other Considerations

In addition to screening improvements, it would also be beneficial to rework the complicated conveyance systems (screenings are passed through multiple conveyors on their way to the dumpsters) in order to improve overall reliability of the screenings process since each conveyor represents a single point of failure risk for the entire headworks process.

It is also recommended that three mechanical screens be installed to provide additional redundancy with automated controls and isolation gates that can be programmed to open if high flow is detected coming into the plant. As part of these improvements, the W2 water connection should be improved to supply vendor recommended spraywash at adequate pressures and flows to each screen. Finally, it is recommended that the City install a means of influent flow measurement which could be used for alarm and control purposes. In order to take full advantage of these improved systems, an overhaul of the headworks SCADA system would be required.

While these screening improvements are anticipated to address a significant portion of the concerns within the headworks, they will not address all of them as many are tied to the configuration of the building itself. The City will still experience the challenges associated with spraydown/wash water from upper levels pooling within lower levels. HVAC and electrical equipment will also not be improved although some improvements could be included if desired by the City. Finally, the adverse slope and steps within the screening channels will not be addressed as these elevations are tied to the building itself. Therefore, it is anticipated that overall screening efficiency would be improved, but that the City would still need to maintain a similar level of operation and maintenance at the headworks.

Alternative 2 – New Headworks

Many of the concerns at the existing headworks are a result of the existing building layout, channel elevations, channel configurations, or other physical elements which cannot be easily addressed as part of a screening upgrade. As a result, the City would need to consider a new headworks building in order to address all of the concerns.

Based on the current WWTP layout, it is assumed that a new headworks building would be most easily accommodated near the rock trap. Electing to pursue this alternative over a screenings upgrade would allow the City to address all of the concerns with the existing structure and would also free up space on site for future expansion of other treatment processes (i.e. Primary Clarifiers or Digester Improvements). The existing structure could also be retained and retrofitted as a grit removal building as that process is expanded or utilized for another purpose.

The new headworks could be an ‘at grade’ structure which would require the installation of an influent lift station downstream of the rock trap or it could be designed to lift screenings from lower elevation channels to a screenings floor that is at or near grade. The latter would exclude some screen configurations from being considered due to the overall channel depth, while the former would allow for more screen technologies to be considered by the City. Because this alternative could ultimately be developed in the manner preferred by the City, individual components are discussed separately herein:

Influent Lift Station

An influent lift station would only be required if an at grade headworks were to be installed. Based on record drawings, the invert at the outlet of the rock trap is approximately 4667’ while the top of wall/top of grating elevation is 4684.5’. Assuming similar elevations for the new headworks, the elevation difference would either need to be made up through pumping for an at-grade headworks were to be installed, or sufficient screen height would be needed to lift screened material from a headworks basement to above grade.

Several different lift station designs could be considered, but among the most common for this application are a wet pit lift station with submersible pumps, a wet pit/dry pit configuration where the pumps are accessible and installed out of the wastewater, or open channel screw pumps. An influent lift station before screenings of debris may result in significant maintenance and alarms to ensure the mechanical systems are online and not damaged by the raw sewage.

Wet Pit Lift Station

A wet pit influent lift station would be very similar to the existing PELS and be comprised of multiple pumps installed in a below-grade box on rails that can be raised and lowered as needed. It is anticipated that this configuration would be the simplest to install but more difficult to maintain since pumps must be lifted from the wet pit. Pumps installed in wet pit configurations can have shorter anticipated lifespans than equivalent pumps installed in less hazardous environments – such as a dry pit. Several different styles of submersible pumps can be considered for these applications.

There could be potential concern with rocks and gravel in the influent if a wet pit style lift station were installed, therefore, rock trap removed efficiency would be critical in minimizing damage to lift station pumps from potentially being impacted by rocks.

Wet Pit/Dry Pit Lift Station

A wet pit/dry pit influent lift station would be comprised of two primary sides. The wet pit would receive incoming wastewater and pipe penetrations through an intermediate wall would feed from the wet pit to the dry pit where the pumps are installed. The dry pit is typically a climate-controlled room that can be easily accessed by WWTP Operators for ongoing maintenance. A crane or hoist system can also be used to facilitate pump removal. Overall a wet pit/dry pit lift station can be more complex to install, but easier maintenance and typically longer lifespans for equipment installed in dry locations can be advantageous. Multiple different pump styles can be considered for wet pit/dry pit installations.

There could be potential concern with rocks and gravel in the influent if a wet pit/dry pit style lift station were installed, therefore, rock trap removed efficiency would be critical to protect the lift station pumps from potentially being impacted by large rocks.

Inclined Screw Pumps

Inclined screw pumps can also be considered as an alternative to a wet pit or wet pit/dry pit lift station. While a centrifugal pump would typically be used for the other types of lift stations considered herein, a screw pump consists of a central shaft with a welded inclined spiral that forms a screw. As a motor turns the shaft, the screw is used to physically lift pockets of water and any entrained solids up to the discharge end of the screw.

A principal benefit to screw pumps over centrifugal pumps is their ability to lift moderately sized solids (i.e., gravel or rocks) while centrifugal pumps are more limited in the size and type of solids they can routinely pass. However, screw pumps can be less efficient due to slippage beneath the screw as it turns and typically have comparatively large footprints to the other lift station types considered. As a result of the larger footprints, it is not uncommon for screw pumps to be installed outside with no or limited coverings, but in colder climates enclosing the pumps can be recommended due to the potential for ice buildup.

Summarized advantages and disadvantages are provided in Table 3-2.

Table 3-2 – Summarized Advantages of Potential Lift Station Alternatives

Wet Pit	Wet Pit/Dry Pit	Inclined Screw Pumps
Advantages		
- Anticipated to be the simplest type of lift station to install - Operators are familiar with this type of lift station due to the PELS - Reasonably efficient pumps with many different manufacturers - Generally small footprint	- Easier maintenance and better monitoring ability than wet pit - Reasonably efficient pumps with many different manufacturers - Potentially longer pump lifespans over wet pit installations - Generally small footprint	- Easier maintenance and better monitoring ability than wet pit - Inclined screw pumps are more versatile for passing solids - Inclined screw pumps can be simpler to maintain than centrifugal pumps and may have longer lifespans in some installations
Disadvantages		
- More limited on the size and type of solids that pumps can pass - Typically lower pump lifespans - More difficult maintenance - Shorter pump lifespans if there is no screening upstream	- More limited on the size and type of solids that pumps can pass - Will have additional cost over wet pit configuration - Shorter pump lifespans if there is no screening upstream	- Can have lower overall efficiencies due to slippage beneath screw - Larger footprint and specialized concrete work increases cost of installation over others - Lower bearing will need to be maintained

The anticipated cost of an influent lift station, depending on the configuration and specific pumps included, is anticipated to vary between \$3.4 Million and \$8.6 Million. The most cost-effective option is the wet pit configuration, while the inclined screw housed in a building is anticipated to be the most expensive. The wet pit / dry pit configuration is roughly \$5 Million. As before, this cost estimate is based on the perception of current conditions at the project location and reflects an opinion of probable costs if the project were to move forward in the Summer 2023 and which is subject to change as the project design matures.

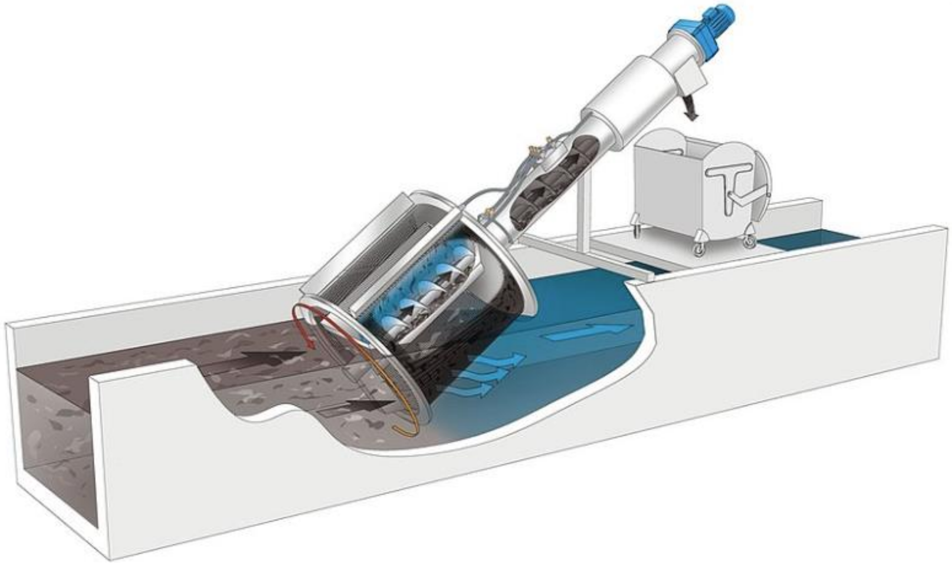
New Headworks Screening Alternatives

Assuming no lift station were installed, the same screening alternatives discussed as part of Alternative 2 could be reconsidered; however, bringing the headworks to grade through use of a lift station allows for other screening alternatives to be used. One such screening option that has become increasingly popular with WWTP operators due to high capture efficiencies and low maintenance requirements are rotary drum screens.

Rotary Drum Screens

A rotary drum screen is depicted in Figure 3-5. In addition to high screening capture efficiencies, another advantage of rotary drum screens is that screenings removal, washing, conveyance, and compaction is accomplished with a single drive which allows for less maintenance and better energy efficiency. Rotary drum screens are typically installed in wide channel sections which can increase footprint and overall building sizes if the screens are installed indoors. Despite the very high capture efficiencies, drum screens also typically have relatively low headloss across the screen.

Figure 3-5 – HUBER Rotary Drum Screen[27]



Typical advantages and disadvantages to rotary drum screens are summarized in Table 3-3. For comparison purposes, the advantages and disadvantages of Multi-Rake Screens and Perforated Plate/Band Screens are also included. Information for step screens was not repeated since they are not recommended for consideration in this application.

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[27] (HUBER Technology, 2023)

Table 3-3 – Summarized Advantages of Rotary Drum Screens

Multi-Rake Screens	Perforated Plate / Band Screens	Rotary Drum Screen
Advantages		
- High hydraulic conductivities - Multiple rakes facilitate cleaning under peak flows - Can have smaller footprints - Less debris carry over with center feed style	- Less debris carry-over with center feed band screen - High screening capture rate - Screenings can be washed/compacted in the unit as an option by some manufacturers (band screen) - Smaller footprint (band screen)	- Very high screening capture rate - Screenings are typically washed/compacted in the unit - Low power requirements
Disadvantages		
- Some screens can have low removal efficiencies - Some screens require bottom sprockets which can impact maintenance	- Higher power requirements - Large solids removal may be an issue - Can have higher headloss than other options in some configurations	- Require a wider channel than other options considered - Require a longer footprint than other options considered - Special channel depths limits retrofit potential

Because a rotary drum screen could realistically only be installed in a new headworks building, the cost of a standalone screening upgrade is not considered; however, the estimated cost of a new headworks building – with and without an influent lift station is anticipated to range between $10 Million (with a screening basement) and $20 Million (includes an inclined screw lift station).

All costs discussed herein are considered to be Class 5 cost opinions, as defined by the Association for the Advancement of Cost Engineering (AACE). These estimates include approximated construction costs with markups of 10% for general conditions, a contingency of 30%-50%, 15% contractor overhead and profit (OH&P), and general and administrative services of 25% (including design administration, construction observation, funding support, legal services, etc.) based on a percentage of total estimated construction cost.

3.1.2 Evaluation and Recommendation of Headwork Alternatives

After receiving input on the preferred headworks alternative, the City-identified improvement priorities included:

1. New screening, washing, and compacting.
    a. It is recommended that the existing Andritz perforated plate screens be replaced. Based on preliminary discussions with the City, the centerflow rake screens may be the preferred option, but final selection would be made during preliminary design of the improvements. It is also recommended that the total number of mechanical screens be increased from two to three to allow the third headworks channel to be utilized more fully and provide additional capacity. In addition to the new screens, new washer-compactors would be included along with the potential for rehabilitation of the screenings conveyance system.
2. HVAC Upgrades
    a. In order to better control humidity and odors within the building, it is recommended that the HVAC system be overhauled or re-designed. This could entail improvement of the energy-capture system and upgrades to the fan systems or a new system with new supply and exhaust fans and duct heaters. Specific HVAC

configuration would be worked through during preliminary design but a supply and exhaust fan type system was assumed for planning purposes.

3. Electrical Updates
    a. Electrical system upgrades at the headworks are recommended to comply with current electrical codes and replace aging panels and VFDs. Other improvements are recommended for the headworks but also have implications plant-wide such the completion of an Arc Flash Study and upgraded SCADA systems/network connections. Plant-wide improvements were not considered herein but is included as other capital improvement plan (CIP) items within the final WWFPS.

The anticipated cost estimate for upgraded headworks screens and washer/compactors, an HVAC overhaul consisting of new supply fans, exhaust fans, and duct heaters, and targeted electrical improvements in the headworks is summarized in Table 3-4 below.

Table 3-4 – Opinion of Probable Project Cost: Headworks Upgrade

Item	QTY	Units	Unit Price	
3 Influent Screens and Control Panels	1	LS	$890,000	$1,000,000
3 Washer/Compactors	1	LS	$360,000	$540,000
Mechanical Connections and Piping	1	LS	$130,000	$130,000
Electrical and Control Integration	1	LS	$250,000	$250,000
HVAC Upgrades	1	LS	$240,000	$240,000
Electrical Panel Replacements	1	LS	$300,000	$300,000
			Construction Subtotal	**$2,170,000**
Mobilization, Bonding, and Insurance (10%)				$220,000
Contingency (50%)				$1,090,000
			Subtotal #1	**$3,480,000**
Contractor OH&P (15%)				$530,000
			Total Construction Cost	**$4,010,000**
Engineering, CMS, Legal, and Administration (25%)				$1,010,000
			Total Estimated Project Cost	**$5,020,000**

Long term, as the existing headworks approaches the end of its anticipated life, the City has indicated that a new headworks option may be necessary. At the end of the projected WWFPS study period, the headworks building will be over 40 years old and could warrant consideration for replacement. The installation of a new headworks building in the future would address all current challenges of the headworks system as well as any other challenges that may occur as the facility continues to age.

3.2 ODOR CONTROL

3.2.1 Odor Control Alternatives

This section highlights recommended changes and upgrades to the existing odor control system concerns as documented within Chapter 2. Multiple recommendations are provided for the various components of the odor control system and allow for phased system improvements.

The blower's operation should not be discontinued for any reason other than failure. Additional testing is recommended to verify current airflows and levels of H_2S in the system. Recent data from the City provides a snapshot of odorous compounds both with and without the odor control system in operation. Continuous sampling over several weeks would provide a more accurate depiction of H_2S trends within the fermenter. H_2S sampling devices, such as the Acrulog H_2S gas monitor, provide continuous minute-by-minute sampling of concentrations within a designated airspace.

Additional sampling will inform technology selection and the reduction in H_2S and other odorous compounds that should be achieved to meet acceptable limits. Based on the current data, additional exhaust ventilation is needed to reach concentrations below 10 ppm within the fermenter. The higher airflow rates would require a new exhaust blower, additional ductwork, and the addition of a second GAC carbon adsorption unit.

To reduce fog formation in the fermenter, the current louvers supplying air to the fermenter should be removed and the openings sealed. A heated makeup air unit should be installed to supply air to the fermenter. It is recommended that the makeup air unit be sized to supply air at a rate equal to 95% of the rate of exhaust ventilation. This allows for a slightly negative pressure inside the fermenter and will help prevent fugitive odor emissions. Fermenter supply air and exhaust blower ductwork should be located on opposite sides of the dome or spaced as far apart as possible. This will provide increased cross-ventilation.

The supply air heater must be capable of heating the makeup air to the greater of 20º F above the ambient temperature or 40º F. This will have the benefit of greatly reducing fog generation and improving visibility in the fermenter. It will also help reduce moisture condensation in the GAC system, prevent freezing, and improve the existing system’s performance. A small, heated enclosure is recommended to enclose the exhaust blowers and provide further freeze protection.

3.2.2 Fermenter Odor Control Costs

An opinion of probable construction cost (OPCC) is provided in Table 3-5. An additional investigation is recommended to fully characterize odor conditions within the dome and properly select any upgrade in treatment technology. However, the cost of a second GAC adsorption unit, exhaust blower, and support equipment is provided for reference. The OPCC included in Table 3-5 is conceptual and based on the recommendations provided in Section 3.2.

Table 3-5 – Opinion of Probable Construction Cost

Improvement Item Description	Construction Cost	Contingency	Other Soft Costs	Total Cost
Makeup Air Unit and Corrosion Resistance Improvements[28]	$130,000	$50,000	$50,000	$230,000
Additional GAC Adsorption Unit (inclusive of blower, mist eliminator, carbon unit, and support equipment/instrumentation)	$370,000	$150,000	$160,000	$680,000
TOTAL CONCEPTUAL OPCC	**$500,000**	**$200,000**	**$210,000**	**$910,000**

3.3 BIOSOLIDS ALTERNATIVES

3.3.1 Biosolids Digestion and Treatment

There are numerous biosolids treatment options to address the concerns identified in Section 2.4 including anaerobic digestion, aerobic digestion, thermal drying, WAS treatment, and lime stabilization. Two options considered most feasible for the Idaho Falls WWTP were evaluated to create additional solids treatment capacity:

- **Additional anaerobic digestion capacity** with a new, third digester and associated control building
- **WAS treatment** with a proprietary CleanB® WAS neutralization system

As part of the evaluation for each alternative, anticipated capital costs were developed along with life cycle costs. Note that all cost estimates are conceptual and based on Class 5 estimating criteria. The Team also examined non-economic advantages and disadvantages for each alternative. The No Action alternative was not deemed viable and was not considered further.

Alternative 1 – Digester Capacity Addition

Under this alternative, the addition of a third anaerobic digester would be constructed for added digester capacity and redundancy. The new digester would be sized to match the size of the two existing digesters (1.125 MG operating volume). The digester could be installed south of the existing primary digesters as shown in Figure 3-6. For the purposes of this evaluation, it is assumed that the digester will be a fixed cover digester with pumped mixing to match the existing digester systems. This alternative would include a new control building with gas handling equipment, boiler, heat exchanger, and recirculation pumping system to support the third digester as well as piping modifications to the other digesters on site to enable full redundancy of digester tankage.

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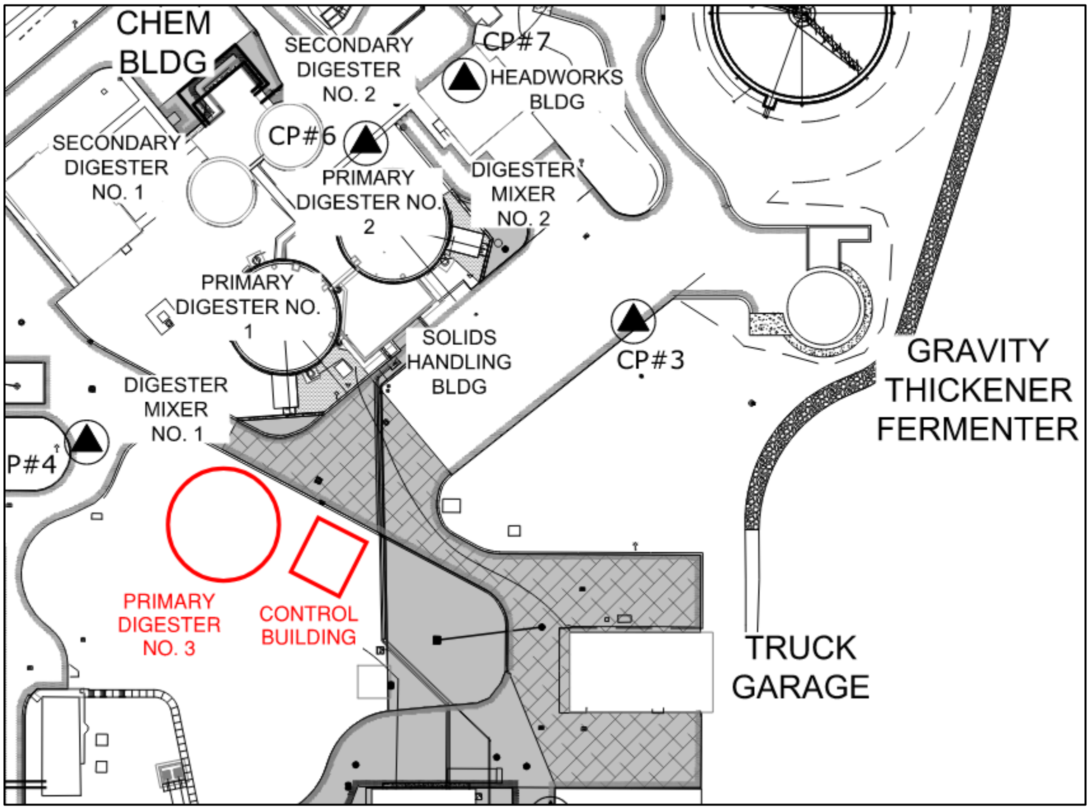
[28] Assumes replacement of corroded items observed during this evaluation (bolt and conduit only); additional corroded items may be selected for replacement upon further investigation.

Figure 3-6 – Proposed Location of Primary Digester No. 3



If a third digester is added, two can be online with one offline to achieve the 15-day standard required for Class B biosolids. As described in Section 2.4.2, the retention time remains above the 15-day standard through 2045 for the average conditions and through 2040 for the maximum month conditions when two digesters are online.

Economic Evaluation

The cost estimates were prepared by using costs from recent digester projects of similar size. The major equipment costs as part of the capital cost estimate for Alternative 1 include:

- Fixed cover digester with pump-mix system
- Control building with gas handling equipment, boiler, heat exchanger, and recirculation pumping system

The estimated capital cost for Alternative 1 is **$14,500,000**.

Key assumptions for operation and maintenance (O&M) costs of Alternative 1 include:

- Captured biogas sent to new boiler system for facility heating or to existing flare (matching current digester biogas handling)
- All utilities assumed an energy cost of $0.07 per kWh
- Operations labor for City Staff is assumed to be 0.25 full-time equivalents (FTEs) at a rate of $65/hour
- Maintenance labor for City Staff is assumed to be 0.25 full-time equivalents (FTEs) at a rate of $65/hour

- The electric-motor driven equipment that must be operated is accounted for as an electrical cost or parasitic loads. The following parasitic loads were included: pump-mix system, boiler, boiler circulating pump, and digester gas compression system

The estimated annual O&M costs developed for Alternative 1 are summarized in Table 3-6.

Table 3-6 – Alternative 1 O&M Annual Costs

O&M Item Description	Annual Costs
Operations Labor	$33,800
Maintenance Labor	$33,800
Electrical Cost for Parasitic Loads	$38,200
ANNUAL O&M	**$106,000**

Non-Economic Evaluation
Advantages and disadvantages for Alternative 1 are summarized in Table 3-7.

Table 3-7 – Alternative 1 Advantages and Disadvantages

Advantages	Disadvantages
Additional digester system redundancy	Significant infrastructure investment
Matches existing technology, familiarity with process	
Certainty of 15-day residence time goal through 2040 for max month conditions and 2045 for average conditions	

Alternative 2 – WAS Treatment

WAS treatment is the third City alternative to address solids treatment capacity. The CleanB® system from BCR is a plug-flow, chemical oxidation/aeration process for WAS that uses chlorine dioxide. The Environmental Protection Agency (EPA) granted the CleanB® system National Process to Significantly Reduce Pathogens (PSRP) equivalency in 2015, meeting the requirements for Class B biosolids in the State of Idaho.

The WAS pumps would feed sludge from the secondary clarifier into the CleanB® system at a monitored and controlled flow rate. It is assumed that the existing WAS pump system could be used for this process, but this would need to be further evaluated during detailed design. The CleanB® system would need to be located upstream of the GBT as the system operates at a maximum of 2% solids. A chemical injection system delivers a flow-controlled dose of chlorine dioxide through BCR’s patented generating system technology. No chlorine dioxide is stored onsite. This system adjusts for variations in the sludge flow rate. Once the chlorine dioxide solution mixes with the sludge stream in the CleanB® process contact system, disinfection occurs, and odor-causing compounds are destroyed. The process contact system is a custom designed piping system designed to provide the proper disinfection residence time (10 minutes) in a relatively small footprint. Upon exiting the CleanB® system, the produced Class B biosolids can then be delivered to the dewatering equipment currently under construction. Figure 3-7 shows a schematic of the CleanB® system and Figure 3-8 shows an example of a CleanB® installation at the Upper Mill Creek WWTP in Ohio.

Figure 3-7 – CleanB® Schematic

Figure 3-8 – Example of CleanB® Installation

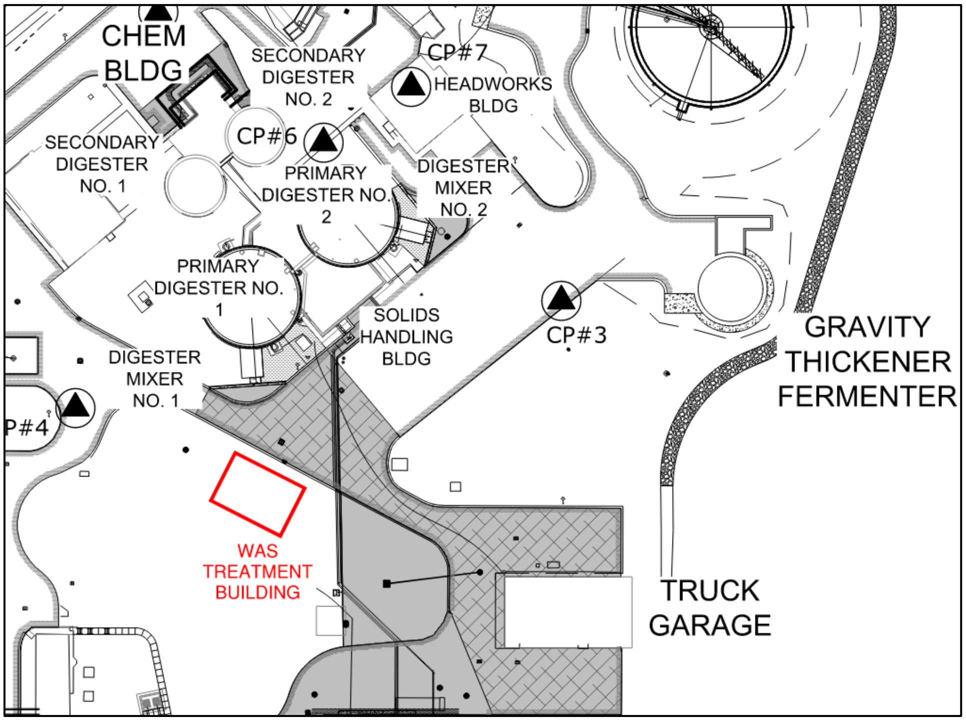
CleanB® is offered with three different coiled pipe sizes (6-inch, 8-inch, and 10-inch) that are capable of treating 55 to 270 gallons per minute (GPM). To size the CleanB® system, it was assumed all the WAS flow would be diverted to the CleanB® system upstream of the GBT. Future WAS projections were developed in a similar method as described for the digester projections in Section 2.4.2. The WAS projections are summarized in Table 3-8.

Table 3-8 – WAS Projections for CleanB® Sizing

	2021 (GPM)	2022 (GPM)	2025 (GPM)	2035 (GPM)	2045 (GPM)
Average Loading	94	83	103	132	152
Maximum Month Loading	111	94	122	157	181

A CB-10 model (10-inch coiled pipe size) capable of treating 85 to 270 GPM was selected by BCR. This model can treat both current and future WAS flows (111 and 181 GPM). A new CMU building was assumed to house the equipment. The building footprint is estimated at 60 ft by 43 ft and could be located south of the existing primary digesters as shown in Figure 3-9. See Appendix C for a proposal from BCR containing budgetary equipment pricing, estimated O&M costs, cutsheets, process flow diagram, conceptual building layout, and more information.

Figure 3-9 – Proposed Location of CleanB® System



As mentioned previously, all the WAS would be treated through the CleanB® system while the primary solids would continue to be treated through the existing digester system. The treatment of WAS through the CleanB® system would improve retention time in the digesters with retention times staying above the 15-day standard through 2045 for average conditions and through 2025 for maximum month conditions with one digester online as shown in Figure 3-10 and Figure 3-11. The CB-10 model can handle up to 270 GPM, so the larger size will ensure the WWTP is well equipped for unanticipated changes in processing flows and future needs beyond 2045. BRC completed a pilot study between August 15th and August 17th. The results of the study are found in Appendix C.

Figure 3-10 – Digester Retention Time Projections Without WAS (Average Conditions)

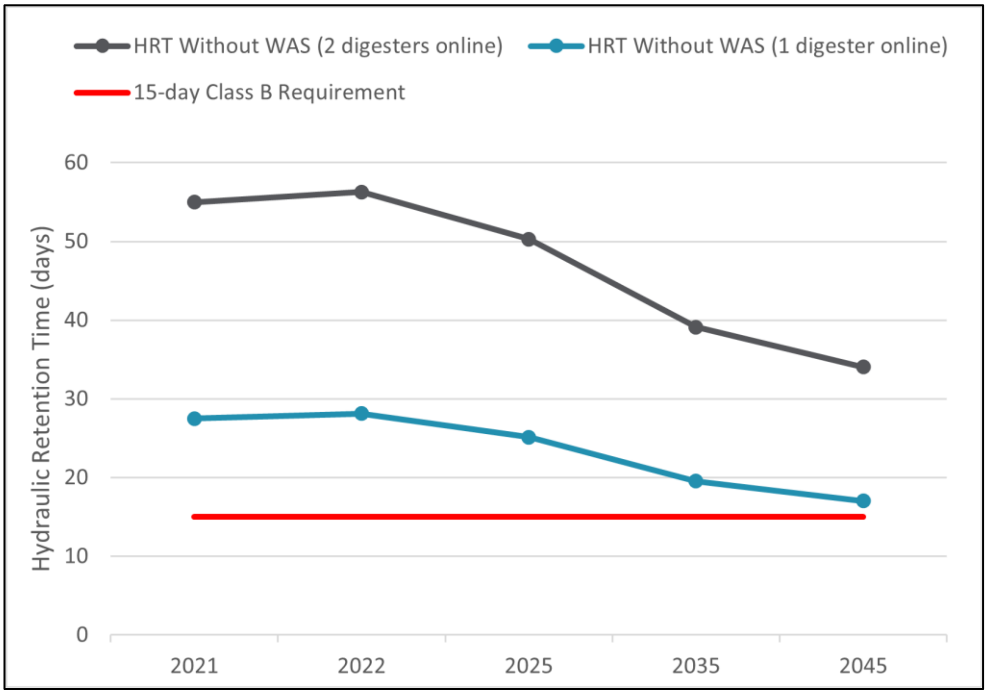
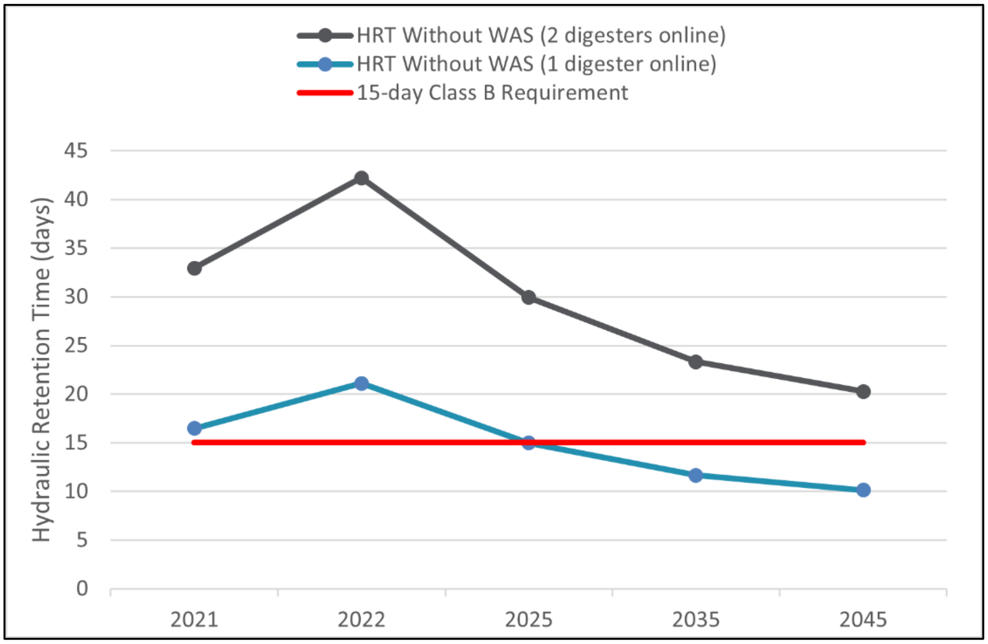


Figure 3-11 – Digester Retention Time Projections Without WAS (Max Month Conditions)



Economic Evaluation

The cost estimates for the WAS treatment alternative were prepared by using costs from similar projects and the budgetary estimates received from BCR (see Appendix C). The major equipment costs as part of the capital cost estimate for Alternative 2 include:

- CleanB® System (see Appendix C for full scope of supply)
    - Two, double-walled HDPE bulk chemical storage tanks with fill station
    - Chlorine dioxide generator and chemical dosing pump skid
    - CB-10 (10-inch) contact chamber unit
    - NEMA 4 control panel

The estimated capital cost for Alternative 2 is **$3,530,000**.

Key assumptions for O&M costs of Alternative 3 include:

- All utilities assumed an energy cost of $0.07 per kWh
- 0.5 HP CleanB® System treating 43 MG WAS per year at 111 GPM and 1.2% total solids for 2021 flows
- 0.5 HP CleanB® System treating 79 MG WAS per year at 181 GPM and 1.2% total solids for 2045 flows
- CleanB® treatment costs include CleanB® chemical management plan (chemicals procured and supplied by BCR), service agreement, operator training, remote monitoring, system support, and repair and maintenance
- Operations labor for City Staff is assumed to be 0.25 full-time equivalents (FTEs) at a rate of $65/hour

The estimated annual O&M based on 2021 and 2045 WAS flows for Alternative 2 are summarized in Table 3-9 and Table 3-10, respectively.

Table 3-9 – Alternative 2 O&M Annual Costs (Based on 2021 Flows)

O&M Item Description	Annual Costs
CleanB® Electrical Costs for Parasitic Loads	$540
CleanB® Treatment Costs	$160,400
City Operations Labor	$33,800
ANNUAL O&M	**$194,800**

Table 3-10 – Alternative 2 O&M Annual Costs (Based on 2045 Flows)

O&M Item Description	Annual Costs
CleanB® Electrical Costs for Parasitic Loads	$590
CleanB® Treatment Costs	$261,600
City Operations Labor	$33,800
NET ANNUAL O&M	**$296,000**

Non-Economic Evaluation

Advantages and disadvantages for Alternative 2 are summarized in Table 3-11.

Table 3-11 – Alternative 2 Advantages and Disadvantages

Advantages	Disadvantages
Improves existing digester capacity	Limited number of installations (13) compared to more traditional technologies
Potentially reduced odors in biosolids through oxidation of sulfides, phenols and mercaptans, expanding number of viable land application sites near residences	Additional chemical systems (sulfuric acid and sodium chlorite) to manage and monitor, safety protocols to follow
Requires only minutes to achieve Class B biosolids rather than days	
Smaller footprint, reduced infrastructure required	
Minimal moving parts (5 motor operated valves, 1 air compressor, 2 chemical pumps)	
Potentially improved phosphorus capture in biosolids from eliminating digestion	
Potentially reduced polymer consumption required for dewatering due to chlorine dioxide acting as a natural flocculant	

3.3.2 Biosolids Handling

As previously discussed, the City processes wastewater residuals in a mesophilic, anaerobic digestion process. Following digestion, Class B biosolids are stored in sludge holding tanks followed by lagoon storage prior to disposal to local agricultural fields as liquid solids. Over the next several years, the City will transition towards a mechanical dewatering process which will replace the existing liquid solids handling process.

Current and Future Regulatory Requirements

Biosolids disposal is governed under 40 CFR Part 503 of the US Federal Code of Regulations and IDAPA sections 58.01.16480 and 58.01.16.650 which allows for disposal through land application, surface disposal (landfill), and incineration. Of the permitted disposal methods, land application and disposal within a landfill are the most common methods used. However, regulatory changes are expected in the future, especially regarding municipally generated biosolids which are known to be contaminated with PFAS – a class of ‘forever chemicals’ that are known to accumulate within the environment and contribute to multiple negative health effects (US EPA, 2023).

A timeline for these regulatory changes is currently unknown but is under review by the US EPA. Additional detail is provided within Section 1.7.1 regarding future permitting requirements which may impact the Idaho Falls WWTP. It is possible that moving forward, PFAS could be added to the list of regulated pollutants for land application of biosolids included in 40 CFR 530. It is also possible that PFAS regulations could preclude any land application activities without additional conditioning of biosolids to degrade entrained PFAS chemicals. This would be a major disruption to operations not only at the Idaho Falls WWTP, but at municipal WWTPs throughout the United States.

Biosolids Disposal Strategies

Currently, the City land applies their Class B liquid biosolids to local agricultural fields and works with agricultural landowners every year to coordinate the application of the biosolids and relies on the Owner's schedules to land apply the solids. Relying on landowners annually to apply biosolids is a risk for the City moving forward and alternatives should be considered if the City runs out of nearby land to land apply the biosolids to. Also, long-term agreements with the landowners could be considered to reduce the annual risk to the City.

The dewatering process currently under construction will allow the City to transition from liquid solids application to dry solids application. As the City continues to grow, the likelihood of development impacting the agricultural spaces that have been applied to historically will increase and fields further from the City or other means of biosolids disposal will need to be considered. At this time, the City has expressed interest in considering continued land application and also landfilling if required in the future.

Biosolids Hauling

Most pressing for the City is that in order to apply dry solids, the City will need to transition its fleet of liquid sludge hauling/spreading vehicles to dry solids hauling/spreading vehicles. At other similar installations, dry biosolids are hauled and spread using KUHN Knight Manure Spreaders. This equipment is available in various sizes and in both truck mounted and trailered mounted configurations and both side and rear discharge variations are available. Popular models, and their respective capacities, are summarized below (Kuhn, Inc., 2023). Silage kits are available on most models which increase the volume which can be hauled; however, it is anticipated that maximum net load weights will be exceeded on most models prior to the available haul volume. The City is reportedly considering the SLC 141 truck model for use in the new hauling/spreading application.

- Kuhn Knight SLC Series Truck and Trailers
    - SLC 132 Truck/Trailer – 430 struck ft^3, 645 heaped ft^3, & 32,000 lb maximum load
    - SLC 141 Truck/Trailer – 550 struck ft^3, 820 heaped ft^3, & 41,000 lb maximum load
    - SLC 150 Trailer – 670 struck ft^3, 965 heaped ft^3, & 50,000 lb maximum load
- Kuhn Knight PSC 100 Series Truck and Trailers
    - PSC 161 Truck/Trailer – 380 struck ft^3, 560 heaped ft^3, & 39,500 lb maximum load
    - PSC 171 Truck/Trailer – 450 struck ft^3, 665 heaped ft^3, & 46,000 lb maximum load
    - PSC 181 Truck/Trailer – 520 struck ft^3, 770 heaped ft^3, & 52,500 lb maximum load
- Kuhn Knight PXL 100 Series Truck and Trailers
    - PXL 185 Truck/Trailer – 600 struck ft^3, 865 heaped ft^3, & 50,000 lb maximum load
    - PXL 1100 Truck – 700 struck ft^3, 1,000 heaped ft^3, & 50,000 lb maximum load
    - PXL 1100 Trailer – 700 struck ft^3, 1,000 heaped ft^3, & 60,000 lb maximum load
    - PXL 1120 Trailer – 850 struck ft^3, 1,230 heaped ft^3, & 72,000 lb maximum load

The City of Idaho Falls provided land application records dating back to 1996. Total gallons of liquid sludge and the associated dry pounds applied vary significantly within the data record and peaked in both 2003 and 2012. The 2012 improvements to the secondary treatment process, the 2013 improvements to the thickened WAS process, and the 2017 improvements to the primary treatment process have all had significant impacts on the volume of solids produced annually. Since 2019, when all major upgrades impacting digester loading and solids production were completed, liquid sludge applied (in gallons) has remained relatively constant and averaged approximately 16.2 million gallons annually. The average number of liquid loads delivered to the fields on an annual basis is nearly 3,300.

The volume of dewatered solids to be disposed of were estimated based on the total dry pounds applied that was provided in the City's records, an average bulk density of 2,000 lbs/cubic yard of dewatered biosolids, and an assumed 15% total solid content of the dewatered solids. Additional solids from dosing ferric chloride were included in the estimate based on the assumptions made by Murray Smith and Associates in the 2021 Dewatering Preliminary Engineering Report (PER) and the theoretical solids generation that would be anticipated at the identified $FeCl_3$ dosage (MSA, Inc., 2021).

The 2022 land application records indicate that the City applied solids on 16 different agricultural fields between April 13th and November 7th. Applications were not made in a single distinct application period and instead appear to have occurred when allowed by each individual landowner. This complicates hauling projections due to the lack of a distinct application period; however, a majority of the applications occurred in May/June 2022 and in August/September 2022 therefore a target period of 16 total weeks (80 workdays total) of application (8 weeks in the spring and 8 weeks in the late summer or early fall) was assumed.

The 2022 average roundtrip driving distance to and from each field was nearly 32 miles with a maximum distance of almost 44 miles. Allowing 0.5 hours for loading of trucks at the WWTP, an average rate of travel of 40 mph, and 0.5 hour at each field for spreading of solids, a duration per load of 1.5 to 2.0 hours was estimated. The City reports that current average trip times, per load and including filling and emptying trucks, is approximately 1.5 hours. Assuming applications occur for 8 hours a day, 4 loads can be made per truck each day. Based on the Kuhn Knight SLC 141, it was assumed that loads would be maximized at 41,000 lbs which corresponds to a volume of 554 ft^3 at the assumed solids density. This volume exceeds the available volume for the SLC 141 model but is within the reported heaped volume available.

Based on the assumptions documented herein and summarized in Table 3-12 3 trucks would be required to dispose of the same volume of solids that the City land applied in 2022. However, in addition to the minimum, it is recommended that 1 or 2 standby trucks be available for use during periods of heavier solids application and for when a truck must be removed from service for maintenance or due to equipment failure. Therefore, it is recommended that the City plan to have available at least 3 to 5 trucks, pending refinement of the documented assumptions by City staff or additional data from the dewatering process.

Table 3-12 – Summarized Assumptions Based on 2022 Application Data

Description	Value	Units	Source
2022 Dry Solids Applied	4,144,064	lbs	(City of Idaho Falls, 2022)
$FeCl_3$ Solution	33%	%	(MSA, Inc., 2021)
Molar Ratio Fe : P	1 - 2	--	(MSA, Inc., 2021)
Pressate Ortho-P	469	mg P/L	(MSA, Inc., 2021)
Residual Ortho-P	109	mg P/L	(MSA, Inc., 2021)
$FeCl_3$ Solids	2,700	lbs/day	Calculated
Future $FeCl_3$ Dry Solids	985,500	lbs/day	Calculated
Total Annual Dry Solids Applied	5,129,564	lbs/day	Calculated
Dewatered Solids	15%	% TS	(MSA, Inc., 2021)
Bulk Solids Density	2,000	lbs/cy	Assumed After Storage
Maximum Truck Load Capacity	41,000	lbs	(Kuhn, Inc., 2023) – SLC 141
Estimated Duration/Load	2.0	hrs	Calculated & City Personnel
Hrs/day Biosolids Applied	8	hrs	City Personnel
Loads/day/truck	4	loads	Calculated
Annual Application Days	80	days	Assumed & City Personnel
Est. Number of Loads Required	834	Loads	Calculated
Est. Number of Trucks Required	**3**	**Trucks**	**Not Including Redundancy**

Continued Class B Land Application

Moving forward, as additional solids are produced due to growth in the municipal service population, the requisite acreage needed for application of solids will increase. In 2022, the City applied 2,072 dry tons of biosolids to 2,036 acres (2,035 lbs/acre). Allowable application rates vary based on the pollutant limits documented within 40 CFR 530, the nutrient content of the solids to be applied, and the agronomic nutrient uptake of the crop to be grown.

Based on the City's 2017 Biosolids Management Plan, the City's biosolids have historically and are currently compliant with the EPA standards for 'Clean Biosolids' as defined within 40 CFR 530 as well as the IDAPA standards 58.01.16.480 and 58.01.16.560 (City of Idaho Falls, 2017). Therefore, pollutant loadings are not anticipated to limit future solids loading rates, but the City will need to update the existing Biosolids Management Plan due to the new dewatering process and associated change in the nature of the biosolids to be land applied. The City's Management Plan also identifies nutrient concentrations (percent of dry weight) of 4.0% for TKN, 0.8% for Ammonia - Nitrogen, and 0.05% for Nitrate/Nitrite – Nitrogen. Crops typical for the area include winter wheat and barley and have typical nitrogen requirements of 95 – 125 lbs of nitrogen per acre (University of Idaho Extension, 2023). Higher nitrogen requirements are possible but are dependent upon target yields and whether or not the crop is irrigated.

Based on a total nitrogen content of 4.0% (dry weight) from the City's Biosolids Management Plan and an assumed limiting nitrogen requirement of 95 lbs/acre, using the conservative number of barley crop, up to 2,375 dry pounds of biosolids could be applied per acre. However, in practice biosolids should be applied in lesser quantities to account for natural variability in the nitrogen content of the biosolids. Therefore, an application rate of 2,000 dry pounds of biosolids per acre is assumed for planning purposes. An application rate of 2,000 dry pounds per acre is approximately equivalent to the current application rate. Table 3-13 illustrates the trend for future land requirements.

Table 3-13 – Projected Biosolids and Required Area for Biosolids

	2022	2025	2035	2045
Dry Solids Applied[29] (lbs)	4,144,000	5,452,700	7,003,400	8,104,000
TKN – N[30] (lbs)	165,760	218,100	280,100	324,200
Crop Requirement[31] (lbs N/acre)	95	95	95	95
Theoretical Minimum Acres[32] (acre)	1,750	2,300	2,950	3,410
Recommend Acres[33] (acre)	2,070	2,730	3,500	4,050

Historically it appears that biosolids applications have been more constrained by limited application windows based on cultivating and harvest schedules rather than application loading rates. To reduce the number of acres required in the future, fields that have crops with higher nutrient uptake could be targeted. It is anticipated that the City will continue to land apply biosolids but will change from liquid to dry biosolids applications as approved by DEQ following completion of the dewatering facility in 2024.

Landfill Disposal

An alternative to land application is to haul generated biosolids to an area landfill. Solid waste landfills do not allow for the disposal of liquid materials and therefore liquid biosolids could not be disposed of in this manner. However, after the completion of the City's dewatering upgrades, the biosolids are expected to achieve sufficient dryness so that landfilling is a viable option.

Bonneville County owns and operates two main landfills (one for construction and demolition wastes and one for municipal waste) and a transfer station. If the City were to dispose of dewatered biosolids within an area landfill, expenses would be incurred to haul the dewatered solids and tipping fees would be assessed by the County. Talking with personnel at the County Landfill, they are open to accepting biosolids that pass the paint filter test. The paint filter tests would need to be completed offsite and the results would need to be provided to the County prior to accepting the waste. The current cost for landfilling biosolids that pass the paint filter test is $40 per ton.

Because tipping fees are typically assessed based on the weight of the load to be disposed of, solids content of biosolids can have a significant impact on the cost of disposal. Table 3-14 presents two scenarios, one in which solids are disposed of at 15% solids (immediately after dewatering) and one in which solids are disposed of at 60% solids which would require covered storage and a supplemental biosolids drying system. Because the dewatering process will not be online until late 2024 or early 2025, Table 3-14 only considers the future condition in 2025, 2035, and 2045.

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[29] Based on 2.5% solids from the digester for 2025, 2035, and 2045 (MSA, Inc., 2021).
[30] Based on 4% TKN on a dry weight basis (City of Idaho Falls, 2017)
[31] Based on recommended nitrogen application for dry farmed barley (University of Idaho Extension, 2023).
[32] Theoretical minimum acreage required based on the average nitrogen content reported by the City (City of Idaho Falls, 2017).
[33] Minimum recommended acreage for planning purposes, based on an application rate of 2,000 lbs dry solids per acre to account for natural variations in the nitrogen content of the biosolids being applied.

Table 3-14 – Estimated Landfill Disposal Tipping Fees at 15% and 60% Total Solids

	2025	2035	2045
15% Solids – Post Dewatering			
Total Solids @ 15% TS (lbs)	36,351,100	46,689,500	54,026,400
Total Solids @ 15% TS (tons)	18,176	23,345	27,013
Landfill Tipping Fee[34] ($ per Ton)	$40	$40	$40
Total Tipping Fee ($)	$727,022	$933,790	$1,080,528
60% Solids – Post Drying			
Total Solids @ 60% TS (lbs)	9,087,800	11,672,400	13,506,600
Total Solids @ 60% TS (tons)	4,544	5,836	6,753
Landfill Tipping Fee[34] ($ per Ton)	$40	$40	$40
Total Tipping Fee ($)	$181,756	$233,448	$270,132

If landfilling of waste is ultimately pursued, it is recommended that the City consider implementing a biosolids drying process. Many thermal drying options of varying complexity are available for consideration if the City identifies landfill disposal of solids as a preferred alternative moving forward. These costs are present value and only include landfill tipping fees and do not include labor, travel, fuel, or equipment required to haul to the landfill.

Other Options – Class A Land Application

Other disposal options are available which the City could consider for ultimate disposal of the generated biosolids. These generally include incineration and Class A land application.

Incineration of biosolids can be an effective means of disposing of municipally generated biosolids with electricity production being the principal product generated; however, no known incinerator is available in the area and the installation of one only to service the Idaho Falls WWTP would likely be prohibitively expensive. Air pollution is also the principal concern with incinerators and an air permit would be required. As a result, incineration is not recommended unless a 3rd party already providing these services can be identified in the Idaho Falls area.

Following the completion of the dewatering project, the City could also consider diverting all or a portion of the dewatered biosolids to a composting process which would produce a Class A biosolid. Under current regulations, these Class A biosolids could then be applied as a fertilizer to additional areas than can be considered with the City's Class B biosolids. This could allow the City to offer or sell composted biosolids to the public for use in home garden applications or to spread the Class A biosolids to parks, golf courses, and other green spaces. Future PFAS regulations could impact the way Class A biosolids can be applied; however, there are treatment techniques currently being researched which could be used in conjunction with composting to produce a Class A, PFAS free, biosolid.

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[34] Based on the identified fee for agricultural waste (Bonneville County, 2023).

3.4 SIDESTREAM TREATMENT ALTERNATIVES

In addition to continual maintenance of the oxidation system and the recommended process of evaluating and cleaning nozzles to prevent biofouling, sidestream treatment is intended to decrease the loading on the main nutrient removal process. For Idaho Falls WWTP, both nitrogen and phosphorus are the targeted nutrients to be removed, therefore two sidestream treatment technologies have been evaluated: ANITA™ Mox Moving Bed Biofilm Reactor (MBBR) and Pearl® Nutrient Recovery System (Pearl).

ANITA™ Mox MBBR

In order to target the treatment of nitrogen within the filtrate stream, one of the sidestream treatment technologies evaluated is the Moving Bed Biofilm Reactor (MBBR). The contacted vendor is Veolia, which provides the ANITA™ Mox MBBR process.

Description

The ANITA™ Mox MBBR process is a single-stage nitrogen removal process with a continuous-flow, non-clogging biofilm reactor containing moving “carrier elements” or media. Media is suspended in the reactor and does not require backwashing or cleaning. The process is specifically designed for the treatment of waste streams with high ammonia concentrations. Veolia states the system can achieve ammonia removals of up to 80-90 percent and total nitrogen removals of up to 75-85 percent. The treatment method uses only 40 percent of the oxygen demand of conventional nitrification and requires no external carbon source.

The anoxic ammonia oxidation (anammox) biofilm (bacteria) critical to the deammonification process is attached to and securely protected by the surfaces of the media. This media is designed to provide a large, protected surface area for the biofilm, and optimal conditions for biological activity when suspended in water. Media of different shapes and sizes provide flexibility for use of the most suitable type depending on wastewater characteristics, discharge standards and available volumes. In addition, a phased approach with different media fill percentage makes expansion of the ANITA™ Mox system much easier. More mediums can simply be added for future increase of flows and loads. AnoxKaldnes media is made from virgin HDPE and has a density slightly less than water.

The ANITA™ Mox process consists of an aerobic nitrification reaction and an anammox reaction. Both take place simultaneously in different layers of the biofilm. Nitrification occurs in the outer layer of the biofilm. Approximately 55 percent of the filtrate ammonia is oxidized to nitrite. Anammox activity occurs in the inner layer. In this step, the nitrite produced, and the remaining ammonia are utilized by the anammox bacteria then converted to nitrogen gas and a small amount of nitrate. Figure 3-12 and Figure 3-13 illustrate this process. More information about the Veolia ANITA™ Mox MBBR proposal is provided in Appendix D.

Figure 3-12 – ANITA™ Mox MBBR Process Part 1

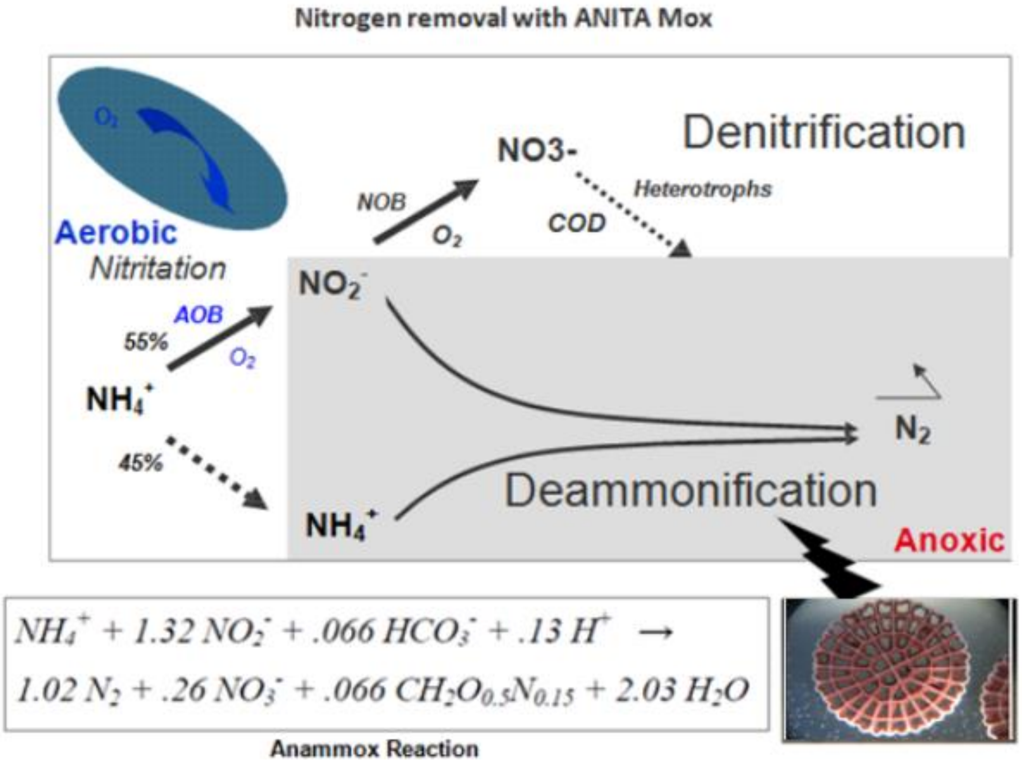
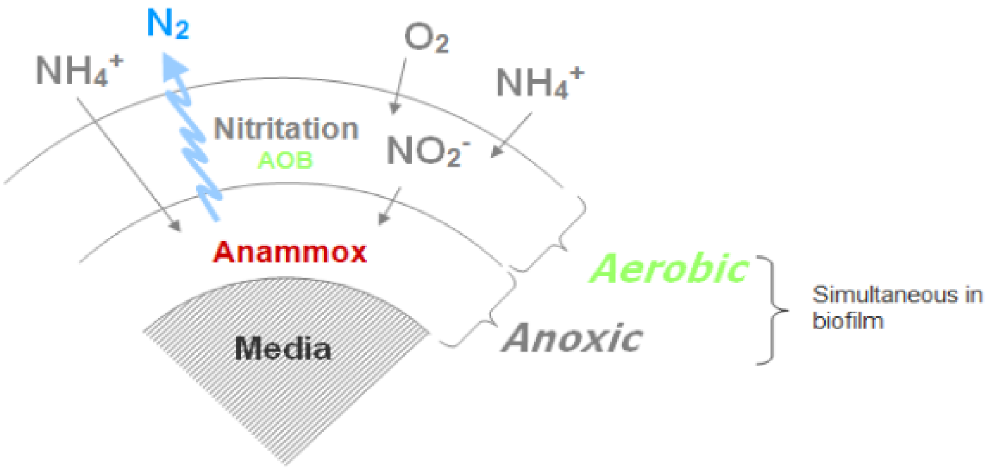


Figure 3-13 – ANITA™ Mox MBBR Process Part 2



Design Criteria

Design criteria for the sidestream treatment system were provided to Veolia for the purpose of sizing the treatment system and developing a budgetary proposal. Design criteria for the ANITA^{TM} Mox MBBR process are based on year 2040 and shown in Table 3-15.

Table 3-15 – ANITA™ Mox MBBR Design Criteria

Parameter	Unit	Value
Average Flow	MGD	0.079
Peak Hourly Flow[35]	MGD	0.16
$cBOD_5$[36]	mg/l	290
COD	mg/l	1,600
TSS	mg/l	1,400
TKN	mg/l	1,100
NH3-N	mg/l	1,100
TP	mg/l	625
Alkalinity	mg/l	3,780
Site Elevation	ft	4,708
Temperature[37]	℃	30
Target Effluent NH4-N Concentration	mg/l	< 150
Target Effluent Total Inorganic Nitrogen	mg/l	< 260

Veolia assumed sidestream temperature of 30°C, where optimal temperature for the MBBR system is between 25-30°C. From piping materials specifications, the filtrate has a minimum temperature of 10°C and a maximum temperature of 27°C. It is important to confirm filtrate temperature once the system is in operation.

Veolia recommends installation of two ANITA^{TM} Mox MBBR process trains. Please see Table 3-16 for more information on process design summary.

Table 3-16 – ANITA™ Mox MBBR Process Design Summary

Parameter	Unit	Value
Number of Process Trains	-	2
Reactor Dimensions (Each)	ft	20 L x 20 W x 16 SWD
Reactor Volume (Total)	ft^3	12,800
Recommended Freeboard for all reactors	ft	2 – 3
Media Type	-	AnoxK^{TM} 5
Fill of Biofilm Carriers, All Reactors	%	45
Media Volume (All Reactors)	ft^3	5,790
Aeration System Type	-	Medium Bubble
Residual DO, Design	mg/l	1.5
Estimated Process Air Requirement, Design	scfm	~800
Pressure from top of Drop Pipe	psig	6.8

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[35] Peak Hourly Flow = 2 * Flow. However, filtrate equalization tank will assist with decreasing peak flow concerns.

[36] Assumed from BOD_5 sampled values.

[37] Veolia assumed values from typical process removal rates.

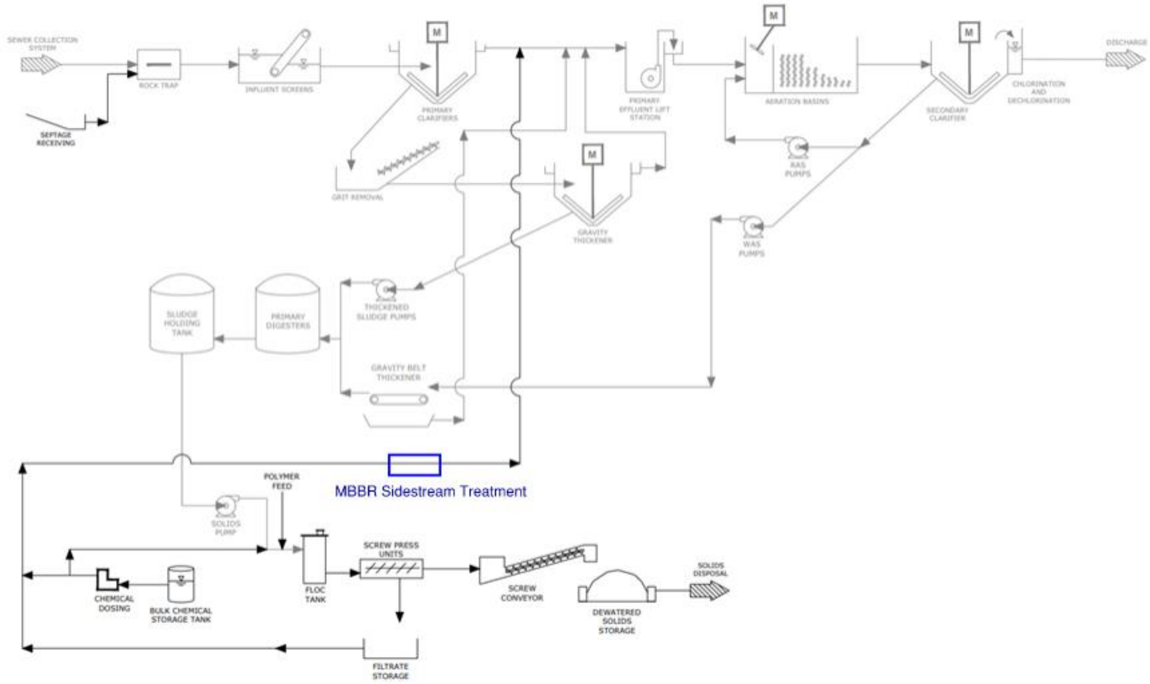
Site Layout

Each MBBR unit has a small footprint of 400 ft^2, so they are easily able to fit onto the site. To minimize piping and filtrate temperature loss on its way to the MBBR process, the proposed location of the two MBBR units is near the filtrate equalization tank. Figure 3-14 shows a conceptual site layout. The MBBR units will be located adjacent to one another on top of a concrete pad. These units do not need to be enclosed in a building and can be exposed to the elements. During design, operators can elect to enclose the units if wanted.

Figure 3-14 – Proposed ANITA™ Mox MBBR Site Layout

The air demand for sidestream treatment was estimated at approximately 800 scfm. There are two options: tying into the existing blower system; or dedicating a new blower system for the MBBR units. For the purposes of this section, we will assume there will be a new blower system and building dedicated to the MBBR process. It is best practice to keep blowers separate from secondary processes because different pressures and air demands could impact the aeration basin control system. Yard piping will be relatively local to the MBBR process as piping connections to convey flow back to the PELS are already included with the current dewatering project. Installation of MBBR units will allow tying into this yard piping. Process Flow Diagram can be found in Figure 3-15.

Figure 3-15 – Process Flow Diagram with ANITA™ Mox MBBR



Estimated Cost

Veolia has provided a budgetary proposal, see Appendix D. Opinion of Probable Construction Cost is in Table 3-17.

Table 3-17 – MBBR Opinion of Probable Construction Cost[38]

Item	Unit	Quantity	Unit Cost ($)	Subtotal ($)
Civil	LS	1	200,000	200,000
Electrical and Instrumentation/Control	LS	1	250,000	250,000
Process Mechanical	LS	1	150,000	150,000
Concrete Equipment Pad	CY	34	750	30,000
Concrete Reactor Basin Tanks	CY	187	750	140,000
Blower Building[39]	LS	1	150,000	150,000
Equipment Cost	LS	1	1,250,000	1,250,000
			Estimated Construction Subtotal	**2,170,000**
			Contingency 40%	870,000
			Estimated Construction Cost	**3,040,000**
			Engineering 20%	610,000
			Legal and Administrative 5%	150,000
			Construction Management and RPR 5%	150,000
			Estimated Soft Costs:	**910,000**
			Total Estimated Cost:	**$3,950,000**

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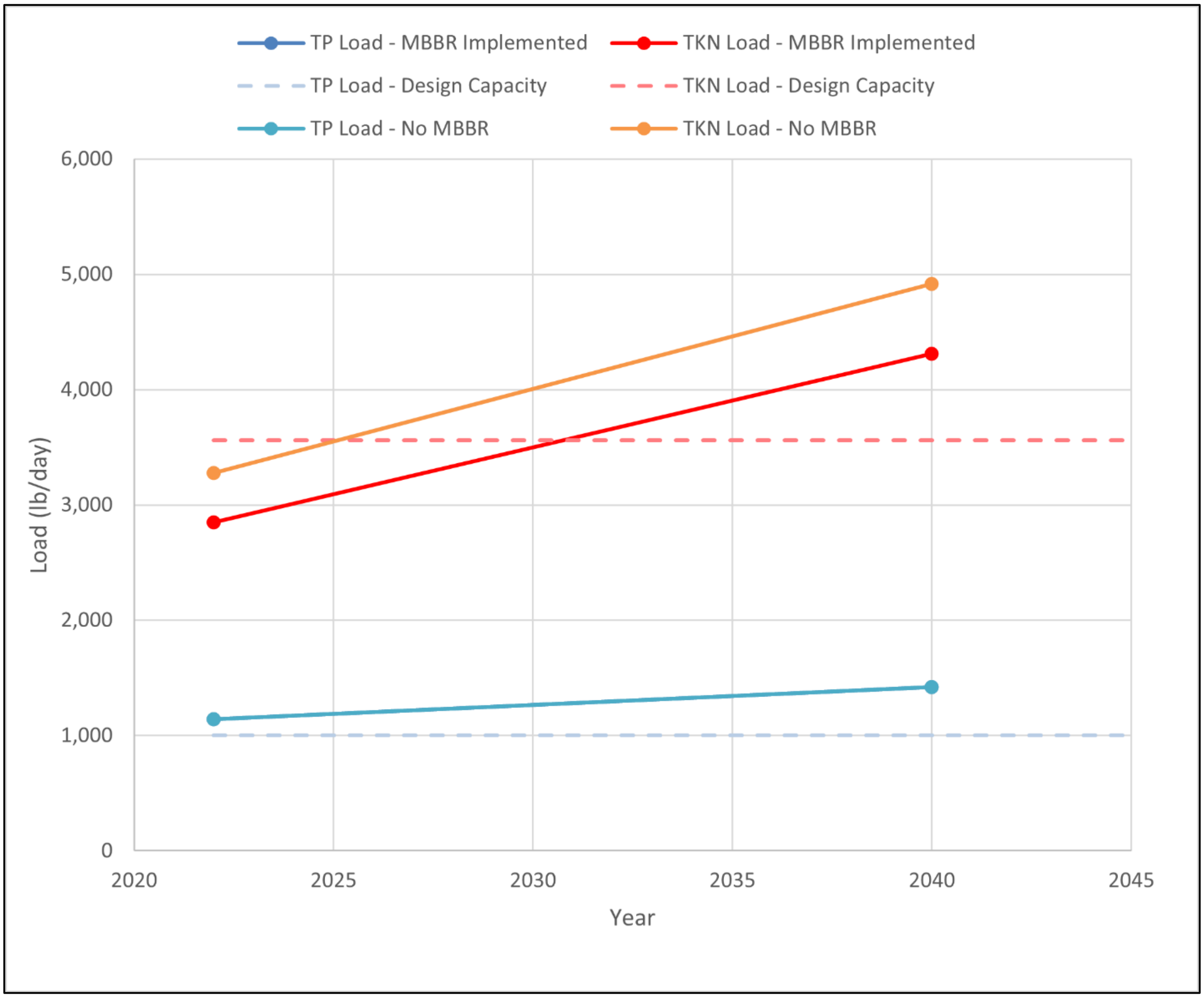
[38] OPCC includes blowers and pumping to/from MBBR process. Estimated range of probable bid cost is from 50% under to 100% over the total estimated cost.

[39] Blower building cost based on Vancouver Water Station 9 escalated to 2023 prices, based on 225 square foot building.

Impact on Nutrient Load

Figure 3-16 shows secondary influent nutrient load projections after implementation of the MBBR process. Installation of the MBBR deammonification process is estimated to delay exceeding design capacity.

Figure 3-16 – Secondary Influent Load Proj With ANITA™ Mox MBBR Process



Pearl® Nutrient Recovery

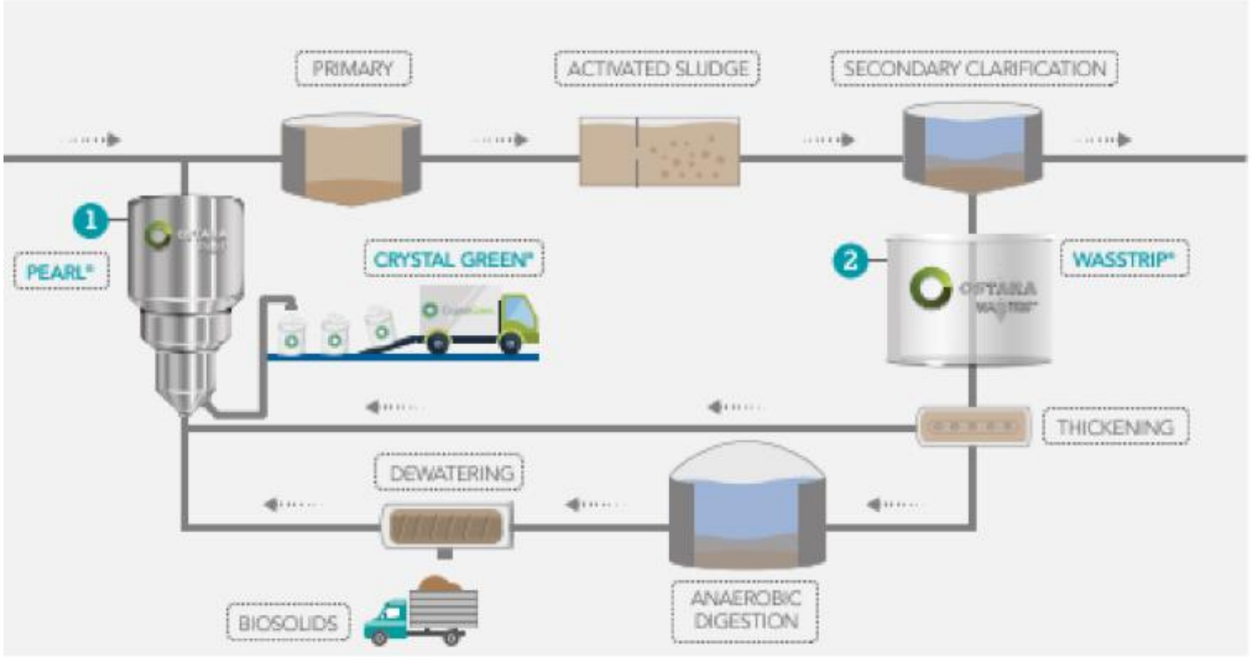
In order to target the treatment of nitrogen and phosphorus within the filtrate stream, the other sidestream treatment technology evaluated is the Pearl® Nutrient Recovery System (Pearl). The contacted vendor is Evoqua, which provides the OSTARA Pearl® and WASSTRIP® Systems.

Description

The Pearl® system aims to recover phosphorus as a high-quality fertilizer, coined Crystal Green®, while offering significant savings on chemical demand, maintenance, and operations. The WASSTRIP® system is optional, however it maximizes total phosphorus removal as well as mitigates struvite formation in the digestion process, as it is a pre-digestion phosphorus release step. This section will move forward assuming installation of the WASSTRIP® system in addition to the Pearl® system, referring to the combination as the Pearl.

Idaho Falls WWTP is planning to dose ferric chloride into the filtrate recycle stream to reduce phosphorus load back to the main treatment processes. This will generate chemical sludge and add to operating costs for dewatering and disposal. The Pearl system, on the other hand, recovers phosphorus from the dewatering and thickening filtrate streams before they accumulate as nuisance struvite in pipes and on other equipment. Recovering phosphorus from the filtrate stream also eliminates the need for ferric addition. Figure 3-17 illustrates the process flow diagram for the Pearl system.

Figure 3-17 – The Pearl® and WASSTRIP® Systems Process Flow Diagram



The Pearl system uses a tightly controlled chemical precipitation process by facilitating the growth of struvite "seeds." The seeds grow in diameter until they reach a desired size suitable for beneficial use and are then dried and collected on-site in a fully automated process. The Pearl system uses a multi-barrier approach to ensure the fertilizer product is consistently pathogen free in accordance with all known regulatory requirements including Part 503 of the US EPA standard for the use or disposal of sewage sludge. More information on the benefits of the WASSTRIP® system and its process can be found in Appendix D.

Design Criteria

Design criteria for the sidestream treatment system were provided to Evoqua for the purpose of sizing the treatment system and developing a budgetary proposal. Design criteria for the Pearl system are based on year 2040 and shown in Table 3-18. These design criteria differ from those for the MBBR system because the Pearl system treats a combination of flow from the gravity belt thickeners and equalized filtrate.

Table 3-18 – Pearl® and WASSTRIP® System Design Criteria

Parameter	Unit	Value
Pearl® Design Criteria		
Average Dry Weather Flow	MGD	15.5
Influent BOD	mg/l	350
Influent TSS	mg/l	296
Influent TKN	mg/l	35
Influent TP	mg/l	7.6
Effluent TP Limit	mg P/l	1.7 (yearly average)
Effluent TN Limit	mg P/l	3.4
Filtrate Flow	gpd	79,000
Wash Water	gpd	4,800
Filtrate OP (with $FeCl_3$)	mg/l	305
Filtrate OP (without $FeCl_3$)	mg/l	544
Filtrate TKN	mg/l	1,070
Filtrate Mg[40]	mg/l	10
Filtrate pH[40]	SU	7
Filtrate TSS	mg/l	1,000
Filtrate Alkalinity[40]	mg/l	2,800
WASSTRIP® Design Criteria		
WAS Flow	gpd	206,660
WAS % Solids	%	1.5

It is important to measure magnesium, pH, and alkalinity of the filtrate stream when the dewatering upgrade project is complete and in service because these components are all critical to effective phosphorus recovery. It is important to note that the Pearl system receives a majority of its flow from the WASSTRIP stream, so it is important to characterize this stream as well.

Table 3-19 shows the design summary of the Pearl system which includes the performance as well as the reactor effluent characteristics. The reactor effluent would now be the recycle stream headed back to the PELS box, impacting nutrient load on the main treatment process.

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[40] Values assumed by Evoqua.

Table 3-19 – Pearl® and WASSTRIP® System Design Summary

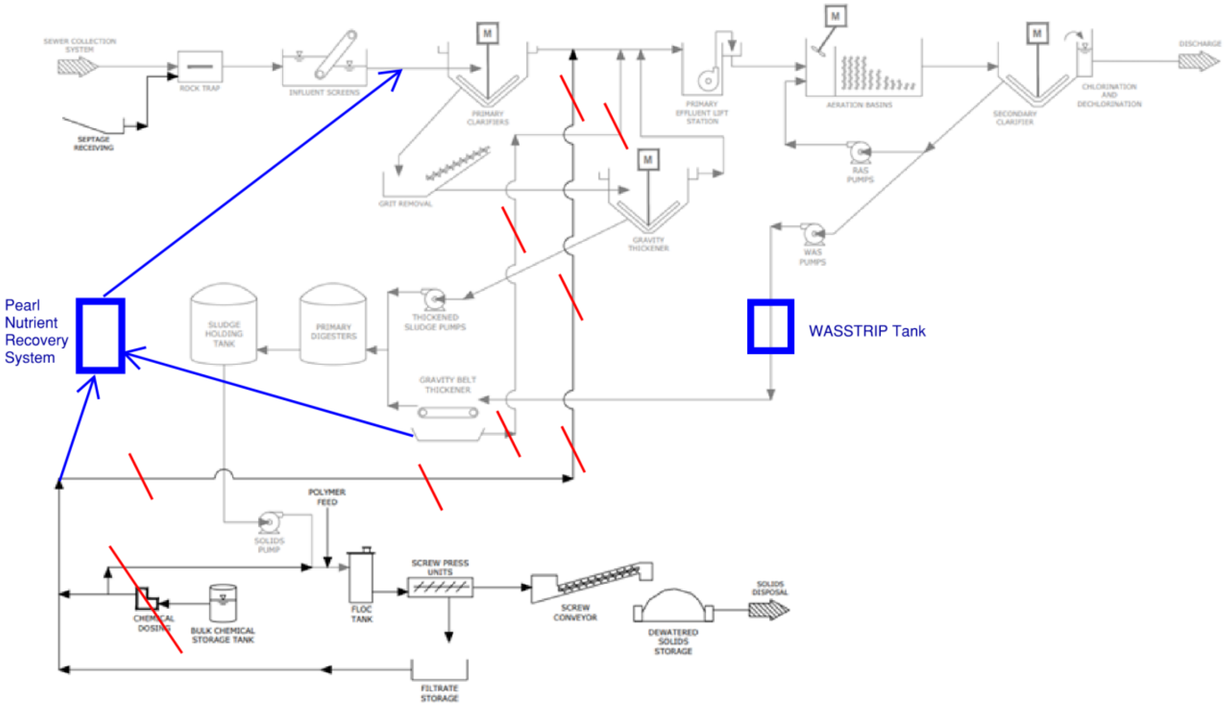
Parameter	Unit	Value
Reactor Effluent		
Recycle Flow	gpd	242,800
Recycle OP Concentration	mg/l	40
Recycle OP Load	lb/day	81
Recycle TKN Concentration	mg/l	311
Recycle TKN Load	lb/day	631
Recycle pH	SU	7.5 – 7.8
Pearl Performance		
Phosphorus Removal	%	81
TKN Removal	%	20
Crystal Green™ Production	tons/year	349 – 399
Pearl System Specifications		
Reactor Model	n/a	Pearl Fx-12'
Reactor Quantity	number	1
Total Reactor Capacity	gpd	360,000
Reactor Feed TSS	mg/l	< 1,000
Reactor Feed OP Range	mg/l	50 – 400
Reactor Feed OP Range	lb/day	75 – 1,200
Reactor Design Operating Temperature	n/a	Ambient
Reactor Design Operating Pressure	n/a	Atmospheric
Approximate Reactor Footprint	per unit	12' (D) x 42' (H)
Approximate Total System Footprint	ft^2	2,000
Life Expectancy of System	years	> 20
Expected Outcomes		
Typical % of Plant Influent TP Treated with Pearl® Only	%	15 – 25
Typical % of Plant Influent TP Treated with Pearl® and WASSTRIP®	%	25 – 40
Average Daily Crystal Green Production Capacity Range	lb CG/day	385 – 6,153

Site Layout

The Pearl® system has a footprint of 2,000 ft^2. The conceptual site layout, seen in Figure 3-18, shows where the WASSTRIP® Tank and the Pearl® reactor will be located. The Pearl® reactor will be enclosed in a building, and earthworks and concrete work are not included in the proposal. The WASSTRIP® Tank will be covered and similar in design to a gravity thickener. The Idaho Falls WWTP Process Flow Diagram after Pearl system implementation is shown in Figure 3-19**.**

Figure 3-18 – Proposed Pearl® System Site Layout

Figure 3-19 – Process Flow Diagram with Pearl® Nutrient Recovery System



Estimated Cost

Evoqua has provided a budgetary proposal, see Appendix D. Opinion of Probable Construction Cost can be found in Table 3-20.

Table 3-20 – Pearl® Nutrient Recovery Opinion of Probable Construction Cost

Item	Unit	Quantity	Unit Cost ($)	Subtotal ($)
Civil	LS	1	400,000	400,000
Electrical and Instrumentation and Controls	LS	1	828,000	828,000
Process Mechanical	LS	1	150,000	150,000
Pearl Building (Structural, Architectural, and Building Mechanical)	SF	2000	1,170	2,340,000
WASSTRIP Tank and Mixer	LS	1	560,000	560,000
Pearl Equipment Cost	LS	1	4,140,000	4,140,000
			Estimated Construction Subtotal	**8,418,000**
			Contingency 40%	3,370,000
			Estimated Construction Cost	**11,788,000**
			Engineering 20%	2,360,000
			Legal and Administrative 5%	590,000
			Construction Management and RPR 5%	590,000
			Estimated Soft Costs:	**3,540,000**
			Total Estimated Cost:	**$15,328,000**

There are financial benefits to the Pearl system which are shown in Table 3-21.

Table 3-21 – Pearl® Nutrient Recovery System Financial Benefits

Item	Unit	Value
Value of Ferric Chloride Avoidance	$/year	$242,800
Value of Biosolids Cost Avoidance	$/year	$39,600
Value of Ammonia Removal	$/year	$67,300
Crystal Green Revenue	$/year	$40,200
TOTAL[41]	**$/year**	**$389,900**
Operations Cost	$/year	-$193,660
NET TOTAL	**$/year**	**$196,240**

Impact on Nutrient Load

Figure 3-20 shows secondary influent nutrient load projections after implementation of the Pearl® Nutrient Recovery System. Installation of the Pearl system is estimated to delay exceeding design capacity in terms of TP. The Pearl system would eliminate the need for ferric chloride addition, divert 25 - 40% of total plant TP, and therefore maintain TP to the secondary process within the design capacity of the system through 2045. Without implementation of the Pearl system, ferric chloride will be added to the filtrate return stream, with a reduction of total plant TP estimated between 10 – 21%. Ferric chloride dosing can be adjusted, potentially further delaying exceedance of secondary system design capacity. Installation of the Pearl system would not address the removal of ammonia to the level that is required to not exceed design capacity. The Pearl system is estimated to remove 20% TKN within the filtrate return stream, however this reduction only delays the need for secondary expansion by 1 – 3 years due to the high ammonia loads received in the influent.

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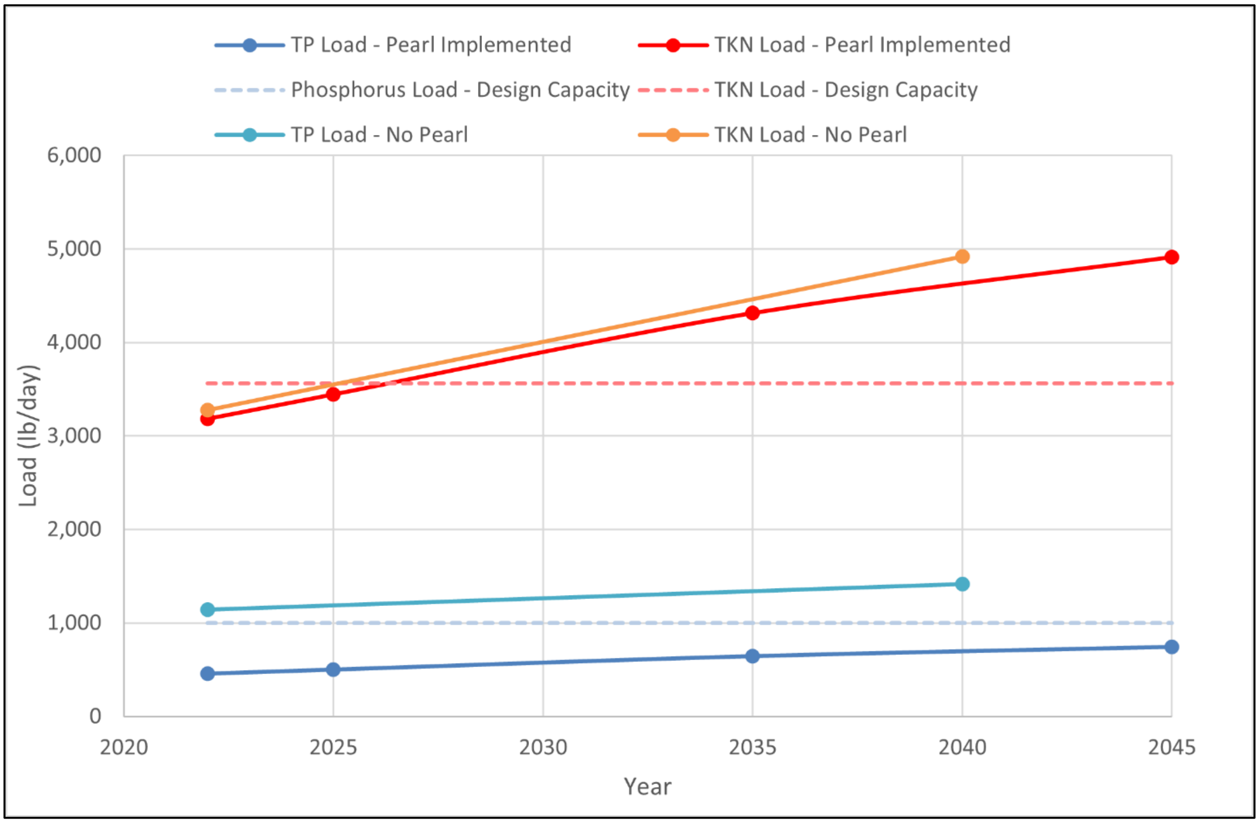
[41] Before factoring in Operations Costs.

Figure 3-20 – Impact on Secondary Nutrient Load after Pearl® System Implementation



3.4.1 Struvite Assessment

Struvite forms in wastewater streams typically after anaerobic digestion as a crystal comprised of ammonia, magnesium, and phosphate. Its ability to precipitate crystals and rock-like formations that clog pipes and equipment, therefore restricting flow, makes Struvite a nuisance. The City has indicated the main area of struvite buildup is in the digesters which experience granular buildup. This buildup accumulates, negatively impacts mixing, and increases digester cleanout frequency.

There are a few potential locations at the WWTP where struvite formation could pose an issue to new improvements. One location may be the filtrate equalization storage tank with mixing as conditions in the tank could lead to struvite formation. Another location that struvite may persist is at the flow control valve prior to ferric chloride metering into the filtrate stream.

To mitigate nuisance struvite formation, a common solution that many WWTPs implement is addition of ferric chloride in or after anaerobic digestion. As a part of the ongoing Dewatering Upgrade Project, a metal-salt coagulant dosing system is being installed, utilizing ferric chloride. In addition, other mitigation options should be considered such as taps for struvite mitigation chemicals, cleanouts, correct piping material selection, and reducing the number of bends or joints in the piping.

The City has the option to dose ferric chloride before dewatering processes, seen on the process flow diagram (MSA, Inc., 2022). Therefore, the filtrate equalization tank would reduce struvite formation, and furthermore the filtrate stream may not cause struvite buildup on the flow control valve or its piping. Ferric chloride can be dosed in two locations for two purposes: to chemically reduce phosphate in the filtrate return stream and to prevent struvite formation in the digested sludge stream, protecting piping and equipment integrity of the downstream dewatering process. Ferric chloride dosage is adjustable and is controlled by the WWTP.

If struvite formation persists within the digesters, another mitigation strategy could be to add another dosage point, tying in before digestion, where ferric chloride can be dosed to reduce hydrogen sulfide as well. Please refer to the Process Flow Diagram for visualization of the chemical dosing locations implemented by the current dewatering project (MSA, Inc., 2022).

The Pearl® system with its WASSTRIP tank ahead of digestion would mitigate struvite formation, a main benefit of the Nutrient Recovery system. The Pearl system recovers phosphorus from the dewatering and thickening centrate streams before they accumulate as nuisance struvite further down the treatment process.

3.4.2 Sidestream Recommendations

The combined influent nutrient loads to the WWTP, along with additional nutrients contributed by the new dewatering system's filtrate return stream, are anticipated to exceed plant capacities in less than ten years. Rerouting filtrate return to a location upstream of the primary clarifiers was considered as a near-term measure, however this was explored during the dewatering project and determined to be infeasible. In order to avoid overloading plant capacity for nutrient treatment in the near term, the following steps are recommended:

1. Update existing, or develop new, calibrated, and validated biological process model for the secondary treatment process. Use this model to: confirm nitrification capacity of existing system; better understand anticipated impacts of the filtrate return; confirm capacity of the existing secondary system; and consider recommended capacity upgrades.
2. Initiate planning and design of a sidestream treatment process to minimize return nitrogen loading to existing secondary treatment process. Alternately, the City could initiate planning and design for expansion of the secondary treatment process.

While the WASSTRIP® and Pearl® systems would recover a valuable product and allow the City to discontinue use of ferric chloride, the $15M expenditure may not be a high priority for near-term capital investment given other needs at the treatment plant.

3.5 DISINFECTION ALTERNATIVES

Disinfection systems are the last line of defense to meet regulatory compliance, environmental stewardship, and community safety. Disinfection removes bacteria, viruses, and protozoan cysts that present a health and safety risk to humans. Disinfection is the primary mechanism for inactivation and/or destruction of pathogenic organisms that spread waterborne diseases. Disinfection efficacy of a selected process is often measured using indicator organisms that exist in high quantities where pathogens are present.

The City of Idaho Falls WWTP effluent is discharged to the Snake River under a National Pollutant Discharge Elimination System (NPDES) permit. Table 1-8 summarizes the current effluent disinfection limitations prior to discharge and monitoring requirements.

To meet these requirements, the WWTP currently disinfects treated secondary effluent using chlorine gas. The chlorination system was largely installed in its current configuration as part of upgrades to the facility in 1993. The Condition Assessment within Chapter 2 provides additional background information on the existing chlorination system.

This section explores alternative disinfection methods and technologies for application at the WWTP with a primary goal of increasing safety for plant operations and minimizing operating costs. As part of the evaluation for each alternative, design and operational considerations were evaluated and a net present worth cost analysis was conducted.

3.5.1 Ultraviolet (UV) Disinfection

The primary function of a UV disinfection system is to inactivate microorganisms so they cannot reproduce. UV disinfection systems have become an effective, well accepted method for disinfecting wastewater. Many WWTPs have been converting to UV disinfection because it provides a safer option when compared to chlorine gas disinfection.

UV light is classified as electromagnetic waves with a wavelength of 40 to 400 nanometers (nm) and is typically generated by applying voltage across a gas mixture. UV radiation wavelengths are categorized into four segments which include UV-vacuum (100-200 nm), UV-C short-wave (200-280 nm), UV-B middle-wave (280-315 nm), and UV-A long-wave (315-400 nm). The germicidal UV light wavelengths range from 200 to 300 nm, with the optimum germicidal effect occurring at 253.7 nm.

UV disinfection is a physical process that uses photochemical energy to damage cellular proteins and nucleic acids in order to prevent replication. UV photons penetrate the cell wall of microorganisms and react with nucleic acids (e.g., DNA, RNA) to distort the normal helical structure. As a result of this reaction, the normal cell activities such as cell synthesis and division are disrupted. A cell that cannot replicate cannot infect a host and cannot reproduce. Variations in DNA structure cause microorganisms to absorb UV light differently. As a result, in differing DNA structures between pathogens, a given UV light dose affects a level of inactivation specific to a particular pathogen. The pathogens most resistant to UV disinfection found to date are viruses, followed by bacteria, *Cryptosporidium*, and *Giardia*.

The effectiveness of UV disinfection depends on the UV dose that the microorganisms are exposed to. The UV dose, D, is defined as the average intensity of the UV lamp(s) (typically reported as milliwatts per centimeter squared, mW/cm^2, or millijoules per centimeter squared, mJ/cm^2) multiplied by the exposure time, t, in seconds. The concept of UV dose is similar to CT of chemical disinfection systems and can be varied by changing either the exposure time or average UV intensity.

A cell damaged by UV light cannot infect a host, however, cell metabolism will continue to function after exposure to UV light at levels consistent with those in most disinfection systems. To completely cease cell metabolism, a UV dose orders of magnitude greater than that to prevent cell replication would be required. UV disinfection for wastewater applications is best defined as “inactivating” microorganisms such that they are no longer able to reproduce. UV disinfection for wastewater applications does not result in sterilization of process water.

Process Description

A UV disinfection system generally consists of:

1. UV lamps
2. Transparent quartz sleeves that surround the UV lamps
3. Sleeve cleaning system
4. The structure that supports the lamps and sleeves and holds them in place
5. Water level control
6. UV intensity sensors
7. UV transmittance analyzers
8. Flow measurement
9. The power supply for the system
10. Lifting devices

UV Lamps

There are two main types of UV lamps used in disinfection applications, both are based on mercury vapor discharge. The two lamp types are commonly referred to as *low-pressure* and *medium-pressure mercury vapor* UV lamps. The low-pressure UV lamp operates at a relatively low internal mercury vapor pressure and a low temperature. The UV light emitted is essentially monochromatic and is focused at the 253.7 nm wavelength (the germicidal wavelength). These lights are similar in design and operation to household fluorescent lamps. These lamps are typically used for smaller wastewater flows where the number of lamps can be reduced and where UVT is not a significant limiting factor.

Newer low-pressure high-output (LPHO) lamps are similar to the low-pressure mercury vapor lamp, but operate under higher electrical input, resulting in a higher UV intensity output. These lamps are also essentially monochromatic. The higher UV intensity output results in fewer lamps needed for higher flows and lower water quality conditions. These lamps include a mercury amalgam on the inside of the lamp which helps control the vapor pressure and allow the low-pressure output at 253.7 nm but at the higher intensity than is possible without the amalgam.

The medium-pressure lamp is also a mercury vapor lamp but operates at a higher internal pressure, higher temperature, and greater electrical input than low-pressure lamps. This results in a polychromatic output of UV light, including wavelengths outside the germicidal range. The germicidal efficiency of medium-pressure lamps is approximately 10 to 15%. These lamps are less germicidally efficient than low-pressure, but the UV output is 10 to 50 times greater than the germicidal UV output of traditional low-pressure lamps, and 4 to 10 times greater than the germicidal output of LPHO lamps. Higher UV output results in a more compact design with fewer lamps for the equivalent effect. Along with being less efficient, the medium-pressure lamps also create heat, which sometimes results in fouling issues. Medium pressure lamps are less common at WWTP due to these operational and maintenance reasons.

The most common technology applied in the wastewater treatment industry is traditional low-pressure and LPHO lamps. A significant driver for this is the advancement of higher UV output lamps resulting in fewer lamps required to achieve UV disinfection, and the advantages of monochromatic light emission, which mitigates the potential for biofouling of the UV equipment. Table 3-22 summarizes the characteristics of mercury UV lamps.

Table 3-22 – Characteristics of Mercury UV Lamps

Characteristic	Low Pressure	Medium Pressure	Low Pressure, High Intensity (LPHO)
UV Output	Monochromatic	Polychromatic	Monochromatic
Input Power (watts/lamp)	200 - 400	1,300 - 5,000	600 - 1,000
Germicidal UV (% of input)	35 - 42	8 - 12	31 - 35
Temperature (C)	100 - 200	600 – 900	100 – 200
Lamp Life (hours)	8,000 – 12,000	5,000 – 10,000	14,000 – 15,000
Number of Lamps (relative to MP)	4-8	1	1
Footprint	Medium	Small	Small

Quartz Sleeves

Most UV lamps are equipped with a quartz sleeve. The sleeve sits in the water around the UV lamp and keeps the lamp dry, insulated and protected. As lamp sleeves age, transmittance decreases. The sleeves can also fracture due to internal stresses, or external forces such as mechanical cleaners or reactor hydraulics. External fouling of the lamp sleeve results from the deposition of material from the treated water. External fouling can be controlled with sleeve cleaning mechanisms, and sometimes requires removal and spraying/washing with a mild acid.

UV Sleeve Cleaning System

Sleeve cleaning systems remove fouling material that may build up on the quartz and absorb or scatter UV light produced by the lamps. Cleaning systems can be manual or automated. They can be pneumatically or hydraulically driven. Some UV system technologies include a dual mechanical/chemical sleeve cleaning system. The chemical is typically a mild acid such as citric acid or phosphoric acid (CLR or Lime-Away).

UV Channels or Reactors

UV systems are often classified as either open-channel flow systems or closed-vessel pressurized systems. Closed-vessel systems are most common for drinking water applications, while open-channel flow systems are most commonly used for wastewater applications. Closed vessels can be used for wastewater systems that are pumped, for example downstream of a membrane system. UV systems are sometimes limited in the number of banks that can be placed in series due to the hydraulic losses through each bank.

UV Modules or Lamp Racks

UV modules or lamp racks are a grouping of horizontal, vertical, or inclined oriented lamps and represent the smallest unit configuration that can be removed from an open-channel UV system.

UV Lamp Banks

Several lamp modules make up a bank. A UV bank typically spans the width of the disinfection channel and is held together by a support structure. A bank of lamps typically operates independently from the other banks of lamps within the UV channel or reactor. Combined with options for more than one channel, UV banks can also provide system redundancy.

Water Level Control

Level control is a critical component of the UV system. The water level controller is typically a fixed weir or a modulating weir gate. The primary purpose is to keep the water level above the lamps near constant. It is critical to maintain a constant water level in order to avoid exposing the uppermost UV lamps (low water level) or reducing the disinfection effectiveness (high water level). For new UV installations, fixed weirs are recommended where plant hydraulics will allow. This needs to be evaluated further when developing a design for UV disinfection.

UV Intensity Sensors

A submersible UV intensity sensor is installed for every bank of lamps to continuously monitor the UV light intensity produced in each bank. The sensors provide feedback to the control system on the UV intensity delivered to the process stream. UV intensity varies depending on lamp power, lamp age, sleeve age, sleeve fouling and UVT. Newer UV control systems now include technology to automatically increase/decrease power to the lamps based on real time intensity measurements in lieu of more static comparisons to end of lamp life values. This can result in lower operating costs.

UV Transmittance Analyzer

The UV system will include a UVT analyzer or analyzers to continuously monitor upstream water quality. Real-time measurements are passed to the UV control system as an input to modulate system power to meet the dose requirements. Where effluent from multiple upstream processes is blended at the UV system influent, multiple UVT analyzer may be beneficial to operate the UV system based on the lowest influent water quality conditions.

Flow Measurement

The UV system will include flow measurement for each UV channel or train to confirm the flow and water level in the channel is operating within the UV equipment validated range. Historically, flow measurement is used as a primary control in the dose delivery algorithm. Newer UV control systems operate on a dose-paced approach by combining flow measurement with real-time UV-intensity sensor readings to optimize energy to meet disinfection requirements.

UV System Power Supply Equipment

Ballasts (transformers) limit the current drawn by the lamp arc discharge and provide the correct voltage for lamp operation. Ballasts can be magnetic or electronic. Magnetic ballasts are the most common type used for medium-pressure lamps because of their durability and operating stability. However, a magnetic ballast limits the level of power adjustment which limits turn-down capacity. Electronic ballasts behave like a switching power supply, and offer increased efficiency, are smaller in size and weight over magnetic ballasts, and allow for continuous power adjustment. A single ballast typically powers two lamps. Ballasts are located in a power distribution center enclosure typically located adjacent to the UV channel or reactor.

UV System Lifting Devices

A monorail or crane may be required for removal of the UV modules for periodic cleaning and maintenance. Some UV system technologies include a lifting mechanism built into the module to articulate the module out of the channel using hydraulics. Where lifting devices are not integral to the UV equipment, a monorail or crane is recommended for equipment removal and maintenance.

System Design and Operational Considerations

Several design and operational parameters must be considered when evaluating and developing a design for UV disinfection. These are summarized below.

Water Quality

The efficacy of UV disinfection is strongly dependent on influent water quality. Constituents in the water can impact the amount of UV electromagnetic energy reaching target organisms by acting as a shield or absorbing or scattering the UV light. These water quality parameters include solids (measured as particles by count or size, turbidity, and total suspended solids, or TSS), dissolved organic carbon, color, hardness, and iron. Other parameters that may impact UV disinfection include some organic and inorganic compounds that absorb UV light and reduce the UV transmittance (UVT) of the water being treated. Generally, water quality parameters such as pH, temperature, alkalinity, and total inorganic carbon do not impact the overall effectiveness of UV disinfection. Hardness affects the rate of lamp fouling, but automatic lamp cleaning systems incorporated on most UV equipment technologies today have minimized the impact on UV system design and operation.

UVT is the best indicator of how well the water matrix will transmit light for disinfection. Higher UVT corresponds to high transmittance and good clarity. The lower the UVT value, the poorer the water quality. Low UVT waters can be effectively disinfected by UV light, but this will result in higher capital and operating costs. Typical UVT values for wastewater applications are in the range of 50% to 75%. Design UVT values are based on meeting disinfection criteria at the lower 10th percentile with duty equipment in operation and meeting the remaining low UVT scenarios with redundant equipment in operation. For the purposes of this evaluation, the planning team assisted the City in collecting discrete wastewater samples for evaluation by three major UV System Suppliers for bench scale collimated beam analysis. The results of the discrete sampling indicate the UVT of the secondary effluent was 57.3%, 63.4%, and 66%. These results are within the typical range for wastewater applications, but on the lower end. The City is encouraged to begin collecting online UVT data from the effluent of the three clarifiers to build a history for future design development. UVT can be influenced by seasonal and diurnal variations, secondary processes (such as clarifier upsets), upstream chemical dosing, industrial discharges into the WWTP, and sidestream flows. Evaluating historical UVT data with bench scale collimated beam testing provides the best picture for understanding the ability of a UV system to perform and the cost of that performance. For example, even a 5% increase in the design UVT value (based on historical sampling results) will typically result in a significant reduction in the size of UV equipment to meet the same disinfection requirements. Without historical UVT values, a detailed evaluation of water quality parameters that might impact UV disinfection cannot be achieved.

Hydraulics

UV disinfection systems are designed using peak hourly flow rates. The UV disinfection system should perform as a plug flow reactor. Flow should be laminar and evenly distributed through the array of lamps. Open channels are always designed in parallel. Consideration must be given to providing standby banks and standby channels, providing a reliable method to ensure UV lamps are submerged such as downward opening weir gates, sharp-crested weirs, and automatic level controllers, and providing positive controls to ensure the flow is equally distributed between units. Channel depth and system headloss must be considered as well. Typically, UV systems require 12-18 inches of headloss that must be accounted for in the overall treatment train hydraulics. This will need to be evaluated as part of a UV disinfection project design. Future expandability should also be considered. The facility footprint and channels need to be designed to include the future required dimensions for build-out, especially if the UV system is installed in a building. Future expansion can be accommodated by adding more banks in series, and/or adding more parallel UV channels.

Table 3-23 presents the advantages and disadvantages of using UV disinfection system.

Table 3-23 – The Summary of Advantages and Disadvantages of Using UV Disinfection

Advantages	Disadvantages
• Non-chemical nature, subsequently no dechlorination process is required. • No disinfection byproducts (DBPs) are formed. • Effective on a wide range of pathogens, including those resistant to chlorination (e.g., Cryptosporidium and Giardia) • Safe for operators, no chemical handling is required. • Easy installation and handling. • Does not change the taste and odor of water. • UV control systems are typically completely automated such that operators do not need to adjust the dose or operation of the units.	• Particulate matter present in the secondary effluent can interfere with the transmission of UV light. Therefore, a pre-filter may be beneficial for water with high turbidity. • Photoreactivation and dark repair of microorganisms may take place, especially if effluent discharge piping is lengthy. • High levels of dissolved solids such as nitrate, iron, and natural organic matter in water increase the absorptivity of the water causing a need for higher UV energy input. The presence of these would be detected by UVT sampling. • No chlorine residual in water distribution network. If nonpotable water is used around the WWTP it may be advisable to have a small sodium hypochlorite or tablet dispensing system to provide chlorine residual and prevent re-growth. • New infrastructure may be required to provide proper hydraulics for system design and operation. This will be a large capital cost compared to other methods presented herein.

3.5.2 Sodium Hypochlorite Disinfection

Sodium hypochlorite (NaOCl) is available commercially at 10 to 15 percent solution (high strength). It can also be generated onsite at 0.8 percent solution (low strength) with specialized equipment. Due to concerns about the risks associated with the handling and storage of chlorine gas, NaOCl is often considered a better alternative depending on the scale of the application. This section will summarize some of the process kinetics as well as some of the design and operational considerations with the use of NaOCl to meet disinfection requirements.

Process Description

High strength NaOCl is a concentrated and potent chlorine solution. Sodium hypochlorite hydrolizes to form hypochlorous acid (HOCl) and sodium hydroxide (NaOH) as follow:

$$NaOCl + H_2O \rightarrow HOCl + NaOH$$

Ionization of hypochlorous acid to hypochlorite ion (OCl^-) readily occurs in water as below:

$$HOCl \rightarrow H^+ + OCl^-$$

The available free chlorine in the water is the total quantity of hypochlorite ions and hypochlorous acid. The germicidal activity of a sodium hypochlorite solution depends on the concentration of HOCl due to its ability to penetrate into microbial cell walls and membranes and neutralize the microbial cells. This results in cell lysis, which is a key differentiator to UV disinfection as the microorganism does not survive the chlorination process. Chlorination results in an irreversible reaction with the enzymatic system of the microorganism.

Design and Operational Considerations

Several design and operational parameters must be considered when evaluating and developing a design for NaOCl disinfection. These are summarized below.

Water Quality

Water quality is a key consideration for chlorine disinfection. The secondary effluent contains oxidizable substances such as nitrogen components (e.g., ammonium, ammonia, and nitrate), organic matter, hydrogen sulfide (H2S), Fe^{+2}, and Mn^{+2}. These substances readily react with hypochlorous acid (HOCl) and reduce the availability of free chlorine. The amount of chlorine required for the oxidation of these substances is called chlorine demand. When chlorine reacts with ammonia, monochloramine (NH_2Cl), dichloramine ($NHCl_2$), and trichloramine (NCl_3) are formed. The sum of chloramines, dichloramines, and trichloramines is defined as the combined available chlorine. The sum of the free and combined chlorine is the total available chlorine.

Contact Time

The main objective of chlorine contact basins is to ensure adequate contact time is given for effective disinfection. The required chemical dosage is estimated by considering the initial chlorine demand of the secondary effluent, decay during the contact time, and the chlorine residual.

Bulk Storage

The stability of NaOCl is highly affected by factors which can accelerate the rate of its decay including the strength of solution, the temperature and pH at which it is stored, sunlight exposure, and the presence of certain heavy metals, specifically copper and nickel. NaOCl readily decomposes at high concentrations, lower pH, and higher temperature. Therefore, it is recommended to store the solution in a cool location and a corrosion resistant tank. It is also recommended to only store volumes for relatively short durations. Half of the NaOCl can be degraded in 30 days of storage at summertime temperatures.

Chemical Dosing Equipment

Sodium hypochlorite is typically dosed using metering pumps. The dosing system includes metering pumps that are often mounted on prefabricated compact skids with all relevant accessories attached. The dosing rate can be flow paced. Chlorine contact, dosing strategy, and monitoring requirements are identical to those used with gaseous chlorine.

Advantages and disadvantages of using sodium hypochlorite as a disinfectant are summarized in Table 3-24.

Table 3-24 – Advantages/Disadvantages of Sodium Hypochlorite as a Disinfectant

Advantages	Disadvantages
• Reducing the hazards associated with the handling and storage of chlorine gas. • Relatively low chemical and power costs. • Dosing can be adjusted with the flow rate of the effluent stream. • The chlorination process is currently in use and well understood by operators. • Option for onsite generation may stabilize supply costs and reliability concerns.	• Dechlorination system is still required. • Higher storage volume is needed as compared to gaseous chlorine for disinfecting the same volume of wastewater. • NaOCl is an alkaline solution (it carries residual NaOH per manufacturing method) and causes calcium to precipitate, which can lead to clogging problems in the disinfection equipment. • At higher pH, the dominant species is hypochlorite ion which is not as effective as hypochlorous acid. • NaOCl decomposes to generate hydrogen gas, which can cause loss line blockage or pipe rupture of chemical flow while feeding. Venting systems must be incorporated into the design to account for the off gassing. • Disinfection by-products are produced. May require downstream THM reduction process if effluent limits dictate. • Not effective at deactivating *Giardia Lambia* and *Cryptosporidium* • Safety and handling considerations. • System is reliant on chemical deliveries.

3.5.3 Peracetic Acid Disinfection

Peracetic acid (PAA) is a powerful oxidizing agent that is gaining a great deal of interest as an alternative to chlorine disinfection due to its ability to disinfect bacteria at a cost that is competitive with other treatment methods. Currently there are five suppliers in the market. In general, PAA systems require a smaller footprint than chlorine gas or NaOCl disinfection systems because it requires a smaller chemical dose to bring bacteria levels below regulatory requirements. Retrofit of existing chlorination systems is often feasible and economical. This section will summarize some of the process kinetics as well as some of the design and operational considerations with the use of PAA to meet disinfection requirements.

Process Description

Peracetic acid (CH_3COOOH) is a liquid oxidizer and disinfectant present only in equilibrium with acetic acid, hydrogen peroxide and water. To manufacture PAA, a catalyst must be used to force the reaction and allow stabilization. PAA is a clear, colorless liquid with no foaming formation. It has a strong pungent acetic acid odor (acetic acid is the principal component of vinegar).

$$CH_3COOH\ (acetic\ acid) +\ H_2O_2(Hydrogen\ peroxide) \leftrightarrows CH_3COO-OH(PAA) +\ H_2O$$

The most common and highest concentrations of PAA currently available for wastewater disinfection applications are 15 percent and 22 percent. As a disinfectant, PAA disrupts the outer cell membrane of microorganisms resulting in cellular lysis and therefore neutralization. Like chlorination, disinfection by PAA results in an irreversible reaction with the enzymatic system of the microorganism, which is a key differentiator to UV disinfection as the microorganism does not survive the PAA process. In wastewater facilities, average feed dosages of PAA between 1 and 3 mg/L are typically required to achieve disinfection. PAA is known as a "fast acting and short lasting" disinfectant as it neutralizes microorganisms quickly, but it leaves low to no chemical residual in wastewater effluents. The properties of 15% PAA are summarized in Table 3-25.

Table 3-25 – Properties of PAA Formulation

Property	Weight PAA (%)	Weight of H_2O_2 (%)	Weight of acetic acid (%)	Weight available oxygen (Wt, %)	Specific gravity
PAA 15%	14-17	13.5-16	28	9.3-11.1	1.12

Design and Operational Considerations

Several design and operational parameters must be considered when evaluating and developing a design for PAA disinfection. These are summarized below.

Bulk Storage

PAA should be stored at ambient temperature out of direct sunlight. PAA begins to decompose above 100 deg F. In arid environments, it should be stored indoors and maintained at less than 100 deg F. Of the commercially available products, freezing temperatures vary with formulation. Freezing temperatures range from -58 to 17 deg F.

It is important all dosing and storage equipment is comprised of PAA compatible materials; the best materials for construction for PAA services are 316 stainless steel or PTFE/PVDF/HDPE.

PAA is also an organic peroxide, and if contaminated can rapidly degrade. Accordingly, it should be stored in its delivery container and is less suitable for bulk chemical delivery and storage. However lower doses are required and typically tote systems suffice for storage and feed.

Chemical Dosing Equipment

PAA is typically fed neat. Dilution prior to injection is not recommended because the product begins to react immediately upon contact with contaminated water. PAA feed is controlled with a flow-paced diaphragm or peristaltic pump and residual monitoring.

Effluent Concentrations

PAA systems do not typically require the effluent residual to be quenched. The EPA recommends that effluent residuals be less than 1.0 mg/L. Some local jurisdictional requirements do require quenching so this must be resolved on a case-by-case basis.

Table 3-26 summarizes the advantages and disadvantages of using peracetic acid as a disinfectant.

Table 3-26 – Advantages/Disadvantages of PAA as a Disinfectant

Advantages	Disadvantages
• Has a greater electrochemical oxidation potential than chlorine and hypochlorite; it will oxidize a greater fraction of TOC • Can be flow paced and adapts well to changes in flow rates • Does not create harmful disinfection by-products • Chlorine infrastructure can be adapted for PAA • Does not increase toxicity in effluent • PAA is typically fed low doses and stored in totes; bulk delivery may not be required • PAA does not degrade like NaOCl, with an estimated shelf life of 12 months • Typically does not require quenching, although this varies by jurisdiction • Effective over a wide pH range • Dosage required to achieve disinfection is lower than alternative disinfectants (1-2 mg/L) • Does not increase TDS or conductivity	• Unstable and may decompose back to its original constituents at high temperature • Does not disinfect all organisms equally well. It is effective against coliform bacteria but is weaker against viruses • Adds organic carbon and BOD to the effluent • Chemical unit costs are higher than NaOCl, and there are relatively fewer sources. PAA is not yet available locally in Idaho • PAA is a newer technology and will require coordination and approvals with DEQ

3.5.4 Summary of Alternatives

The alternatives considered and evaluated for replacing the existing gaseous chlorine disinfection system include:

1. Convert to UV Disinfection
2. Convert to Sodium Hypochlorite Disinfection
3. Convert to Peracetic Acid Disinfection

Each alternative is summarized below in greater detail. General design criteria applied to all three alternatives is also summarized.

Disinfection Requirements

Each disinfection technology proposed is sized to meet the existing effluent permit requirements. These are summarized in Table 1-8 above.

Flow Criteria

Design flows for each alternative are based on the 2045 future flows presented in Section 1.5.3 – Future Flows. These are summarized in Table 3-27 below.

Table 3-27 – Summary of Disinfection Design Flows for Idaho Falls WWTP

Flow Regime (MGD)	Total Flow to WWTP
Average Annual Day	15.5
Maximum Month	16.1
Maximum Day	21.0
Peak Hour	44.6

The design flow for the disinfection system alternatives is 45 MGD based on the peak hour flow condition. This does not consider flows from recycle streams. These are anticipated to be small, but the final design flow of an alternative disinfection system will need to consider recycle streams.

Alternative 1 – Convert to UV Disinfection

There is a diverse line-up of UV disinfection technologies for wastewater application in the industry today. The planning team considered and evaluated these technologies and developed a short list to select the best options for replacement of the existing gaseous chlorine disinfection system. This exercise included the evaluation of open channel systems available from GlascoUV, Trojan Technologies, and Xylem Wedeco. This alternative is broken down into three sub-alternatives corresponding to each vendor technology. Summaries of each proposed UV disinfection system are included below, along with general UV design criteria applied to all three UV System Suppliers (UVSS).

UVT Design Basis

A preliminary design UVT of 55% is recommended based on this evaluation, subject to confirmation from future UVT monitoring data. All sizing for the technologies discussed below is to be based on this value.

UV Dose Development

For this evaluation, bench scale testing was performed by all three UVSS. This testing was performed using a collimated beam apparatus to assess bacteriological dose-response of a single secondary effluent sample, and then used to develop a bioassay dose recommendation. Collimated beam results cannot be used alone for full-scale design. These doses are considered best-case dose-response data for a small non-turbulent and evenly applied dose on a known volume. The UVSS dose recommendations are reduction equivalent doses (RED) that are developed per industry UV technology validation requirements based on bioassay results (for MS2 bacteriophage), full-scale efficiencies, and challenge organisms (other microbial organisms used as surrogates for regulated organisms). The methodology takes collimated beam results and correlates them with challenge organisms at full-scale to predict the required dose to achieve the specific treatment goal. These bench scale doses are adjusted based on specific technologies and configurations, which allow variables such as non-uniform flow and non-uniform UV intensity to be addressed.

RED methodology addresses dose variability within the UV reactor, but it still does not address other considerations that affect full-scale performance. It is common for bioassay doses to need additional factors of safety applied to ensure consistent full-scale performance. This ensures that UV systems achieve regulatory requirements and process performance goals despite non-ideal and variable conditions in treatment facilities.

All three UV System Suppliers recommend a UV dose of 30 mJ/cm^2. This is the RED based on bench scale bioassay and comparison to industry requirements for wastewater applications. It also meets the Idaho Department of Environmental Quality minimum dose requirements of 30 mJ/cm^2. In the absence of pilot or full-scale data, it is challenging to select a dose that ensures consistent long-term performance. At best, the bioassay dose recommendation establishes the low range of a performance envelope that can be tested at full-scale for process optimization.

Reliability and Redundancy

There are two common approaches to equipment reliability and redundancy for UV systems. One approach is to install redundant equipment in a channel. This approach allows for equipment to be removed from the channel for maintenance without requiring a shutdown.

The second approach is to provide a fully equipped standby channel. This approach generally requires more capital cost than the redundant equipment option, but it has the benefit of allowing the entire channel to be taken down for maintenance, and it does not require as much redundant equipment.

For the purposes of this evaluation, it is recommended that UV channels include duty equipment only and that one standby channel be considered.

Alternative 1a – GlascoUV

GlascoUV is proposing an open channel vertical array UV technology (model VC-16-A800X2 / VC-8-A800 x1). This technology includes vertical modules with automatic cleaning and low-pressure high intensity amalgam lamps. Each bank of lamps can be dimmed or shut off for turndown functionality. For the WWTP, ten (10) VC-16-A800 modules and five (5) VC-8-A800 modules are required per channel. The proposed technology by GlascoUV will introduce an additional headloss of approximately 3-inches at peak flow conditions to the overall plant hydraulics. This alternative requires the lowest headloss when compared to other UV technologies. This is the result of the vertical lamp array. A comparison of each proposed UV technologies is provided in Table 3-31 below.

GlascoUV is proposing an option to retrofit the existing chlorine contact chamber for each clarifier with the vertical array UV technology (Figure 3-21). This could be a significant advantage to minimize capital costs over other UV technologies that will require a dedicated UV facility. This will require structural modifications which will need to be carefully considered to ensure the existing infrastructure can support the retrofit. Another key consideration is the hydraulics of the chlorine contact chambers. Flow should be laminar and evenly distributed through the array of UV lamps. The circular flow path of the existing channels may result in differences in flow velocity through the array of lamps, which may result in different levels of exposure to UV light. A careful consideration of chlorine contact chamber hydraulics is recommended, including computational fluid dynamics (CFD) evaluations when considering this option. This section does not include this level of evaluation. Therefore, Alternative 1a was evaluated considering a new standalone UV facility to be consistent with the other two proposed technologies.

Figure 3-21 – Glasco UV Disinfection Technology Overall Layout[42]

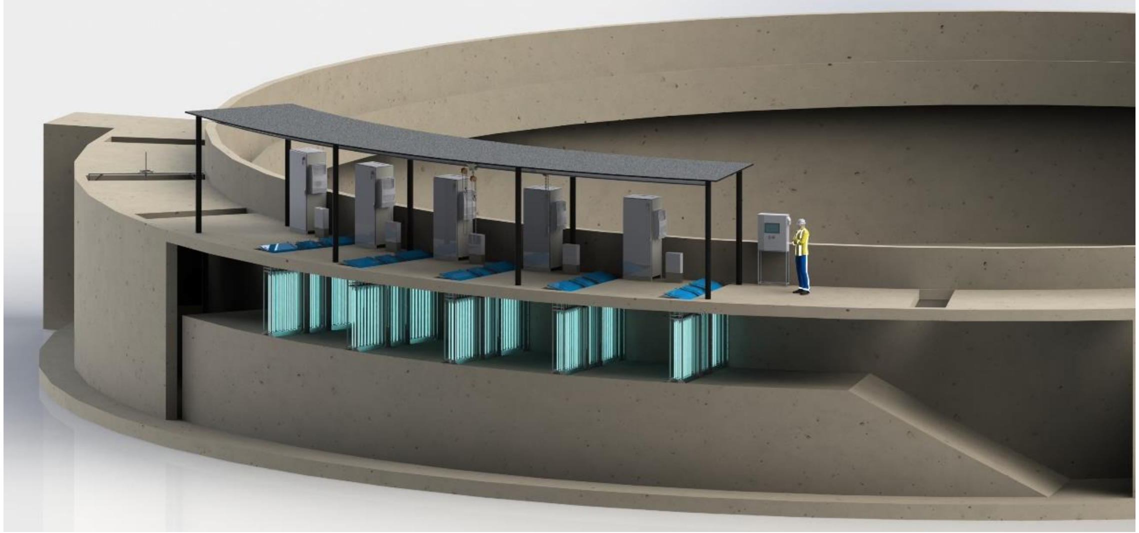


Table 3-28 presents the advantages and disadvantages of the proposed GlascoUV disinfection technology.

Table 3-28 – GlascoUV Technology Advantages and Disadvantages

Advantages	Disadvantages
• 16,000-hour lamp life • Easy lamp change • No underwater seals to be maintained • Flow pacing and lamp dimming technology included in control system • Automatic cleaning system included • Potential to re-use existing chlorine contact chambers	• Lower wattage lamps require more total lamps and more total energy usage over other UV technologies • Overhead monorail or rolling gantry may be required to remove modules for longer term maintenance and replacement. • Hydraulics of reusing existing chlorine contact chambers may present challenges • May require a new standalone UV facility

Alternative 1b – TrojanUVSigna™

Trojan Technologies is proposing their UVSigna™ technology (Figure 3-22). The UVSigna™ lamps are configured transverse to the direction of flow and are grouped by four or six lamps per row. Multiple rows in series make up a reactor. Individual rows are staggered in the reactor for better dose distribution. The UVSigna™ allows for more tolerance in head loss through the disinfection system and incorporates an additional feature called a “Light Lock” to minimize short circuiting of flow past the UV lamps. The UVSigna™ system uses the Solo lamp technology. This lamp requires an input power of 1000-watts, generates higher output intensity than other UV lamp technologies, and is rated for 15,000-hours of continuous operation. This amounts to significantly fewer lamps for the UVSigna™ system compared to other UV technologies. For the WWTP, Trojan is proposing three duty channels and one redundant channel. Each channel will include

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[42] Courtesy to GlascoUV Budget Proposal

three duty banks, each with 16 lamps for a total of 48 lamps per channel. The proposed system requires 144 duty lamps and includes 48 redundant lamps for a total system count of 192 lamps. The UVSigna™ technology will introduce an additional headloss of approximately 1-foot at peak flow conditions to the overall plant hydraulics, which appears to leave approximately 8-inches of drop at the final clarifier weir. This will need to be evaluated in greater detail as part of a UV disinfection project design. A comparison of each proposed UV technologies is provided in Table 3-31 below.

Figure 3-22 - Trojan UVSigna Disinfection Technology Overall Layout[43]

Table 3-29 presents the advantages and disadvantages of the proposed TrojanUVSigna™ disinfection technology.

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[43] Courtesy to TrojanUVSigna Budget Proposal

Table 3-29 – TrojanUVSigna™ Technology Advantages and Disadvantages

Advantages	Disadvantages
• 1,000-watt lamp results in fewer lamps than other UV technologies • Easy lamp change • Automatic raising mechanism included. No crane or external lift required • Flow pacing and lamp dimming technology included in control system • Automatic dual-cleaning (chemical/mechanical) system included • Light lock technology included to mitigate short circuiting of flow above the top of lamps • Lamp plugs with LED status indicators and integral safety interlock prevent an operator from accidentally removing an energized lamp	• Lamp life of 15,000-hours is less than other UV technologies • Requires a new standalone UV facility

Alternative 1c – Xylem Wedeco Duron 8

Xylem Wedeco is proposing their Duron 8 technology (Figure 3-23). The Wedeco Duron 8 is an open-channel UV disinfection system for wastewater applications. It is designed with their Ecoray UV lamp technology, incorporates an integral module lifting mechanism for simple and fast maintenance. For the WWTP, Wedeco is proposing two duty channels and one standby channel. Each channel will include three duty banks and one standby bank. Each bank will include 40 lamps for a total of 160 lamps per channel. The Wedeco Duron 8 technology will introduce an additional headloss of approximately 1-foot at peak flow conditions to the overall plant hydraulics, which appears to leave approximately 8-inches of drop at the final clarifier weir. This will need to be evaluated in greater detail as part of a UV disinfection project design. A comparison of each proposed UV technologies is provided in Table 3-31 below.

Figure 3-23 – Xylem Wedeco Duron 8 Disinfection Technology Overall Layout[44]

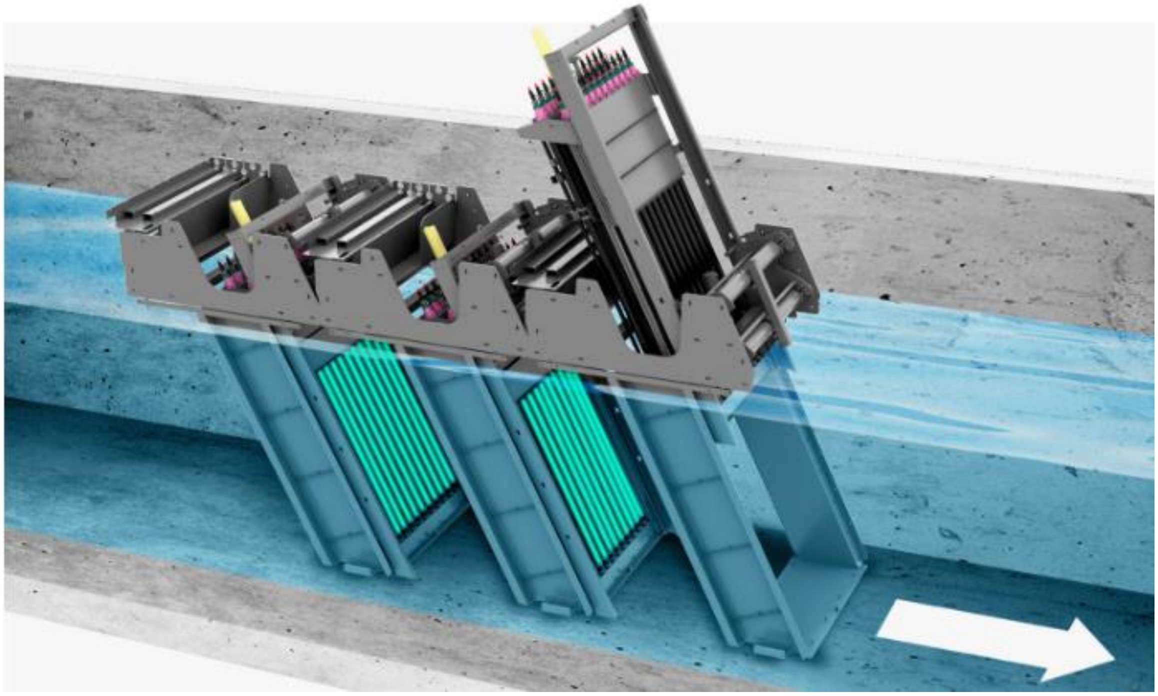

Table 3-30 presents the advantages and disadvantages of the proposed Xylem Wedeco Duron 8 disinfection technology.

Table 3-30 – Xylem Wedeco Duron 8 Technology Advantages and Disadvantages

Advantages	Disadvantages
• Easy lamp change • Automatic raising mechanism included. No crane or external lift required • Flow pacing and lamp dimming technology included in control system	• Lower wattage lamps require more total lamps and more total energy usage over other UV technologies • Lamp life of 14,000-hours is less than other UV technologies • No chemical sleeve cleaning system, only mechanical • Requires a new standalone UV facility

Comparison of Alternative 1 Technologies

Table 3-31 provides a summary of all three technologies proposed for the UV disinfection alternative.

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[44] Courtesy to Xylem Wedeco Budget Proposal

Table 3-31 – Comparison of Alternative UV Technologies for Idaho Falls WWTP

System Characteristics	GlascoUV	TrojanUVSigna™	Wedeco Duron 8
Headloss (inches)	3	12 (max)	11.7 (max)
Minimum Submergence (ft.)	4.92	5.29	4.46
Level Control	Modulating weir gate	Modulating weir gate	Fixed weir
Reactor Configuration	Open Channel	Open Channel	Open Channel
Lamp Configuration	Vertical	Incline	Incline
Bank Configuration	15 per Channel	3 per Channel	4 per Channel
Light Lock	No	Yes	No
Lamp Type	LPHO	High Wattage LPHO	LPHO
Input Power per Lamp (Watts)	800	1000	800
Turn-Down	Not Provided	30-100%	50-100%
Lamp Life (hours)	16,000	15,000	14,000
End of Lamp Life Factor	Not Provided	0.86	Not Provided
Dose Pacing Control	Yes	Yes	Yes
Lamp Sleeve Type	Quartz	Quartz	Quartz
Ballast / Lamp Driver (No.)	200	96	160
Integral Bank Lifting Device	No	Yes	Yes
Power Distribution Center	5	4	Not Provided
Sleeve Cleaning System	Pneumatic	ActiClean WWTM chemical/mechanical	Mechanical

Alternative 2 – Convert to Sodium Hypochlorite Disinfection

To determine the required dosing of sodium hypochlorite, three different scenarios at minimum (4 mg/L), average (6 mg/L), and maximum (8 mg/L) dosing levels were evaluated. Generally, the total chlorine demand equals the sum of required chlorine residual, the amount of chlorine decomposing in a contact chamber, and the amount of chlorine needed to reduce the total count of E. coli to below 146 cfu/100 ml. The WWTP permit limits the max chlorine residual to 0.2 mg/L. The average dosing of 6 mg/L was considered to obtain the total volume of sodium hypochlorite needed annually. The reason to select 6 mg/L of sodium hypochlorite dosing was that the historical data of plant indicated dosing at a rate of 6 mg/L (600 lb/day at average annual flow rates) for chlorine gas (Cl_2) is necessary to meet the DEQ requirements. The Idaho Falls Wastewater Treatment Plant's average day design flow was considered as 15.5 million gallons a day (MGD). Sodium bisulfate dosing system (dichlorination) is also required to reduce the excess amount of sodium hypochlorite residual. The existing sodium bisulfate system will be retained for this alternative. The annual sodium hypochlorite volume required was estimated at approximately 253,700 gallons. Table 3-32 indicates the summary of design criteria and parameters.

Table 3-32 – Design Criteria Considered for Sodium Hypochlorite Design System

Design Parameters	Value	Comments/Considerations
Design Average Day Flow (MGD)	15.5	
Recommended Chlorine Dose (mg. L^{-1})	6	
Required Sodium Hypochlorite (gpd)	695	
Annual Sodium Hypochlorite Volume Required (gallon)	253,700	
Total Number of Metering Pumps	2	1 Duty + 1 Standby
Feed Pump Flowrate (gph)	29	
Number of Bulk Tank Storage	2	1 Duty + 1 Standby
Design Days of Storage (day)	7	
Working Volume per Tank (gal)	4,860	

It is anticipated that the existing chemical storage and feed facility has sufficient space to install two new sodium hypochlorite tanks and dosing pumps for this alternative. No new building space is anticipated for this alternative.

Alternative 3 – Convert to Peracetic Acid Disinfection

ENVIROTECH provided an average usage of approximately 8,600 gallons per month for PAA (15%) with the average dose and average flowrate of 2 mg/L and 15.5 MGD, respectively. ENVIROTECH recommends using totes for bulk storage in lieu of tanks. Table 3-33 provides a summary of design criteria and parameters.

Table 3-33 – Design Criteria Considered for Peracetic Acid (15%)

Design Parameters	Value	Comments/Considerations
Design Average Day Flow (MGD)	15.5	
Recommended PAA Dose (mg. L^{-1})	2	
Required PAA (gpd)	288	ENVIROTECH provided an average usage of 8,639 gallons per month for PAA (15%)
Annual PAA Volume Required (gallon)	103,668	
Total Number of Metering Pumps	2	1 Duty + 1 Standby
Feed Pump Flowrate (gph)	12	

It is anticipated that the existing chemical storage and feed facility will have sufficient space to store PAA totes and new dosing pumps for this alternative. No new building space is anticipated for this alternative.

3.5.5 Recommendations

The evaluation of alternatives was based on a present worth cost comparison (Table 3-34). For the UV alternatives above, each vendor was asked to provide a budgetary estimate to support this evaluation. Other costs are presented in the context of supplier budgetary estimates (in the case of bulk chemical deliveries) and/or comparable values from recent construction projects. Opinions of probable construction cost are not presented herein. For example, the cost for a new UV disinfection facility is a high-level estimate and does not include any design calculations or design development. The following alternatives were shown to have the lowest net present values and recommended for further evaluation and consideration for inclusion into the City's capital improvement plan for future transition away from gas chlorine disinfection:

- Alternative 3 – Convert to PAA has the lowest calculated net present value. This is the result of low capital investment to convert from gaseous chlorine to peracetic acid, and lower bulk chemical costs over sodium hypochlorite due to lower dose requirements. The benefits of this alternative include greater electrochemical oxidation potential than chlorine and hypochlorite, no harmful disinfection by-products and no quenching, the re-purposing of the chlorine disinfection infrastructure, lower dose feed rates and stored in totes such that bulk delivery may not be required. The challenges include the potential to decompose back to its original constituents at high temperature, does not disinfect all organisms equally well, adds organic carbon and BOD to the effluent, and higher chemical unit costs than NaOCl with relatively few sources. The biggest challenge is that PAA is not yet available locally in Idaho and is a newer technology that will require coordination and approvals with DEQ.

- Alternative 1b – TrojanUVSigna™ has the second lowest net present value. UV disinfection systems have become an effective, well accepted method for disinfecting wastewater. Many Water Resource Recovery Facilities have been converting to UV disinfection because it provides a safer option when compared to chlorine gas disinfection. With low energy costs and reliable performance of UV disinfection technologies in the industry today, Alternative 1b offers the best combination of features and value for replacement of the gaseous chlorine disinfection system. Alternative 1b – TrojanUVSigna™ is the recommended alternative.

Table 3-34 – Net Present Value Summary of Disinfection Alternatives for WWTP

Costs	**GlascoUV**	**TrojanUVSigna™**	**Wedeco Duron 8**	**Sodium Hypochlorite**	**Peracetic Acid (PAA)**
Equipment Cost ($)	2,375,000	1,550,000	1,547,650	200,000	200,000
New Disinfection Facility Cost ($)	10,000,000	10,000,000	10,000,000	-	-
Total Capital Cost ($)	***12,375,000***	***11,550,000***	***11,547,650***	***200,000***	***200,000***
Annual Sodium Bisulfate Cost ($)	-	-	-	70,000	-
Annual Hypochlorite Cost ($)	-	-	-	1,046,132	-
Annual PAA Cost ($)	-	-	-	-	742,522
Total Annual Chemical Cost ($)	***-***	***-***	***-***	***1,116,133***	***742,522***
Total Annual Power Cost ($)	***280,320***	***40,822***	***278,743***	***-***	***-***
Annual Lamp Replacement Cost ($)	71,175	23,800	106,530	-	-
Annual Ballast Replacement Cost ($)	18,000	2,850	19,504	-	-
Annual Sleeve Replacement Cost ($)	6,000	675	14,912	-	-
Total Annual Equipment Replacement ($)	***95,175***	***27,325***	***140,946***	***-***	***-***
Capital Cost ($)	**12,375,000**	**11,550,000**	**11,547,650**	**200,000**	**200,000**
Total Annual Operating Cost ($)	**375,495**	**68,147**	**419,689**	**1,116,133**	**742,522**
Time Period (years)	20	20	20	20	20
Interest (%)	4	4	4	4	4
Present Worth ($)	**17,478,100**	**12,476,140**	**17,251,360**	**15,368,600**	**10,291,120**

3.6 COLLECTION SYSTEM

The City has a proactive approach to managing their collection system. The cleaning and inspection program directly feeds into identification of capital improvement projects and aging infrastructure is proactively rehabilitated. The following are recommendations for consideration to further improve the operation and maintenance of the City's collection system, none of which are mutually exclusive.

- Update the hydraulic model to reflect system upgrades completed since the last analysis, including a more detailed analysis of lift station capacities and re-evaluate the impacts on the system from future development projections. City staff identified a substantial amount of development infill in the last 10 years and have also removed stormwater connections to the sanitary sewer system which could affect the model. During the update it is recommended to include more sewer areas, confirm lift station capacity, and utilize annual flow monitoring data and rainfall derived I&I to provide a more comprehensive analysis of the system
- Continue to remove stormwater connections to reduce extraneous wet weather flows. Although the collections system and WWTP may currently have adequate capacity to handle peak flows, the City projects future growth (increased flow), which will reduce the WWTP's ability to handle peak flows from storm events. Further reducing extraneous stormwater inflow would benefit both the collection system and the WWTP. Metering WWTP influent flow throughout the collection system could help the City prioritize connections based on impact
- Expand the GIS database for:
    - Lift stations – Table of attributes does not include pump age, pump make/model, capacity, pipe size, or instrumentation data for most lift stations (Information Gap)
    - Manholes – Table of attributes does not appear to include condition assessment information and priority information (Information Gap)
    - Sewer pipe – Table of attributes does not appear to include slope or condition assessment and priority (Information Gap)
- Implement a standard rating scale, such as Pipeline/Manhole Assessment and Certification Program (PACP/MACP), for sewer pipes, manholes, and lift stations to increase objectiveness in prioritizing capital improvement projects. Implement criticality rating for annual cleaning and inspection
- Upgrade more than one lift station each year. If the City continues to prioritize only one lift station a year, they are on a 32-year rotation. If the City increased to three lift stations each year, they will be close to a 10-year improvement rotation which more closely matches the life expectancy of a typical lift station pump (10-15 years). Increasing to three upgrades per year would likely require triple the annual budget for lift station improvements. Recent estimates suggest a budget of $75K to $150K for a small (<10 hp) lift station upgrade. The range is based on extent of repairs, depth of lift station, and pump/valve size. It is anticipated upgrades of larger lift stations would be more costly. Therefore, it is recommended to increase the budget to match escalation, number of lift stations upgraded, and lift station size

- Rehabilitate at least 1% of the existing collection system annually. If the average lifespan of collection system pipe is 100 years, approximately 1% of existing pipe should be rehabilitated or replaced each year. It is recommended to increase the budget to match escalation and quantity of pipe

CHAPTER 4 FUNDING ANALYSIS CIP IMPLEMENTATION

4.1 PROJECT IDENTIFICATION & PRIORITIZATION

Throughout the facility planning process, the Engineering Team worked closely with Idaho Falls staff to identify and recommended improvement projects based on regulatory compliance, condition, capacity, and general principles of asset management. Projects identified in the facility planning process cannot be constructed all at once due to budgetary, staff/community capacity, and other constraints. Therefore, projects must be prioritized in a logical, defensible, transparent, and documented manner.

Project prioritization was completed using a stepwise decision matrix. The step wise process includes the following activities to prioritize and order identified projects.

- Identification of criteria
- Determining relative weightings between criteria
- Rating each project based on the criteria
- Combining relative weighting and project rating

4.1.1 Criteria

Community, department, and utility values were reviewed, and the following criteria were identified as most appropriate to evaluate facility plan project priorities.

- **Regulatory/Environment:** does the project or activity assist in meeting regulatory requirement or improve the environment in Idaho Falls?
- **Operations Efficiency:** City operations staff are most affected by and most likely to observe poorly functioning infrastructure. The intent of this criteria is to promote operational preference and efficiency.
- **Capacity/Redundancy:** does the project or activity provide additional infrastructure capacity or provide required redundant facilities for resilient operations?
- **Public Involvement/Acceptance:** the City wishes to provide opportunities for public involvement and acceptance in overall wastewater operations. Does the project or activity provide an opportunity for public involvement and acceptance?
- **Health and Safety:** does the project or activity improve health and safety of operations staff, community, or environment?

Once the appropriate criteria were established the next step was to determine the relative importance of each criterion to prepare for ranking each project.

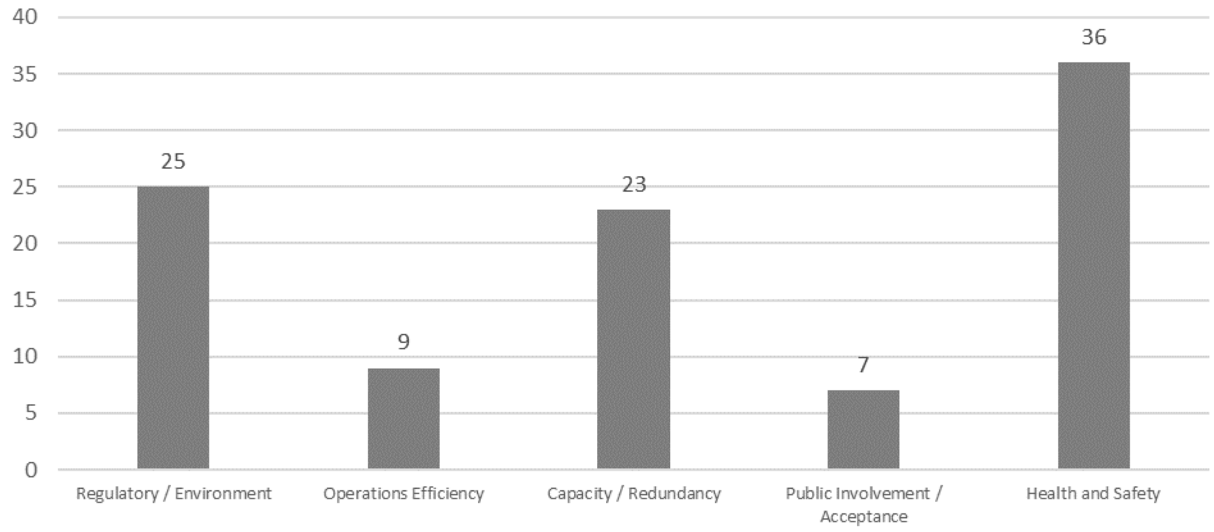
Criterion Relative Importance

In a workshop process the criteria were evaluated using a pairwise process to determine the relative importance of each criterion to other criterion. The pairwise workshop used Table 4-1 – Pairwise Evaluation Logic when establishing relative difference between criteria and resulted in the following weighting criterion, Figure 4-1.

Table 4-1 – Pairwise Evaluation Logic

Relative Difference Between Criterion Importance	Entered Score	Paired Score
Substantially More Important	10	0
Somewhat More Important	8	2
Equal Importance	5	5
Somewhat Less Important	2	8
Substantially Less Important	0	10

Figure 4-1 – Pairwise Resulting Weighted Criterion



Health and safety were determined to be the most important criterion followed by regulatory/ environment, capacity/redundancy, operations efficiency, and public involvement/acceptance, respectively.

Likert Scale

Each identified project was then rated based on the following Likert scale, Table 4-2. The projects' rating and relative weighting of each criterion established its priority in an objective unbiased process.

Table 4-2 – Likert Scale

CRITERION	1	5
Regulatory/Environment	Least likely to assist in meeting regulatory requirement or improve the environment at Idaho Falls	Most likely to assist in meeting regulatory requirement or improve the environment at Idaho Falls
Operations Efficiency	Least likely to improve operational efficiency	Most likely to improve operational efficiency
Capacity/Redundancy	Least likely to provide additional capacity or redundancy	Most likely to provide additional capacity or redundancy
Public Involvement/Acceptance	Least likely to provide an opportunity for public involvement or acceptance	Most likely to provide an opportunity for public involvement or acceptance
Health and Safety	Least likely to contribute to safety	Most likely to contribute to safety

Overall project prioritization is established by multiplying the projects criteria weighting by the weight of the criteria. The resulting recommended prioritization is shown in Table 4-3. All annual/maintenance projects needed within the next 20 years are included in the following table at the bottom in no particular order. Annual projects were valued with the highest scoring from the Likert Scale to ensure annual projects were included in the final Capital Improvement Plan and the Financial Analysis and Management System (FAMS) report. The following table is the first step that was needed to create the final Capital Improvement Plan. The projects identified were determined by the plant's condition and upcoming needs as described in the previous chapters. Once these projects were identified and prioritized based on the above Likert Scale, the final Capital Improvement Plan was created with consideration of time and available budgets. The Priority 2 improvements (10+ years) were reordered in the table primarily due to availability of future funding to fund the projects.

Other: Ongoing Asset Management

This facility plan is a point in time and based on specific findings evaluated. However, the Idaho Falls collection and treatment system is expected to remain in operation for the foreseeable future. To address yet undetermined needs, asset management principles were implemented in the recommended capital plan. The collection system ongoing investment was recommended at a minimum of one percent of asset value for ongoing investment. Treatment is composed of many moving parts and aging structural elements. The treatment system is recommended at a minimum of two percent of asset value for ongoing investment. Both collection and treatment asset management investments are shown in Table 4-3.

Table 4-3 – Initial Project Prioritization

CIP Rank	Project	Evaluation	Process Area	Description/Comment	Regulatory/ Environment	Operations Efficiency	Capacity/ Redundancy	Public Involvement/ Acceptance	Health and Safety	Score
1.1	Secondary System Evaluation	Sidestream Treatment	Secondary	Secondary System Evaluation - First Step in MBBR and Other Secondary Improvements	5	5	5	5	5	500
1.2	Clean B System	Biosolids Digestion & Treatment	Digestion	Step 1 – Sidestream/Digester Capacity Value. Wait for report.	5	4	5	5	4	455
1.3	Disinfection & Contact Chamber Gate Replacement	Disinfection Alternatives	Disinfection	UV Disinfection, Liquid Chlorine, or Paracetic Acid – UV Preferred. Due to Cost Liquid Chlorine chosen	4	4	4	5	5	443
1.4	Screening/Washer Compactor/Headworks Improvements	Headworks Hydraulics and Screening & Condition Assessment	Headworks	Screening/Washer Compactor Improvements, Rock Trap Crane/Hoist, Influent Flow Meter, Isolation Gate Improvements, HVAC Upgrade, Lighting Upgrades, Electrical Panel and VFD Improvements	3.5	4	4	3	4	380.5
1.6	MBBR	Sidestream Treatment	Sidestream Treatment /Secondary	MBBR Improvements plus Aeration Basin Air Valve Heat Tracing, and Scum Trough Replacement	4.5	3	5	4	2	354.5
1.7	Makeup Air Unit and Corrosion Improvements	Odor Control	Odor	Makeup Air Unit and Corrosion Improvements (near term)	3	4	2	2	5	351
2.1	Primary Scum Pit Upgrade	Condition Assessment	Headworks	Primary Scum Pit Upgrades	1	4	2	1	3	222
2.2	Additional GAC Adsorption Unit	Odor Control	Odor	Additional GAC Adsorption Unit (Long Term)	4	3	4	4	4	391
2.3	Plant Wide Arc Flash Study and SCADA Improvements	Condition Assessment	Electrical & SCADA	Plant Wide SCADA and Network Infrastructure and Plant Wide Arc Flash Study	3	5	2.5	3	5	378.5
2.4	Digester & Biogas Improvements	Condition Assessment & Cogeneration Memo	Digestion	Digester Cover Replacement, Biogas Flare Replacement, Biogas Upgrades - Cogeneration P3 TBD	2.5	3	3	4	4.25	339.5
2.5	New Digester	Biosolids Digestion & Treatment	Digestion	Step 2 - Digestion Expansion	3	2.5	4.5	1.5	3.5	337.5
2.6	New Headworks Building	Headworks Hydraulics and Screening	Headworks	New Headworks beyond facility plan time frames	1.5	4.5	4	4	4	342
Annual	Facility Asset Management	Wastewater Treatment Plant	All	Allocation of Plant Asset Management Improvements (Placeholder beyond identified projects) 1.5%-2% of plant value	5	5	5	5	5	500
Annual	Remove Stormwater Connections	Collections System	Collections	Annual Stormwater Connections Effort	5	5	5	5	5	500
Annual	Upgrade 3 Lift Stations Per Year And Backup Generation	Collections System	Collections	Annual Lift Station Asset Management and Backup Generation Additions	5	5	5	5	5	500
Annual	Upgrade at least 1% of Collection System	Collections System	Collections	Collection System Asset Management	5	5	5	5	5	500
Recurring	Facility Plan Update	Facility Plan	Facility	Facility Master Planning	5	5	5	5	5	500
Recurring	Collection System Master Plan & Model Update	Collection System	Collections	Collection System Master Planning	5	5	5	5	5	500

4.2 POTENTIAL FUNDING OPPORTUNITIES

Idaho Falls should consider the following funding opportunities.

Clean Water State Revolving Fund (CWSRF) – Construction Loan: The Idaho Department of Environmental Quality (DEQ) provides low-interest loans for wastewater projects that address water quality needs and supports compliance. Funding for these state-level loans comes to the DEQ through annual capitalization grants from the Environmental Protection Agency (EPA). The loans provided for the construction portion of the project are typically 20-year but may be up to 30-year terms. The loans also offer below-market-rate interest and may include principal forgiveness. The DEQ also offers principal forgiveness for loans if the community population is declining or if unemployment exceeds the statewide average. While the availability of funding varies by year, loans can cover up to 100% of the project costs and can cover project planning, design, and construction. This fund received increased investment from the 2021 Bipartisan Infrastructure Law. Applicants must apply by the end of the calendar year to have an application considered for the Intended Use Plan, which the DEQ submits to the EPA for funding.

Clean Water State Revolving Fund (CWSRF) – Planning Grant: The DEQ offers planning grants to wastewater systems through the CWSRF. Wastewater grants are used to develop wastewater treatment plant plans based on cost-effective, least environmentally impactful methods of upgrading, maintaining, and expanding the facilities. Applicants can receive funding up to 50% of the project's planning costs and are typically subject to a maximum amount. This can be a useful tool to bring projects through the planning and design phases before searching for construction funds. The City of Idaho Falls received a planning grant to complete the 2023 Wastewater Facility Plan.

Water Infrastructure Finance and Innovation Act (WIFIA): The EPA WIFIA program provides flexible, long-term, low-cost loans to fund up to 49% of the planning, design, and construction of impactful projects. The currently open funding opportunity has $6.5 billion available for financing. Any project eligible for the CWSRF is also eligible for consideration under WIFIA. The interest rate set by WIFIA is no lower than the U.S. Treasury rate at closing (3.7% in April 2023) and is not tied to the borrower's credit rating. Repayment can be delayed up to five years after completion of construction and, during the term of the loan, repayment can be sculpted to accommodate borrowers' other debt obligations or capital expenditures. These loan characteristics allow borrowers with multi-year construction phases, significant capital costs, and long asset lives to mitigate the debt service impact on rate payers. The minimum project size for a WIFIA loan is $20 million, and multiple projects in the Facility Plan may be bundled together into a larger application. Letters of intent began being accepted on a rolling basis on September 6, 2022.

Water Project Loans: Idaho Water Resources Board offers a state-level loan program to help finance water projects in the state that the board deems to be in the public interest. The terms of the loan range from 5 to 30 years and are based on the amount borrowed, the scope of the project, the financial capability of the recipient, and the length of time requested by the recipient. The rate of the loan is set by the Federal Prime Rate on the first date of each quarter; however, the current interest rate (8% for Q2) is unfavorable compared to other funding options included in this WWFPS. The application process for IWRB loans starts with contacting the loan program team to discuss the project, and then if the project is approved an application form will be submitted and verified.

Public Works and Economic Adjustment Assistance Programs: The Economic Development Agency (EDA) offers strategy grants and implementation grants to assist in designing and implementing strategies to adjust or bring about change to an economy. Funding through these programs can cover 50-80% of a project with awards between $100,000 and $30,000,000. The project must align with regional Comprehensive Economic Development Strategy (CEDS) document or the creation of a CEDS. Eligibility requirements are flexible for this program as it is designed to help communities through construction and non-construction projects designed to meet local needs. To be eligible, a project must be in a region that meets one or more of the following economic distress criteria of either a 24-month unemployment rate that is at least 1 percentage point greater than the national average or a per capita income that is not more than 80% of the national average. The most recent census data shows per capita income in Idaho Falls as 78% of the national average.

Given the extreme competitiveness of these EDA grants, projects should also be evaluated for their competitiveness, beyond just eligibility. Competitive projects must show meaningful economic benefits, and priority is given to projects that promote equity within the region that the project will impact.

Midsize and Large Clean Water Infrastructure Resilience and Sustainability Program: As of the time of this study, this program is not yet operating and there is no known opening date; however, this is a new EPA funding program authorized by the 2021 Bipartisan Infrastructure Law. Wastewater systems serving more than 10,000 people will be eligible for this new federal grant funding for projects that increase the resilience of wastewater systems to natural hazards, extreme weather events, and cybersecurity threats. 50% of the total $125 million that will be available will be awarded to wastewater systems serving between 10,000 and 100,000 individuals, with the remaining 50% for systems serving more than 100,000 individuals.

WaterSMART Grants: Environmental Water Resources Projects: The Bureau of Reclamation offers grants for projects that are focused on environmental benefits and that focus on establishing and implementing strategies to increase water resource reliability. Projects must have a beneficial impact on ecological or watershed health and be collaboratively developed. Eligible projects may receive up to 75% federal cost share contribution, up to a maximum of $3,000,000. Projects cannot have a total project cost of more than $6 million, and projects must be completed within three years. For projects larger than $6 million, the City could also consider the new WaterSMART Aquatic Ecosystems Restoration Program.

Hazard Mitigation Grant Program (HMGP): FEMA's Hazard Mitigation Assistance Program provides funding for the development of hazard mitigation plans and rebuild in a way that reduces future disaster losses in their communities. Eligible projects include developing or updating a FEMA-approved mitigation plan, or implementing activities that increase resilience, such as retrofitting existing buildings, purchasing hazard prone property, utility and infrastructure retrofits, and drainage improvement projects. Aging infrastructure projects are not eligible. Grant funding covering up to 75% of project costs is available up to twelve months after the state of Idaho receives a federal disaster declaration, and funding flows through the Idaho Office of Emergency Management.

Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program: If a HMGP grant is secured for a hazard mitigation project, the City could also pursue a STORM loan to finance the minimum 25% local cost share. New in 2023, this new FEMA loan program operates similarly to the Clean Water SRF, creating state-level banks to finance resilience projects. Priority is given to projects that benefit an underserved community; support partnerships between two or more eligible entities; consider regional hazards; and/or protect major economic sectors or critical regional infrastructure. The maximum funding through this program is $5 million, loans are offered on 20-year terms with a less than 1% interest rate and payments deferred until after construction.

4.2.1 Other Funding Considerations

Disadvantaged status: State and federal funds are prioritized for disadvantaged or socially vulnerable areas. Disadvantaged status may apply to certain census tracts or communities within Idaho Falls. There are also various indicators that are used to identify disadvantaged communities, such as socioeconomic, demographic, financial, public health, and environmental justice indicators that may be used to communicate the need of the Idaho Falls community. Indicators such as high sewer rates as a percent of household income, high poverty or unemployment rates, and others can also help the City evaluate community needs.

Request Water Technical Assistance: Communities can request no-cost technical assistance through the EPA. The technical assistance provides a range of services including evaluating wastewater infrastructure and water quality improvement needs, planning for capital improvements, improving technical capacity, preparing application materials for financing through the CWSRF and other EPA-back funding sources.

4.3 FUNDING IDENTIFICATION

Financial Analysis and Management System (FAMS) was used to model Idaho Falls' financial position, including all wastewater enterprise fund revenues, expenses, and cash balance. Model outputs and scenarios are included within Appendix E. The model starting point was the City's fiscal year (FY) 2024 with projected revenue or cash in of $13,646,851, and expenses or cash out of $25,919,227. FY 2024 has an initial fund balance of $23,100,000. All expenses and project costs were calculated in 2023 dollars. FAMS adjusted costs for inflation through the 20-year planning cycle and it was assumed that projects must be fully funded at the end of the previous FY for the subsequent budgeted FY.

Section 4.2 surveyed the most likely alternative funding resources including potential grant and debt instruments available to the community from state and federal sources. The City has historically cash funded improvements in both collection and treatment. Therefore, this CIP assumed the only funding vehicles are rate and fee revenues.

4.3.1 Project sequencing/scheduling

To sequence and schedule projects the Engineering Team looked at previously established project priorities, capacity needs, project delivery, and timing. The following general assumptions were used in developing project sequencing and scheduling:

- Design and construction are assumed to be in subsequent FYs for all projects greater than $200,000, with initial year at 12 percent of total costs to account for engineering, potential right-of-way, environmental activities, and public involvement efforts. The project balance is included in the subsequent year. It is assumed that dollars may flow from year one (1) to year two (2) as necessary to maintain progress and account for unforeseen issues. It is also assumed that projects valued at $200,000 or less could be completed within the same FY.
- Investment in master planning for collection and treatment facilities is sequenced and scheduled on a five-year basis. The collection system planning study is scheduled in FY 2025 and every five years thereafter. The WWTP planning study is scheduled for five years from the start of this study (FY 2028) and every five years thereafter.

The following is a sequencing and scheduling description for identified collection, treatment, and other improvements.

Collection System Improvements

The City has a practice of continuously improving the collection system through an internal asset management process with a focus on highest impact areas. Following the City's historical process, projects were sequenced and scheduled in the following:

1. Invest in removing stormwater connections as these projects affect both collection and treatment capacity.
2. Invest annually to maintain lift stations which are a common pinch point in the collection system. The recommended capital plan looks to upgrade three (3) lift stations per year, resulting in an upgrade cycle of approximately 10-years.
3. Invest annually in the collection system at one percent of total asset value.

Wastewater Treatment Improvements

Following the prioritization and ranking process, the sequencing for treatment improvements is as follows:

1. Invest in Secondary System Evaluation immediately. It is important to begin this study in FY 2025 to verify the impacts of the ongoing solids handling construction project on overall system treatment process. Evaluation is expected to identify other improvements necessary to maintain capacity and permit compliance in the short and long term.
2. Invest in the Clean B System to address immediate solids capacity concerns and potential impacts of the solids handling project currently underway.
3. Invest in disinfection improvements from use of gaseous chlorine. The Chlorine Contact Chamber Gate Replacement project is necessary to combine with Disinfection Improvements should chlorine contact be necessary to complete disinfection. UV disinfection would allow removal of the chlorine contact chamber as it would no longer be necessary for disinfection.
4. Combine higher priority Screening/Washer Compactor Improvements with other identified Headworks Improvements. Both identified projects are located within the headworks facility. Combining these projects provide an economy of scale and ease of construction in a critical portion of the plant.
5. Invest in a side stream improvement project. A preliminary evaluation indicates that a MBBR improvement project is a likely alternative and is sequenced and scheduled. However, this value may be a placeholder for a different project improvement as may be defined by the Secondary System Evaluation and performance of the Clean B system.
6. The remaining projects are sequenced and scheduled based on identified priorities and follow:
    i. Makeup Air Unit and Corrosion Improvements
    ii. Primary Scum Pit Upgrades
    iii. Additional GAC Adsorption Unit
    iv. Plant Wide Arc Flash Study and SCADA Improvements

v. Digester and Biogas Improvements

vi. New Digester – this project may be adjusted or eliminated by performance of the Clean B System

vii. New Headworks Building

Other Capital Improvements

In addition to the collection and treatment system improvements two other significant investments were sequenced and scheduled. The solids handling project currently under construction necessitates a change in solids hauling and distributing equipment. Two solids handling trucks are scheduled for FY 2024 and a third is scheduled for FY 2025. The other significant investment is to provide available funds for opportunistic improvements associated with development. Private development moves at its own pace. The City needs to be able to react to take advantage of companion projects associated with development. These opportunistic projects may be lift station upgrades, pipeline upgrades or extensions associated with new development and or economic opportunities.

4.3.2 Rate sufficiency & adjustments

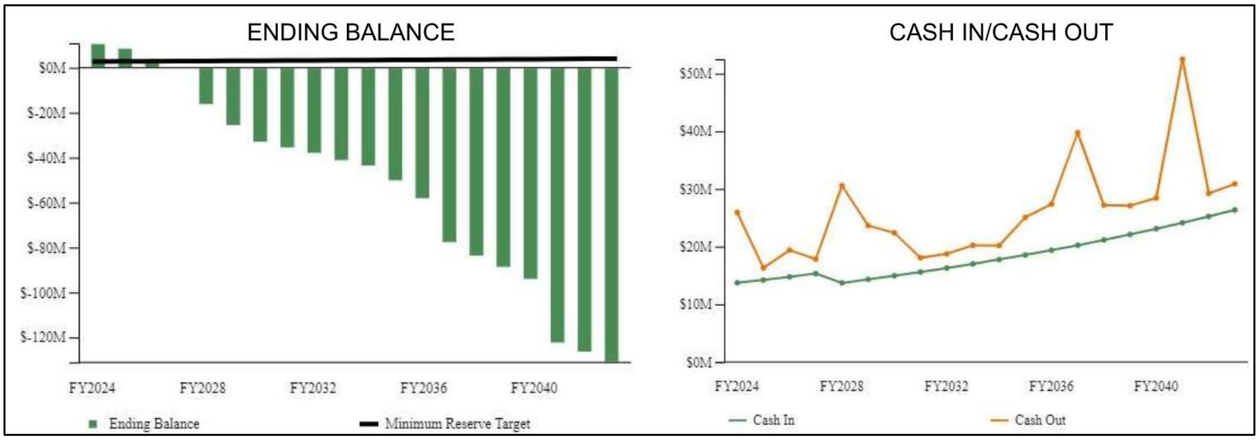
Once the recommended projects were identified and prioritized, available funding and investment identified, plus sequencing established, they were input into FAMS based on the recommended schedule as shown in Table 4-3 to evaluate sufficiency of planned rates.

Rate Sufficiency

The City's March 2021 rate study recommended rate increases, initially varying by customer class, to move the customer classes to cost of service in FY 2021 and FY 2022. A general two percent rate increase for all customer classes is recommended through the end of the forecast period FY 2023-FY 2025. Based on the study it was also assumed to forecast a series of ongoing annual two percent rate increases across the board through the end of the planning period.

The rate study also provided adjustments to hook-up fees both within the Idaho Falls system and specifically for the City of Ucon and the Iona Bonneville Sewer District (IBSD) which are served under contract. Furthermore, it was assumed the City of Ucon and IBSD will cease to be customers of Idaho Falls in 2028. Ucon and IBSD are both currently progressing studies to develop individual wastewater treatment facilities which are expected to be online by 2028. Incorporating the projects and proposed rate increases provides the following FAMS output charts, Figure 4-2 which clearly show rate insufficiency with negative ending cash balances and cash out exceeding cash in throughout the entire planning period.

Figure 4-2 – Insufficient Rate FAMS Output Charts



Once rate insufficiency was identified, it was apparent alternative timing and funding should be considered. As project sequencing is based on highest priority to address utility goals, project sequencing was preserved. Secondary Evaluation and Clean B schedules were maintained as these projects are schedule critical to meet treatment capacity and regulatory certainty. All other identified projects were assumed to be schedule flexible allowing time for rate revenues to grow and accommodate the projects.

Several funding alternatives were discussed including debt and initial rate increases of 10 percent and 15 percent. It was again determined that debt would not be considered, and rate increases to be limited to 5 percent going forward. The FAMS model was set with rate revenue limitation and project schedules were adjusted to within funding limitations.

Adjustments

Several adjustments were made to the recommended projects. Some ongoing investments were adjusted downward, as described below, to accommodate funding levels and many project schedules were extended to adjust for funding limitations within the 20-year planning horizon.

- The level of investment to remove stormwater connections is recommended at $500,000 per year. However, given the limited available budget, the level of investment in removing stormwater connections is reduced by 50 percent for six (6) years to allow the City to increase its funding through ongoing rate increases.
- Three lift stations are recommended to be upgraded and evaluated annually to address lift stations on a 10-year cycle. However, given the limited available budget and current age of lift stations, a 15-year upgrade cycle or two lift stations per year is considered for seven (7) years. The cycle may be extended for a period of time to allow the City to increase its funding through ongoing rate increases and build its lift station asset management database. A 10-year cycle is reinitiated beginning in FY 2031.
- The recommended one percent of collection system investment is estimated at $2,500,000. However, the limited available budget will not accommodate the level of investment. Considering described adjustment activities, the collection system investment is recommended to be ramped up to the recommended investment as fast as reasonably possible. $1,000,000 is identified in FY 2025 through FY 2030, and $1,500,000 in FY 2031, 2032, and 2033. The full investment of $2,500,000 should be

able to be accommodated in FY 2034 and beyond. Additional investment may also be identified through ongoing asset management activities over time.

Escalation

Project escalation is key to identifying funding and project needs throughout the entire 20-year plan. FAMS escalates both revenues and expenses through the planning horizon. Table 4-4 summarizes modeled escalation.

Table 4-4 – Cost Esclation Factors

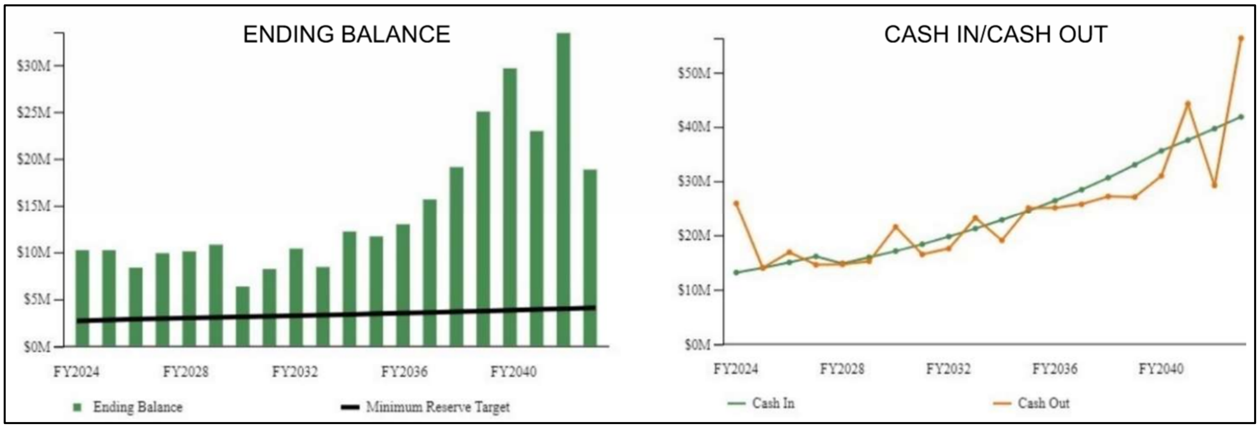
Inflation Factor

	CAPITAL COST	CONNECTION FEE	DEFAULT INFLATION	NO ESCALATION	O&M	TRANSFER TO GENERAL FUND
FY 2024	3.00%	0.00%	2.90%	0.00%	4.00%	4.50%
FY 2025	3.00%	0.00%	2.36%	0.00%	4.00%	4.50%
FY 2026	3.00%	0.00%	2.36%	0.00%	3.00%	4.50%
FY 2027	3.00%	0.00%	2.36%	0.00%	3.00%	4.50%
FY 2028	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2029	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2030	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2031	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2032	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2033	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2034	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2035	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2036	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2037	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2038	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2039	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2040	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2041	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2042	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%
FY 2043	3.00%	0.00%	2.36%	0.00%	2.00%	4.50%

Final Rate Sufficiency

Final rate sufficiency is achieved by adjusting as described above and increasing rates consistently at five percent per year through FY 2040 with three percent increases in FY 2041, 2042, and 2043. This approach to rates also accounts for escalation of CIP over the planning period and incorporates funding for new headworks at planning period end. The following FAMS Output Charts, Figure 4-3, demonstrate funds are available for subsequent FY capital projects while preserving minimum fund balances and a demonstrated savings plan using cash in to balance cash out over the planning period.

Figure 4-3 – Sufficient Rate FAMS Output Charts



4.4 PUBLIC PARTICPATION

40 CFR Part 25 discusses objectives and requirements for public participation. The public refers, in the broadest sense, to the general populace, and may include any special interest groups. This process helps responsible officials become aware of public attitudes by allowing the public to communicate their views.

Various means were used to inform the public of the City's ongoing facility planning efforts. The City Council was informed of the preliminary findings of the WWFPS through a Council Work Session on March 11, 2024. A public open house was also held to inform interested individuals of the plan, its findings, and the preliminary recommendations. The public meeting helps facilitate a discussion about the alternatives, customer costs based on anticipated funding sources, related environmental impacts, and mitigation measures specific to each alternative, as well as the reasons for possible rejection of certain alternatives.

The open house was advertised in Spanish and English and held on April 3, 2024. Members of the public were invited to attend and provide comments on the planning effort. A 14-day public comment period from March 27th to April 10th was also held concurrent to the public open house during which participation from members of the public was encouraged via the printed news, social media posts, and the City's website. Public-comment printed drafts of the planning study were made available for public access and review at the City Public Works (City Annex Building) and the Wastewater Treatment Plant. No public comments were received during the open comment period.

With the completion of the public open house and comment period, the City is scheduled to formally adopt the WWFPS and its findings at the April 25, 2024 City Council Meeting. A copy of the approved City Council meeting minutes from that meeting will be included in Appendix F.

4.5 CAPTIAL IMPROVEMENT PLAN

A draft City Wastewater CIP was developed ahead of the public comment period and is included in Table 4-5. Attachments A-F within Appendix E are intended to provide additional context for the CIP items. A brief description of each attachment to Appendix E is provided here:

- Attachment A is the Master Capital Improvement Plan Escalated.
- Attachment B is the base budget year (FY 2024) for Attachment A.

- Attachment C documents the financial model input assumptions.
- Attachment D demonstrates development and adjustments to CIP in 2023 dollars.
- Attachment E represents the Master CIP in 2023 dollars.
- Attachment F is the complete look at forecasted revenues, expenses, and capital improvements over the 20-year planning cycle.

Table 4-5 – Identied CIP Priority and Escalated Estimated FY Cost

ID#	Item	Total Cost	
	Priority 1 Improvements (2024-2034)		
1.1	Secondary System Evaluation	$ 212,180	
1.2	Clean B System	$ 3,843,844	
1.3	Liquid Chlorine Disinfection and Gate Replacement	$ 919,691	
1.4	Screening/ Washer Compactor Improvements	$ 5,171,928	
1.5	Headworks Improvements	$ 1,973,176	
1.6	Moving Bed Biofilm Reactor (MBBR)	$ 5,624,721	
1.7	Makeup Air Unit and Corrosion Improvements	$ 308,020	
	Total for Priority 1 Improvements	**$ 18,053,560**	
	Priority 2 Improvements (2035-2043)		
2.1	Primary Scum Pit Upgrades	$ 585,360	
2.2	Additional GAC Adsorption Unit	$ 1,024,966	
2.3	Plant Wide Arc Flash Study and SCADA Improvements	$ 1,443,846	
2.4	Digester & Biogas Improvements	$ 6,176,515	
2.5	New Digester	$ 24,599,001	
2.6	New Headworks Building	$ 35,995,972	
	Total for Priority 2 Improvements	**$ 69,825,660**	
	Ongoing Improvements	**Total Cost**	**Ave. Annual Cost**
1	Remove Stormwater Connections	$ 11,607,659	$ 610,930
2	Upgrade 3 Lift Stations per year and Backup Generation	$ 28,012,896	$ 1,474,363
3	Upgrade at least 1% of Collection System	$ 52,407,251	$ 2,758,276
4	Facility Plan Update – Every 5 Years	$ 2,933,635	$ 154,402
5	Collection System Master Plan & Model Update – Every 5 Years	$ 2,147,753	$ 113,039
6	Developer Participation	$ 4,666,473	$ 245,604
7	Facility Asset Management	$ 24,646,020	$ 1,297,159
	Total for Ongoing Improvements	**$ 126,421,687**	**$ 6,653,773**

A simplified visual version of the Master CIP plan is shown in Figure 4-4.

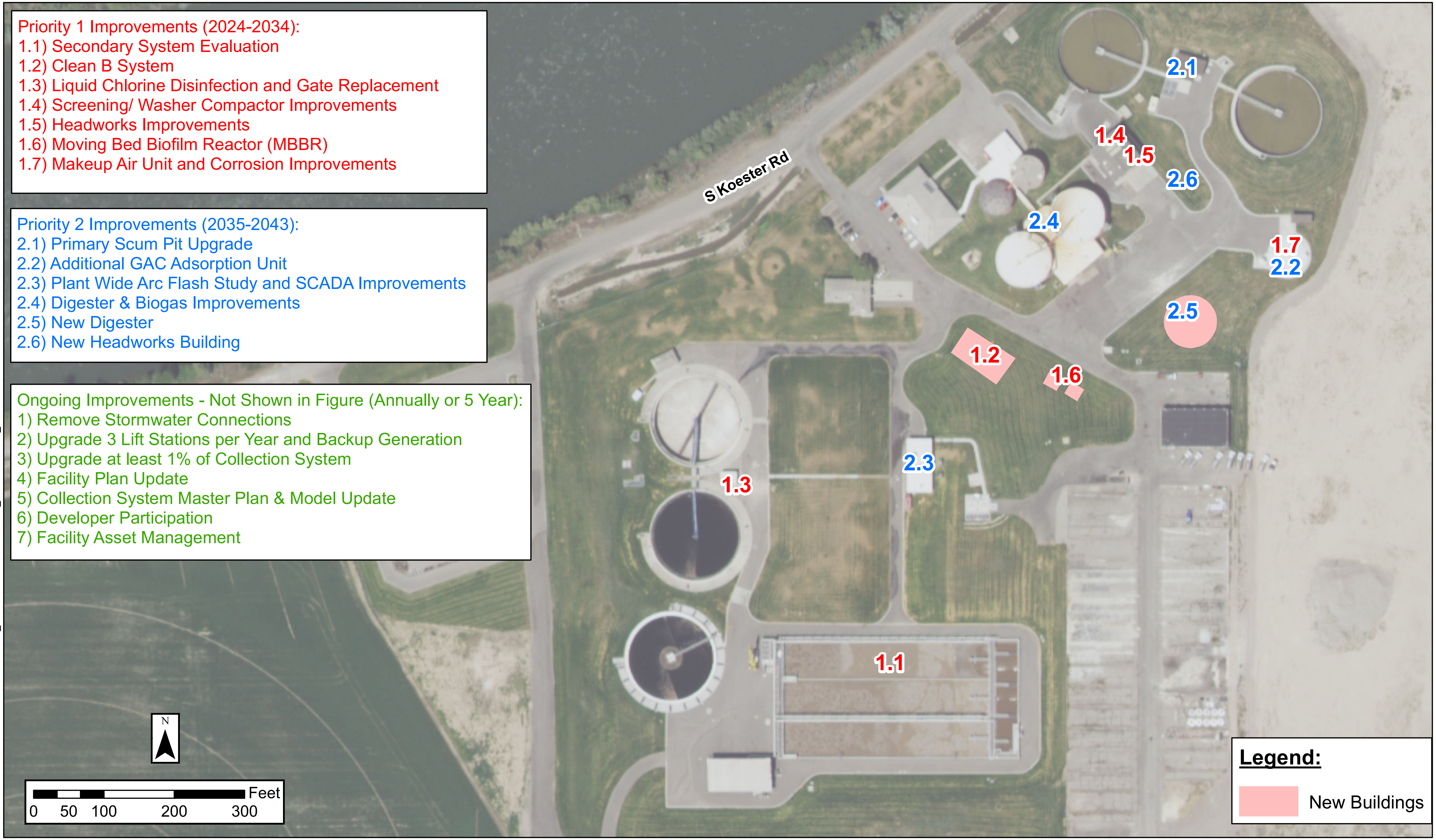
4.6 PROJECT IMPLEMENTATION AND SCHEDULE

The project team has worked closely with the City to analyze the needs of the WWTP and develop improvement alternatives that will support the long-term needs of the community. Before proceeding with the design of the preferred alternatives, pre-design documents must be completed and approved by the regulatory agencies for the selected alternatives.

A schedule for implementing Priority 1.1 and 1.2 system improvements was developed to provide a timeline that considers the availability of funding. Lower priority improvements will be scheduled as the initial improvements near completion.

Table 4-6 – Project Schedule – Priority 1.1 and 1.2 Improvements

Event	Date
Complete DEQ Approved Planning Study	April 2024
Secure Funding for Priority 1 Improvements in FY 25	August 2024
Begin Preliminary Engineering Report for Clean B	October 2024
Begin Secondary System Evaluation	October 2024
Complete Preliminary Design Report for Clean B	January 2025
Begin Design of Clean B System	February 2025
Complete Secondary System Evaluation	March 2025
Complete Design of Clean B System	September 2025
Bid Package for Clean B System	October 2025
Begin Design for Liquid Chlorine System	October 2025
Begin Construction of Clean B System	November 2025
Complete Design for Liquid Chlorine and Gate Replacement	September 2026
Complete Construction of Clean B System	November 2026



Priority 1 Improvements (2024-2034):
1.1) Secondary System Evaluation
1.2) Clean B System
1.3) Liquid Chlorine Disinfection and Gate Replacement
1.4) Screening/ Washer Compactor Improvements
1.5) Headworks Improvements
1.6) Moving Bed Biofilm Reactor (MBBR)
1.7) Makeup Air Unit and Corrosion Improvements

Priority 2 Improvements (2035-2043):
2.1) Primary Scum Pit Upgrade
2.2) Additional GAC Adsorption Unit
2.3) Plant Wide Arc Flash Study and SCADA Improvements
2.4) Digester & Biogas Improvements
2.5) New Digester
2.6) New Headworks Building

Ongoing Improvements - Not Shown in Figure (Annually or 5 Year):
1) Remove Stormwater Connections
2) Upgrade 3 Lift Stations per Year and Backup Generation
3) Upgrade at least 1% of Collection System
4) Facility Plan Update
5) Collection System Master Plan & Model Update
6) Developer Participation
7) Facility Asset Management

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Capital Improvements Site Plan

IDAHO FALLS WWTP

FIGURE 4-4

CITY OF IDAHO FALLS

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APPENDICES

APPENDIX A: REFERENCE INFORMATION

Soils Report for PPPA

Process Flow Diagram

Wetlands Map

FEMA FIRM

IPaC Explore Location

EID Screening matrix

ESA & EFH Memo

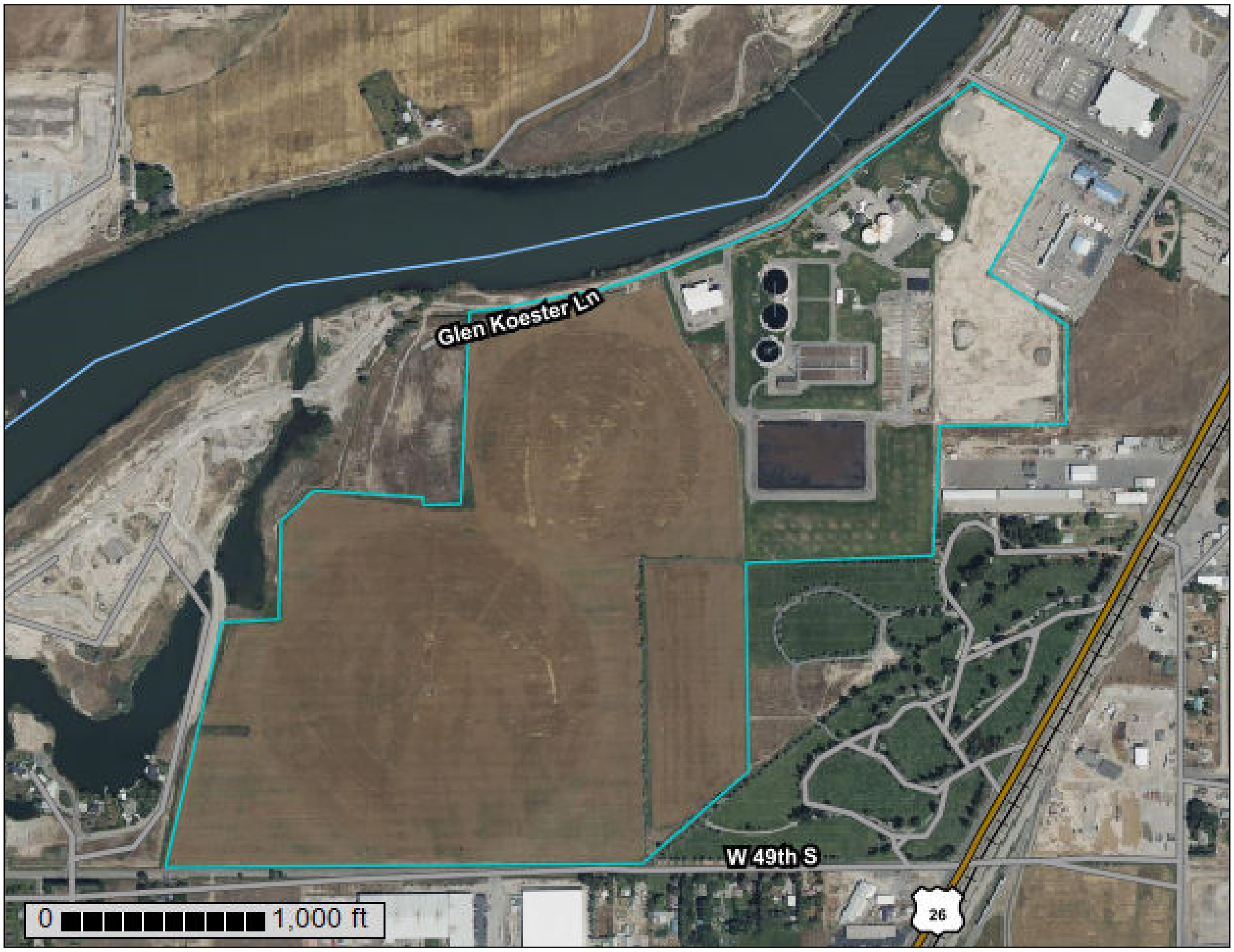
United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Bonneville County Area, Idaho



February 1, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

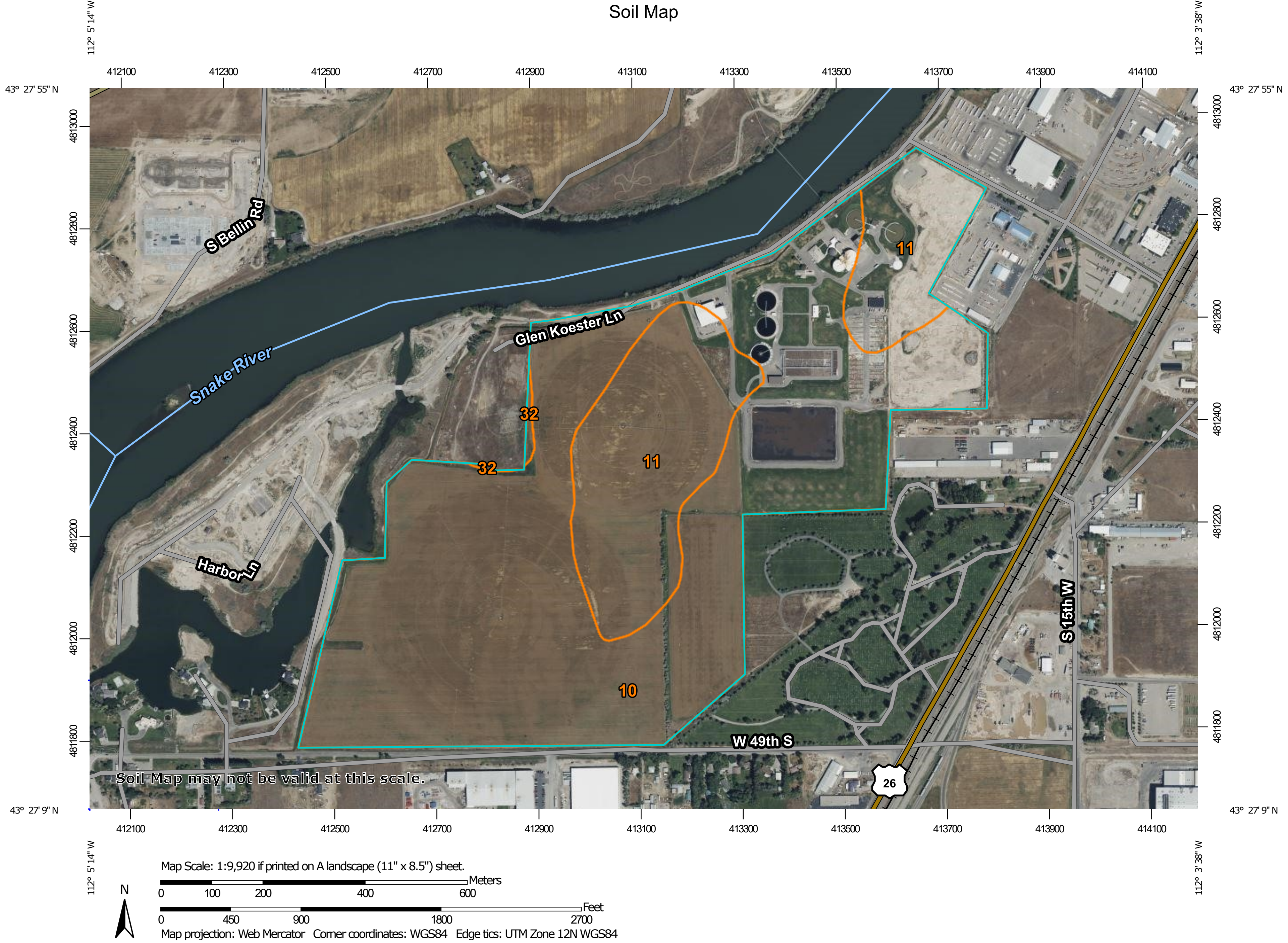
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:9,920 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

□ Area of Interest (AOI)

Soils

□ Soil Map Unit Polygons

〰 Soil Map Unit Lines

■ Soil Map Unit Points

Special Point Features

☉ Blowout

⊠ Borrow Pit

✱ Clay Spot

◇ Closed Depression

✕ Gravel Pit

∴ Gravelly Spot

⊗ Landfill

Λ Lava Flow

⫫ Marsh or swamp

⚒ Mine or Quarry

◎ Miscellaneous Water

○ Perennial Water

∨ Rock Outcrop

+ Saline Spot

⁙ Sandy Spot

⊖ Severely Eroded Spot

◈ Sinkhole

⋗ Slide or Slip

∅ Sodic Spot

≡ Spoil Area

○ Stony Spot

∞ Very Stony Spot

ψ Wet Spot

△ Other

⋯ Special Line Features

Water Features

〜 Streams and Canals

Transportation

┿ Rails

〰 Interstate Highways

〰 US Routes

〰 Major Roads

〰 Local Roads

Background

▩ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bonneville County Area, Idaho
Survey Area Data: Version 18, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	144.5	73.4%
11	Heiseton fine sandy loam, drained	51.7	26.3%
32	Pits	0.6	0.3%
Totals for Area of Interest		**196.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bonneville County Area, Idaho

10—Harston fine sandy loam

Map Unit Setting

National map unit symbol: 2tkp
Elevation: 4,200 to 5,900 feet
Mean annual precipitation: 8 to 13 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 80 to 126 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Harston and similar soils: 80 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harston

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or lacustrine deposits and/or loess

Typical profile

A - 0 to 10 inches: fine sandy loam
C1 - 10 to 20 inches: sandy loam
C2 - 20 to 25 inches: sandy loam
2C - 25 to 60 inches: very gravelly coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 8.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: B
Ecological site: R011XB021ID - Meadow DECA18-CANE2
Hydric soil rating: No

Minor Components

Xeric torrifluvents

Percent of map unit: 5 percent

Landform: Flood plains
Hydric soil rating: Yes

11—Heiseton fine sandy loam, drained

Map Unit Setting

National map unit symbol: 2tkq
Elevation: 4,200 to 5,900 feet
Mean annual precipitation: 8 to 13 inches
Mean annual air temperature: 39 to 46 degrees F
Frost-free period: 95 to 125 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Heiseton and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Heiseton

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A1 - 0 to 8 inches: fine sandy loam
A2 - 8 to 14 inches: fine sandy loam
Bw1 - 14 to 29 inches: fine sandy loam
Bw2 - 29 to 44 inches: fine sandy loam
Bk3 - 44 to 49 inches: fine sandy loam
2Bk4 - 49 to 60 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6c

Hydrologic Soil Group: A
Ecological site: R011XB001ID - Loamy 8-12 PZ
Hydric soil rating: No

Minor Components

Xeric torrifluvents

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

32—Pits

Map Unit Composition

Pits, gravel: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Gravel

Typical profile

C - 0 to 60 inches: gravel, cobbles

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Building Site Development

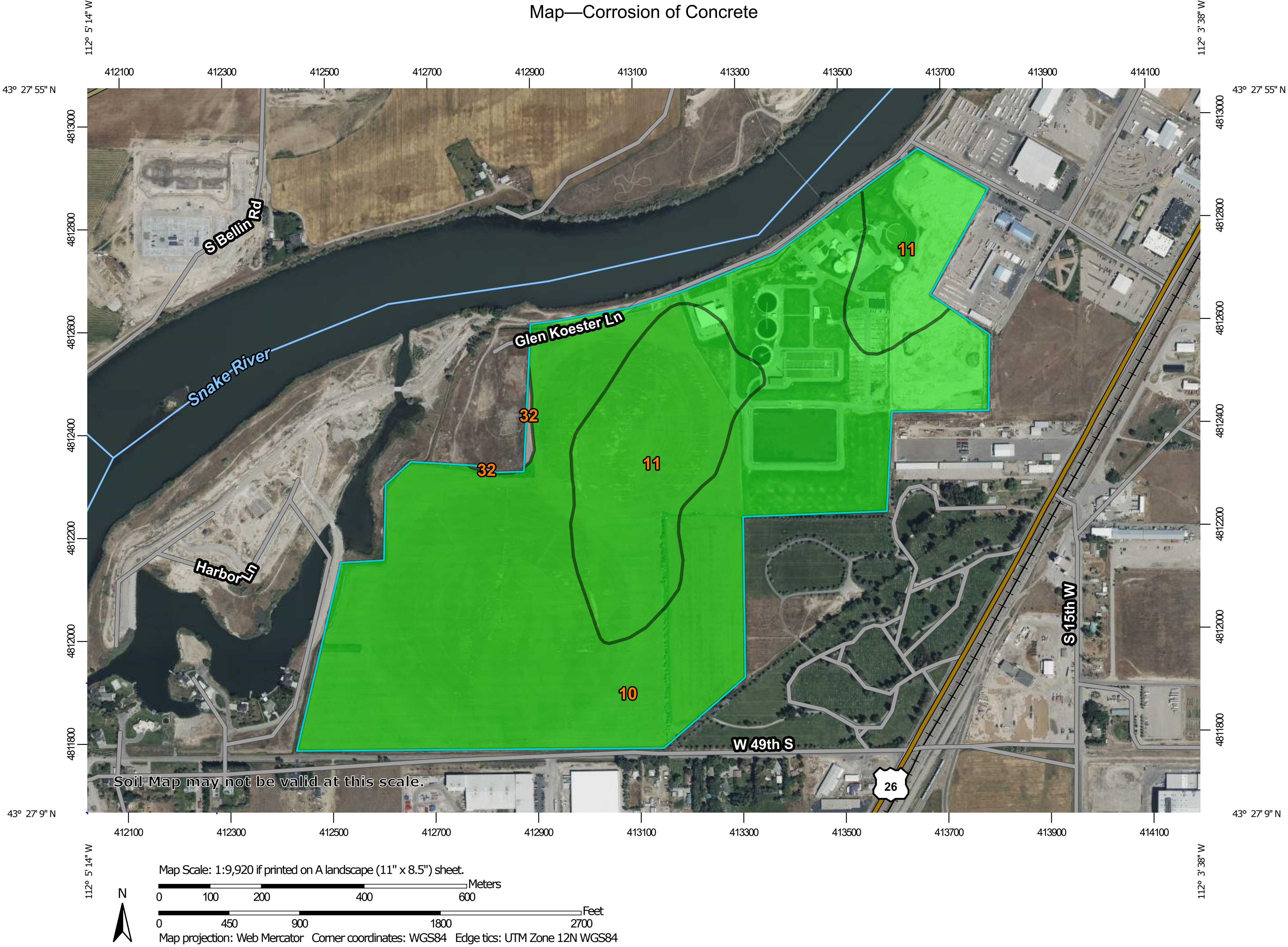
Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use. Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Corrosion of Concrete

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Map—Corrosion of Concrete



MAP LEGEND

Area of Interest (AOI)

- ▭ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟥 High
- 🟨 Moderate
- 🟩 Low
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 High
- 〰 Moderate
- 〰 Low
- 〰 Not rated or not available

Soil Rating Points

- ■ High
- ■ Moderate
- ■ Low
- ▣ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Soil Survey Area: Bonneville County Area, Idaho
Survey Area Data: Version 18, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Corrosion of Concrete

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	Low	144.5	73.4%
11	Heiseton fine sandy loam, drained	Low	51.7	26.3%
32	Pits		0.6	0.3%
Totals for Area of Interest			**196.8**	**100.0%**

Rating Options—Corrosion of Concrete

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

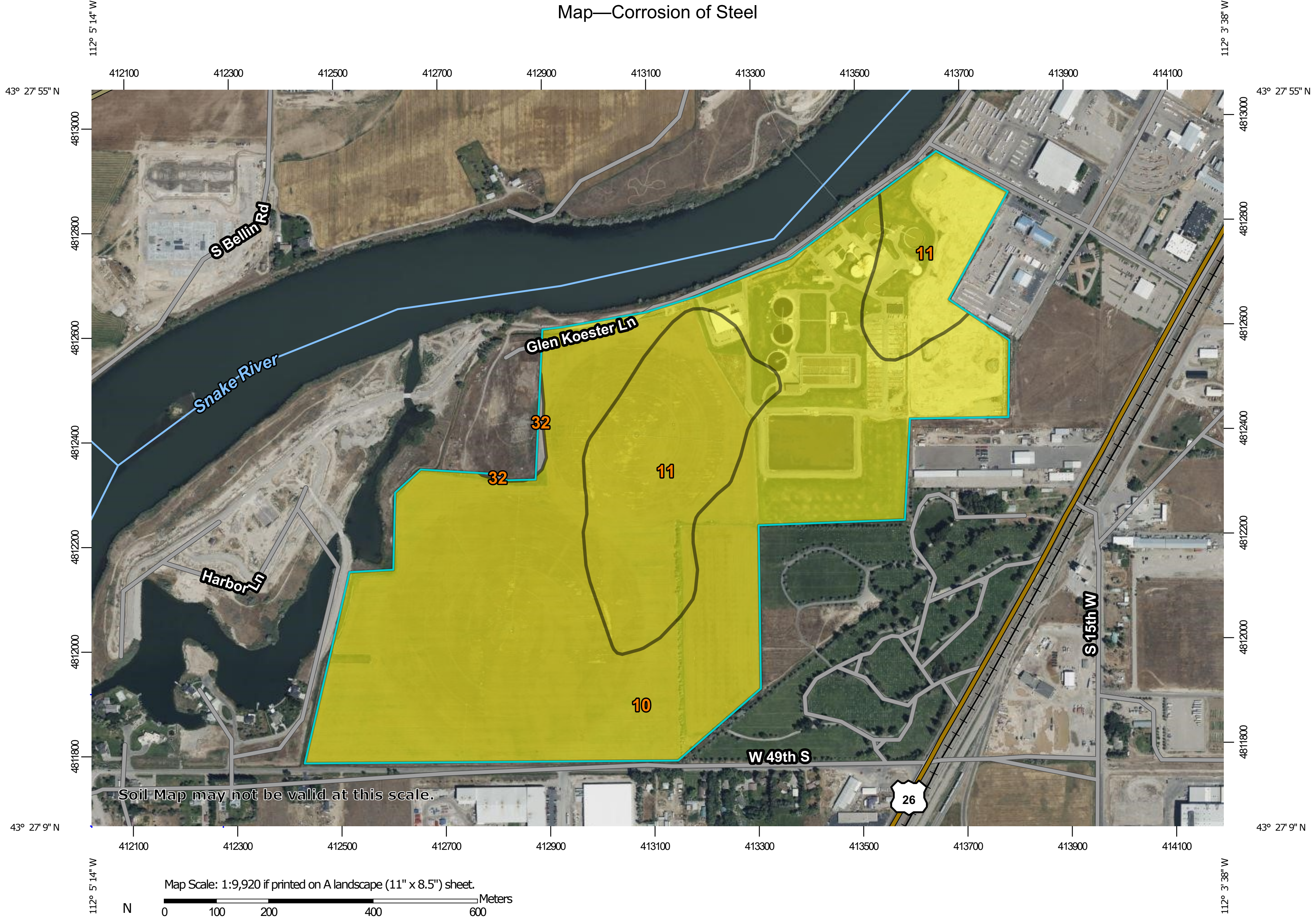
Tie-break Rule: Higher

Corrosion of Steel

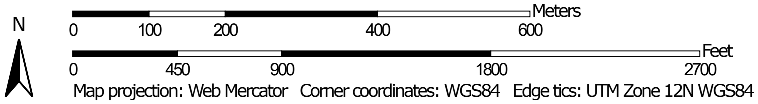
"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Custom Soil Resource Report
Map—Corrosion of Steel



Map Scale: 1:9,920 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- ☐ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟥 High
- 🟨 Moderate
- 🟩 Low
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 High
- 〰 Moderate
- 〰 Low
- 〰 Not rated or not available

Soil Rating Points

- 🟥 High
- 🟨 Moderate
- 🟩 Low
- ◻ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Table—Corrosion of Steel

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	Moderate	144.5	73.4%
11	Heiseton fine sandy loam, drained	Moderate	51.7	26.3%
32	Pits		0.6	0.3%
Totals for Area of Interest			**196.8**	**100.0%**

Rating Options—Corrosion of Steel

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Shallow Excavations

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

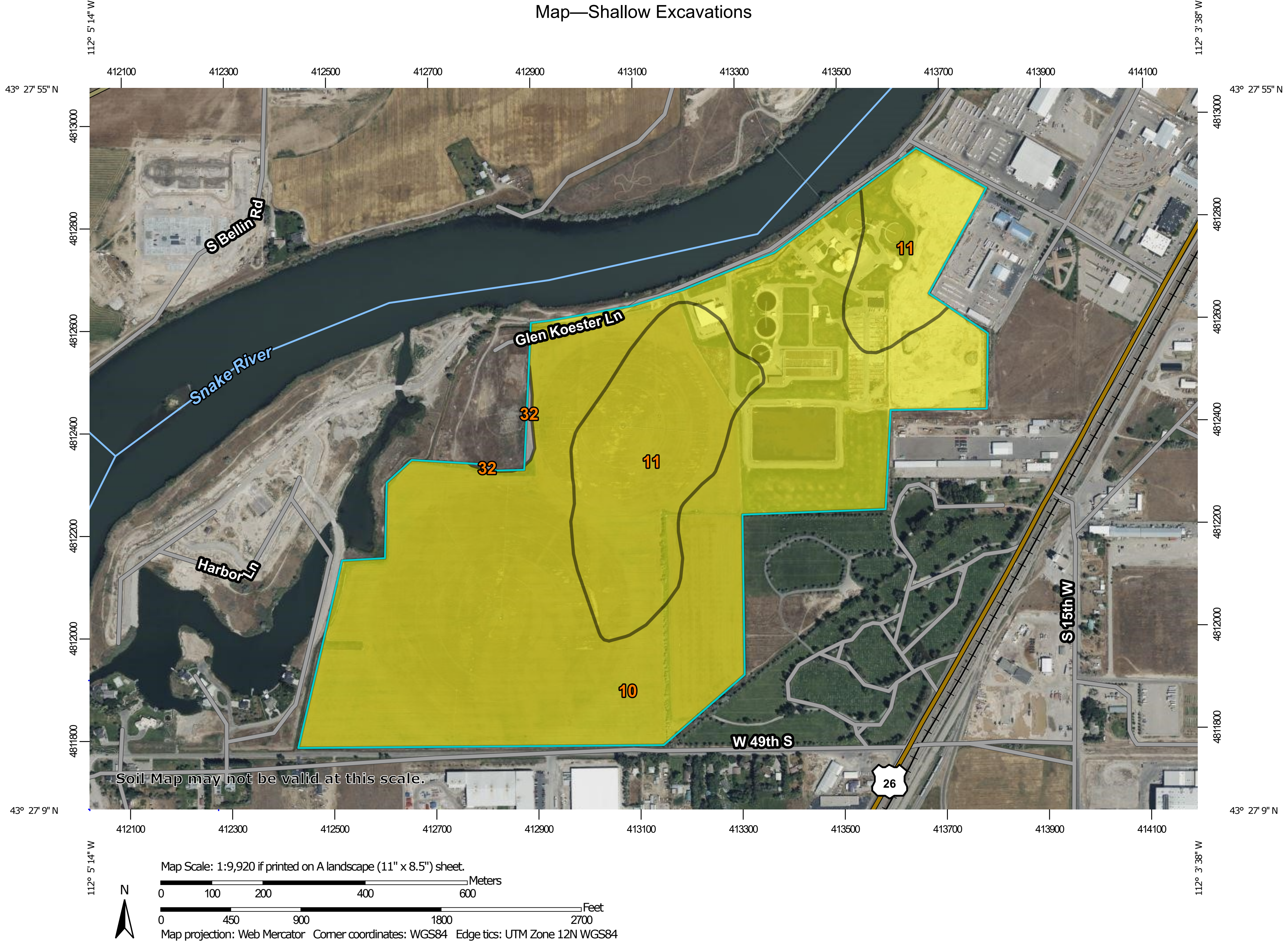
The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report
Map—Shallow Excavations



Map Scale: 1:9,920 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- ☐ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟥 Very limited
- 🟨 Somewhat limited
- 🟩 Not limited
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 Very limited
- 〰 Somewhat limited
- 〰 Not limited
- 〰 Not rated or not available

Soil Rating Points

- 🟥 Very limited
- 🟨 Somewhat limited
- 🟩 Not limited
- ◻ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bonneville County Area, Idaho
Survey Area Data: Version 18, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Shallow Excavations

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	Somewhat limited	Harston (80%)	Unstable excavation walls (0.72)	144.5	73.4%
				Dusty (0.03)		
11	Heiseton fine sandy loam, drained	Somewhat limited	Heiseton (90%)	Dusty (0.05)	51.7	26.3%
				Unstable excavation walls (0.01)		
32	Pits	Not rated	Pits, gravel (100%)		0.6	0.3%
Totals for Area of Interest					**196.8**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Somewhat limited	196.2	99.7%
Null or Not Rated	0.6	0.3%
Totals for Area of Interest	**196.8**	**100.0%**

Rating Options—Shallow Excavations

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

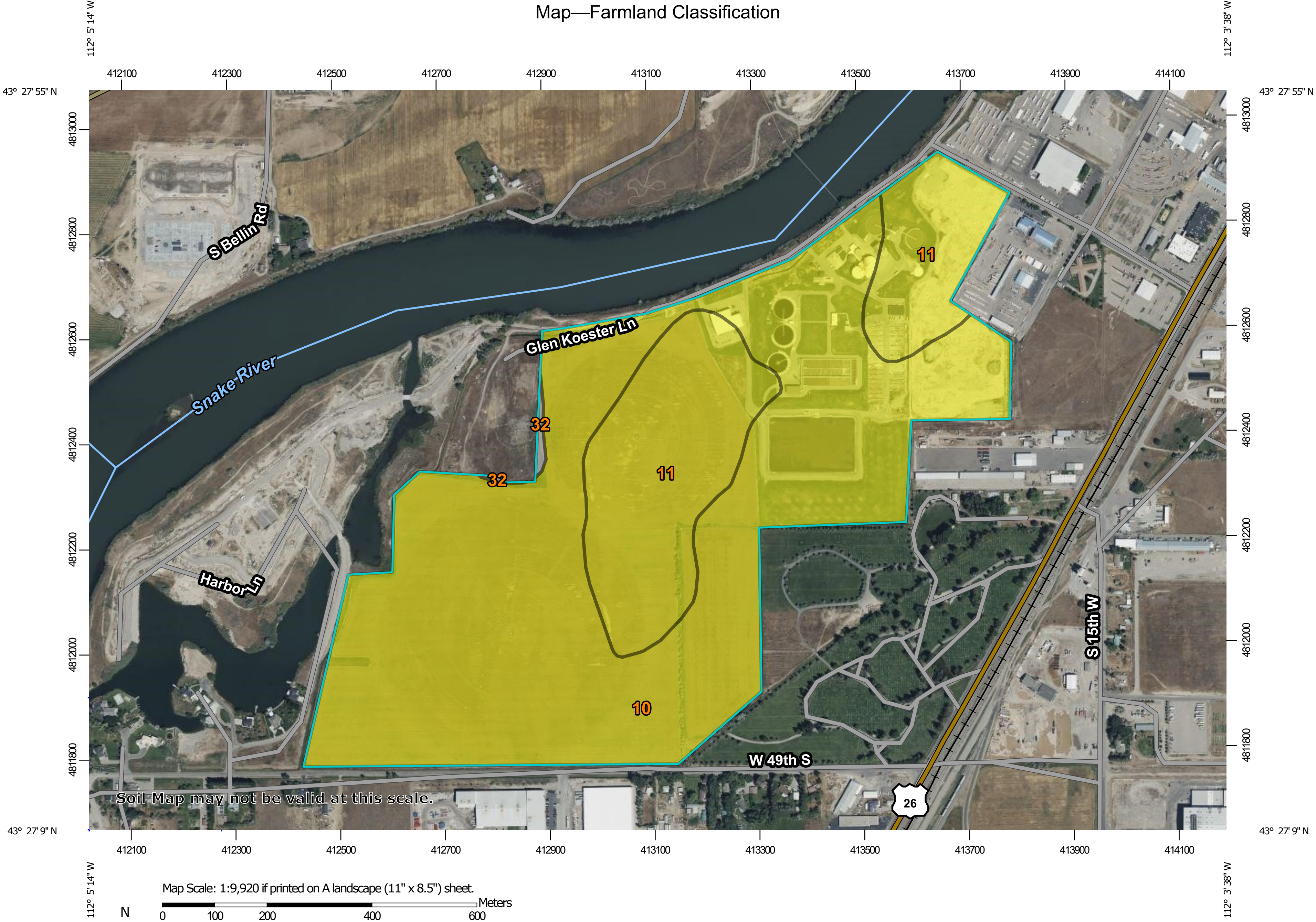
Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

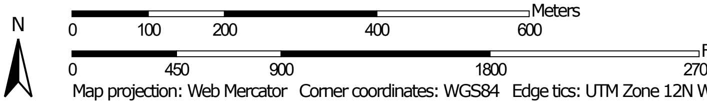
Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Map—Farmland Classification



Map Scale: 1:9,920 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

⬜ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟥 Not prime farmland
- 🟩 All areas are prime farmland
- 🟩 Prime farmland if drained
- 🟩 Prime farmland if protected from flooding or not frequently flooded during the growing season
- 🟨 Prime farmland if irrigated
- 🟨 Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- 🟫 Prime farmland if irrigated and drained
- ⬜ Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- ⬜ Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- 🟦 Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- 🟦 Prime farmland if irrigated and reclaimed of excess salts and sodium
- 🟦 Farmland of statewide importance
- 🟦 Farmland of statewide importance, if drained
- 🟪 Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- 🟧 Farmland of statewide importance, if irrigated
- 🟩 Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- 🟩 Farmland of statewide importance, if irrigated and drained
- 🟫 Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- ⬜ Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- 🟪 Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- 🟪 Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- 🟨 Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- 🟦 Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- 🟫 Farmland of statewide importance, if warm enough
- 🟥 Farmland of statewide importance, if thawed
- 🟦 Farmland of local importance
- 🟧 Farmland of local importance, if irrigated
- 🟦 Farmland of unique importance
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 Not prime farmland
- 〰 All areas are prime farmland
- 〰 Prime farmland if drained
- 〰 Prime farmland if protected from flooding or not frequently flooded during the growing season
- 〰 Prime farmland if irrigated
- 〰 Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- 〰 Prime farmland if irrigated and drained
- 〰 Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

- 〰 Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- 〰 Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- 〰 Prime farmland if irrigated and reclaimed of excess salts and sodium
- 〰 Farmland of statewide importance
- 〰 Farmland of statewide importance, if drained
- 〰 Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- 〰 Farmland of statewide importance, if irrigated
- 〰 Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- 〰 Farmland of statewide importance, if irrigated and drained
- 〰 Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- 〰 Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- 〰 Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- 〰 Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- 〰 Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- 〰 Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- 〰 Farmland of statewide importance, if warm enough
- 〰 Farmland of statewide importance, if thawed
- 〰 Farmland of local importance
- 〰 Farmland of local importance, if irrigated
- 〰 Farmland of unique importance
- 〰 Not rated or not available

Soil Rating Points

- ■ Not prime farmland
- ■ All areas are prime farmland
- ■ Prime farmland if drained
- ■ Prime farmland if protected from flooding or not frequently flooded during the growing season
- ■ Prime farmland if irrigated
- ■ Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- ■ Prime farmland if irrigated and drained
- ■ Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- ■ Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- ■ Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- ■ Prime farmland if irrigated and reclaimed of excess salts and sodium
- ■ Farmland of statewide importance
- ■ Farmland of statewide importance, if drained
- ■ Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- ■ Farmland of statewide importance, if irrigated

- 🟩 Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- 🟩 Farmland of statewide importance, if irrigated and drained
- 🟥 Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- ⬜ Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- 🟪 Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- 🟪 Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- 🟨 Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- 🟩 Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- 🟫 Farmland of statewide importance, if warm enough
- 🟥 Farmland of statewide importance, if thawed
- 🟦 Farmland of local importance
- 🟧 Farmland of local importance, if irrigated
- 🟦 Farmland of unique importance
- ⬜ Not rated or not available

Water Features

- ~ Streams and Canals

Transportation

- ┼┼┼ Rails
- ~ Interstate Highways
- ~ US Routes
- ~ Major Roads
- ~ Local Roads

Background

- 🟩 Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 18, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	Prime farmland if irrigated	144.5	73.4%
11	Heiseton fine sandy loam, drained	Prime farmland if irrigated	51.7	26.3%
32	Pits		0.6	0.3%
Totals for Area of Interest			**196.8**	**100.0%**

Rating Options—Farmland Classification

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Waste Management

Waste Management interpretations are tools designed to guide the user in evaluating soils for use of organic wastes and wastewater as productive resources. Example interpretations include land application of manure, food processing waste, and municipal sewage sludge, and disposal of wastewater by irrigation or overland flow process.

Land Application of Municipal Sewage Sludge

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include saturated hydraulic conductivity (Ksat), depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

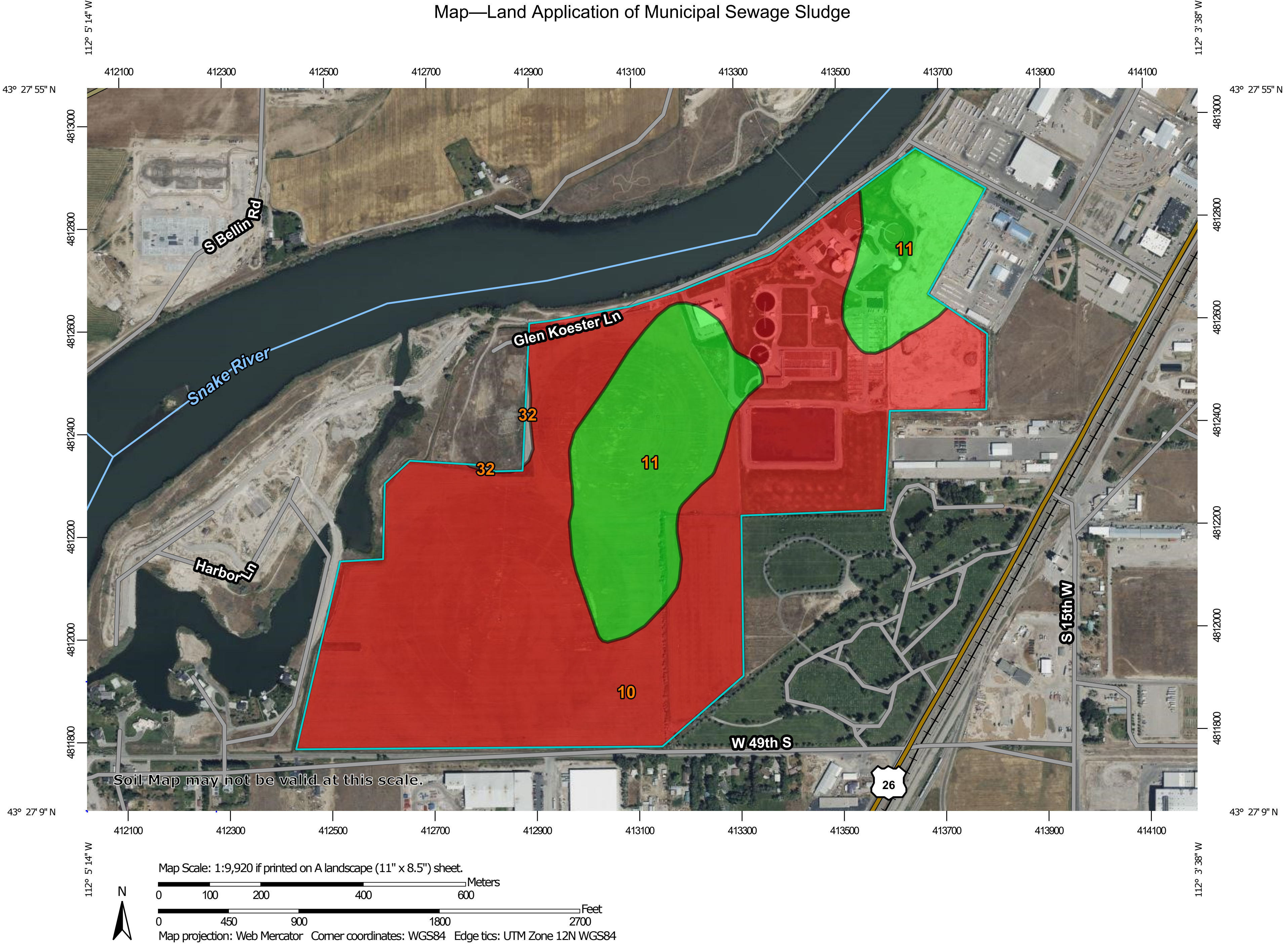
The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report
Map—Land Application of Municipal Sewage Sludge



Map Scale: 1:9,920 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- ▭ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟥 Very limited
- 🟨 Somewhat limited
- 🟩 Not limited
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 Very limited
- 〰 Somewhat limited
- 〰 Not limited
- 〰 Not rated or not available

Soil Rating Points

- ■ Very limited
- ■ Somewhat limited
- ■ Not limited
- ■ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 18, Sep 2, 2022

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Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Land Application of Municipal Sewage Sludge

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	Very limited	Harston (80%)	Filtering capacity (1.00)	144.5	73.4%
				Droughty (0.23)		
				Sodium content (0.02)		
11	Heiseton fine sandy loam, drained	Not limited	Heiseton (90%)		51.7	26.3%
32	Pits	Not rated	Pits, gravel (100%)		0.6	0.3%
Totals for Area of Interest					**196.8**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Very limited	144.5	73.4%
Not limited	51.7	26.3%
Null or Not Rated	0.6	0.3%
Totals for Area of Interest	**196.8**	**100.0%**

Rating Options—Land Application of Municipal Sewage Sludge

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Disposal of Wastewater by Irrigation

Wastewater includes municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. The effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, saturated hydraulic conductivity (Ksat), slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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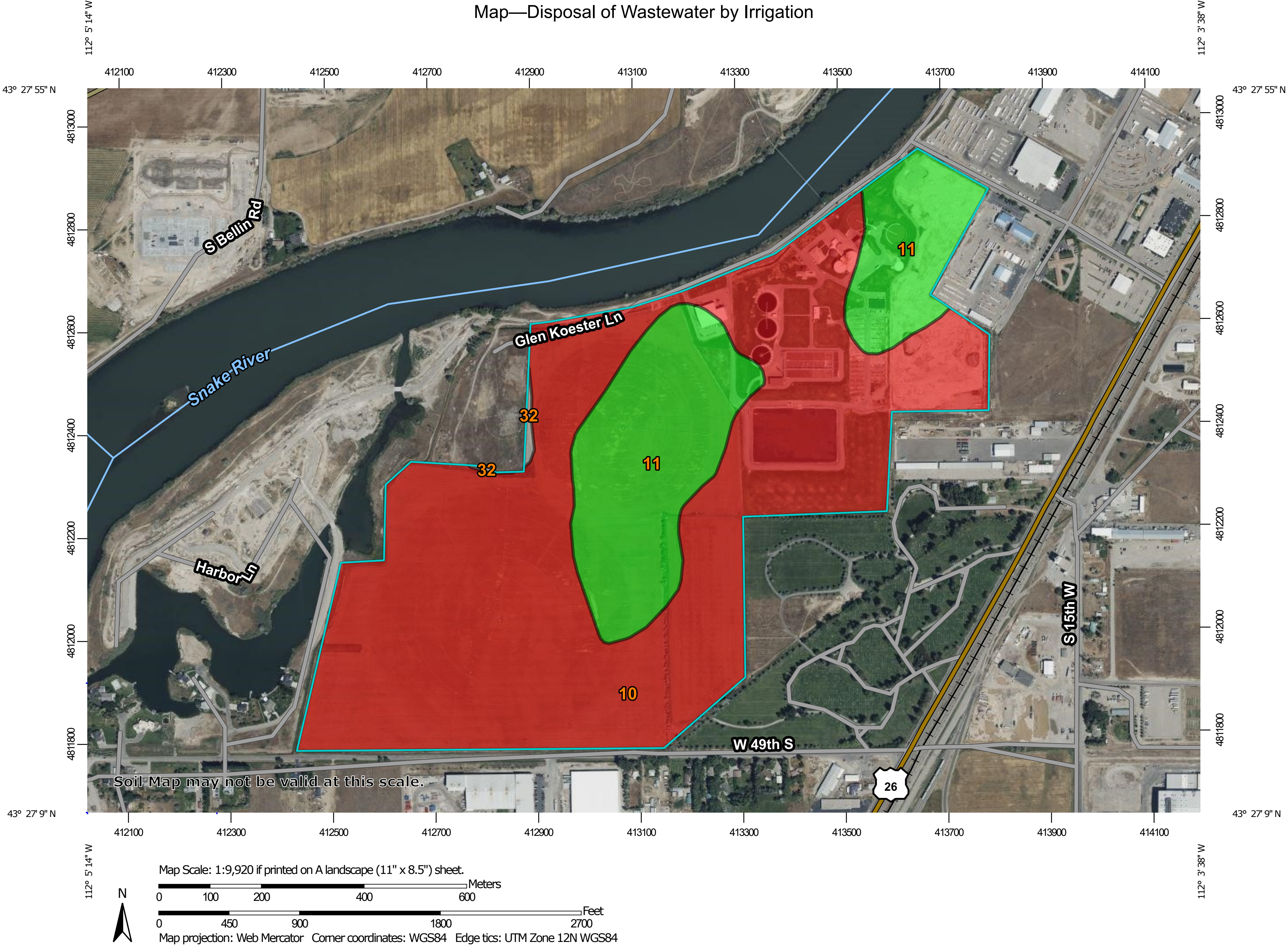
Map—Disposal of Wastewater by Irrigation



Map Scale: 1:9,920 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

☐ Area of Interest (AOI)

Soils

Soil Rating Polygons

🟥 Very limited

🟨 Somewhat limited

🟩 Not limited

⬜ Not rated or not available

Soil Rating Lines

〰 Very limited

〰 Somewhat limited

〰 Not limited

〰 Not rated or not available

Soil Rating Points

🟥 Very limited

🟨 Somewhat limited

🟩 Not limited

⬜ Not rated or not available

Water Features

〰 Streams and Canals

Transportation

┼┼┼ Rails

〰 Interstate Highways

〰 US Routes

〰 Major Roads

〰 Local Roads

Background

▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Bonneville County Area, Idaho
Survey Area Data: Version 18, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Disposal of Wastewater by Irrigation

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	Very limited	Harston (80%)	Filtering capacity (1.00)	144.5	73.4%
				Droughty (0.23)		
				Sodium content (0.02)		
11	Heiseton fine sandy loam, drained	Not limited	Heiseton (90%)		51.7	26.3%
32	Pits	Not rated	Pits, gravel (100%)		0.6	0.3%
Totals for Area of Interest					**196.8**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Very limited	144.5	73.4%
Not limited	51.7	26.3%
Null or Not Rated	0.6	0.3%
Totals for Area of Interest	**196.8**	**100.0%**

Rating Options—Disposal of Wastewater by Irrigation

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Water Features

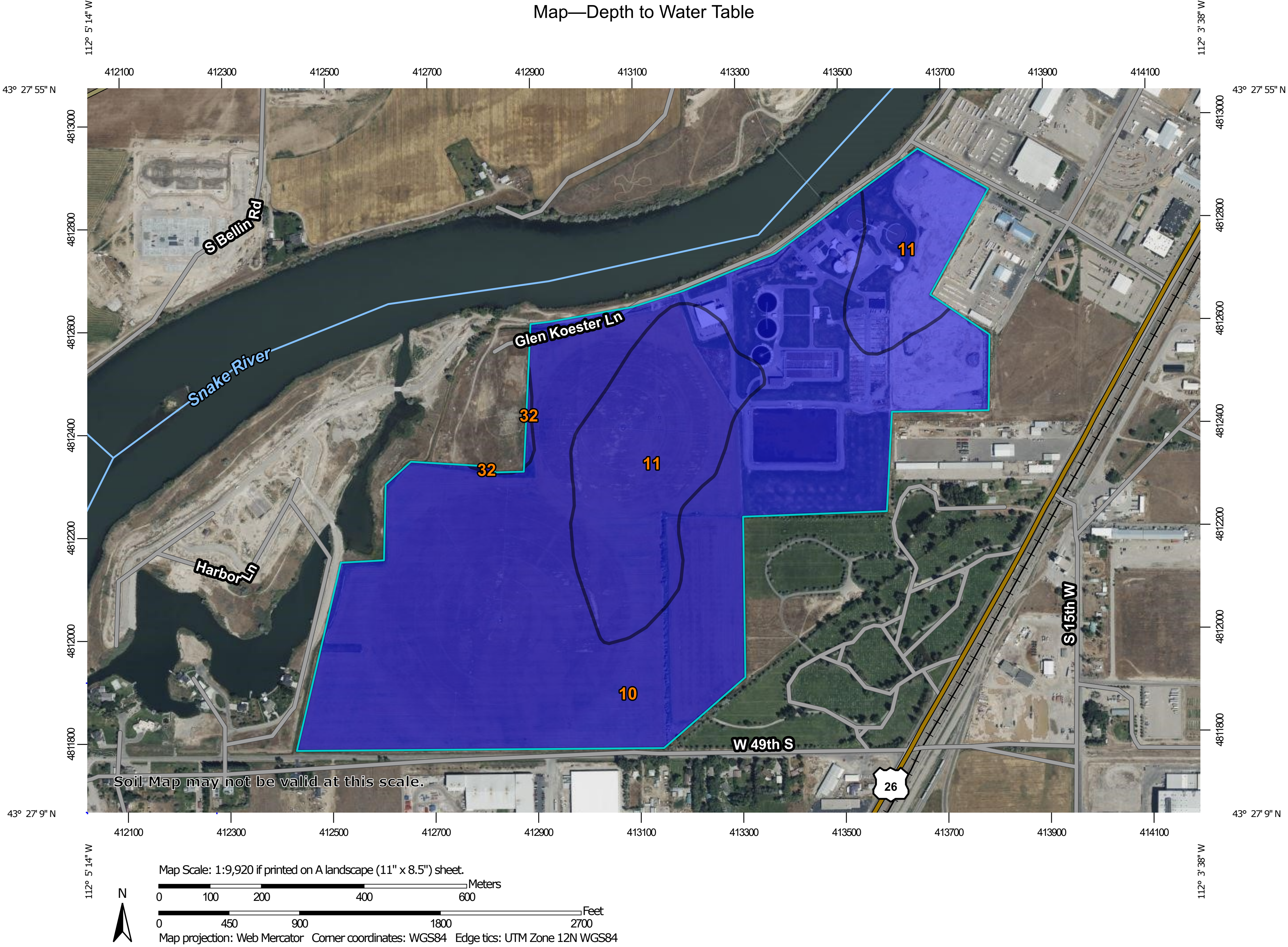
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Depth to Water Table



Map Scale: 1:9,920 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

⬜ Area of Interest (AOI)

Soils

Soil Rating Polygons

🟥 0 - 25
🟧 25 - 50
🟨 50 - 100
🟩 100 - 150
🟦 150 - 200
🟪 > 200
⬜ Not rated or not available

Soil Rating Lines

〰 0 - 25
〰 25 - 50
〰 50 - 100
〰 100 - 150
〰 150 - 200
〰 > 200
〰 Not rated or not available

Soil Rating Points

🟥 0 - 25
🟧 25 - 50
🟨 50 - 100
🟩 100 - 150
🟦 150 - 200
🟦 > 200
▣ Not rated or not available

Water Features

〰 Streams and Canals

Transportation

┼┼┼ Rails
〰 Interstate Highways
〰 US Routes
〰 Major Roads
〰 Local Roads

Background

▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bonneville County Area, Idaho
Survey Area Data: Version 18, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	>200	144.5	73.4%
11	Heiseton fine sandy loam, drained	>200	51.7	26.3%
32	Pits	>200	0.6	0.3%
Totals for Area of Interest			**196.8**	**100.0%**

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Flooding Frequency Class

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

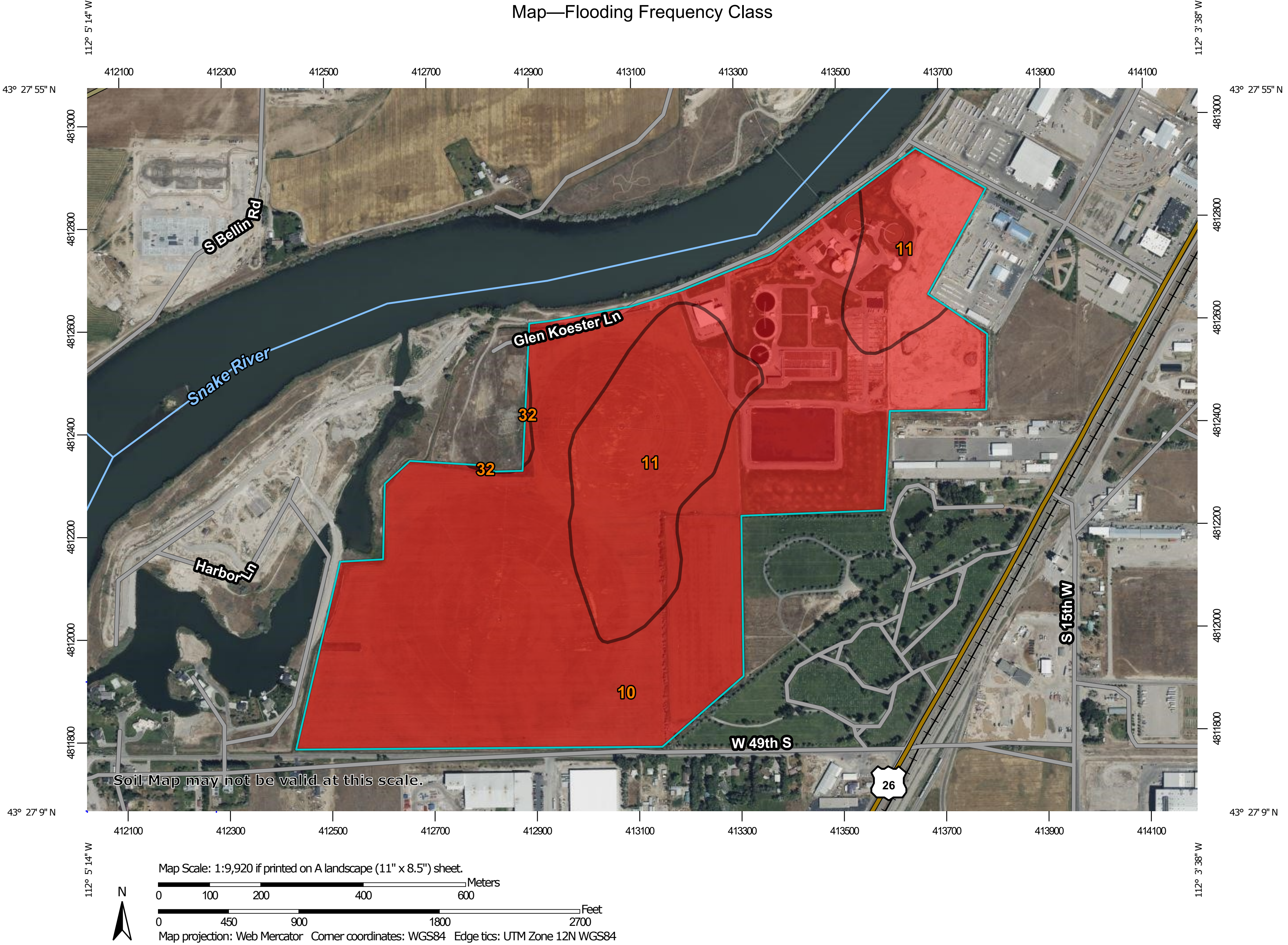
"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Map—Flooding Frequency Class



MAP LEGEND

Area of Interest (AOI)

- □ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟥 None
- 🟧 Very Rare
- 🟨 Rare
- 🟩 Occasional
- 🟦 Common
- 🟦 Frequent
- 🟪 Very Frequent
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 None
- 〰 Very Rare
- 〰 Rare
- 〰 Occasional
- 〰 Common
- 〰 Frequent
- 〰 Very Frequent
- 〰 Not rated or not available

Soil Rating Points

- 🟥 None
- 🟧 Very Rare
- 🟨 Rare
- 🟩 Occasional
- 🟦 Common
- 🟦 Frequent
- 🟦 Very Frequent
- ⬜ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bonneville County Area, Idaho
Survey Area Data: Version 18, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Flooding Frequency Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Harston fine sandy loam	None	144.5	73.4%
11	Heiseton fine sandy loam, drained	None	51.7	26.3%
32	Pits	None	0.6	0.3%
Totals for Area of Interest			**196.8**	**100.0%**

Rating Options—Flooding Frequency Class

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

References

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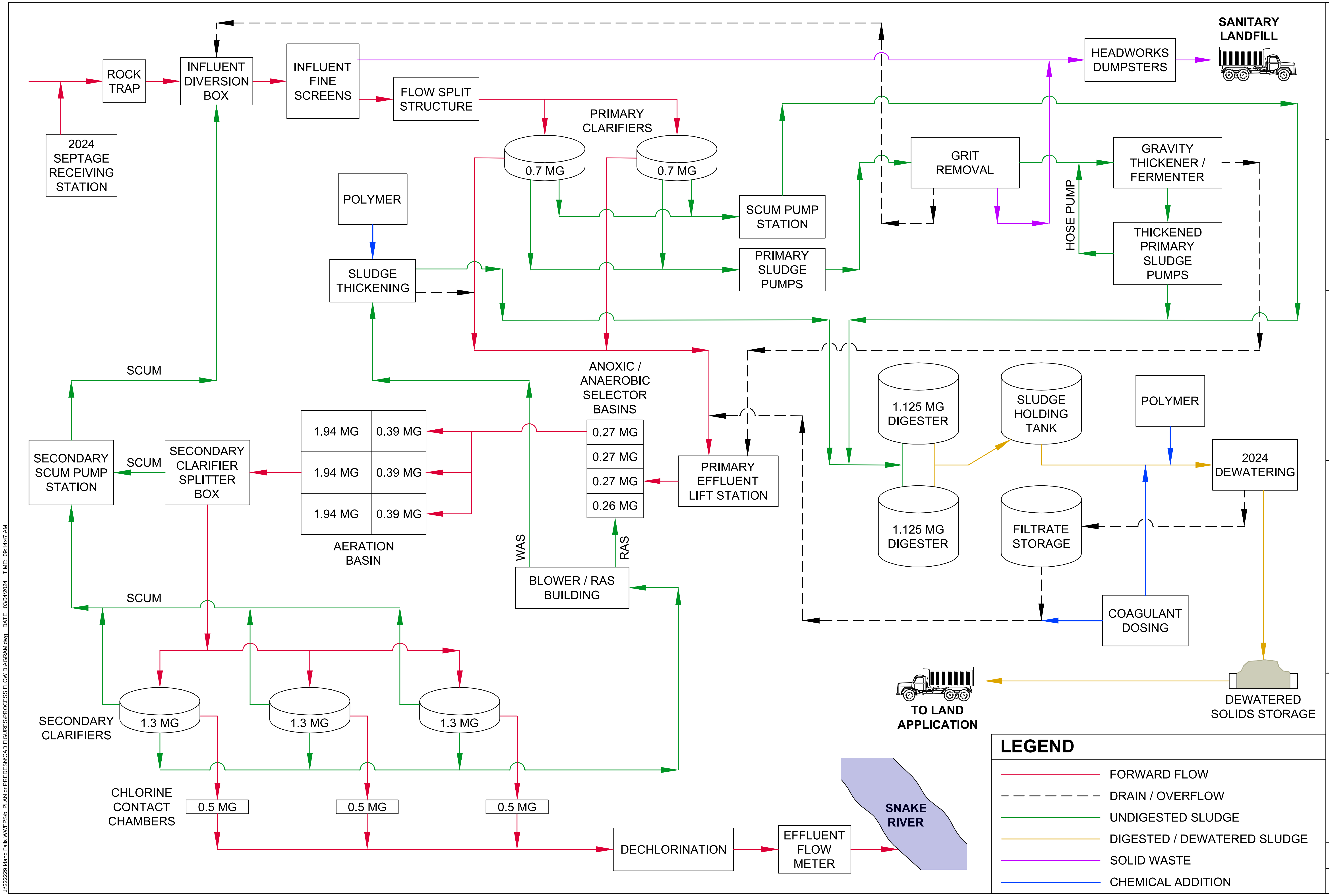


KELLER ASSOCIATES

Stantec

CITY OF IDAHO FALLS

WASTEWATER FACILITIES PLANNING STUDY

PROCESS FLOW DIAGRAM

PROJECT NO.
222229

FIGURE NO.
36

J:\222229 Idaho Falls WWFPS\b_PLAN or PREDESN\CAD FIGURES\PROCESS FLOW DIAGRAM.dwg DATE: 03/04/2024 TIME: 09:14:47 AM

U.S. Fish and Wildlife Service

National Wetlands Inventory

Idaho Falls WWTP Wetlands Map

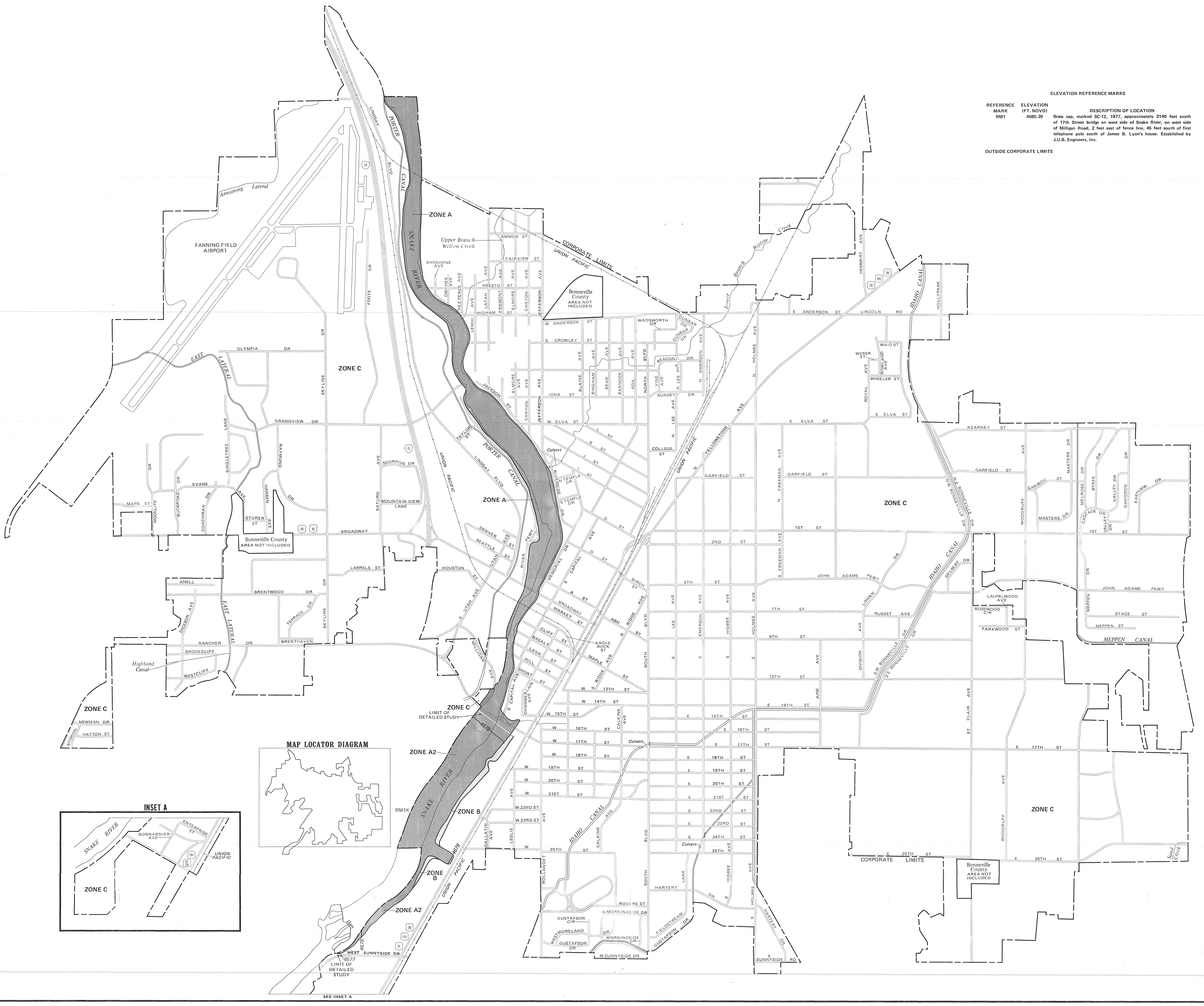
U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov

January 31, 2023

Wetlands

- 🟦 Estuarine and Marine Deepwater
- 🟩 Estuarine and Marine Wetland
- 🟩 Freshwater Emergent Wetland
- 🟩 Freshwater Forested/Shrub Wetland
- 🟦 Freshwater Pond
- 🟪 Lake
- 🟫 Other
- 🟦 Riverine

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM1	4685.39	Brass cap, marked SC-12, 1977, approximately 3140 feet south of 17th Street bridge on west side of Snake River, on west side of Milligan Road, 2 feet east of fence line, 45 feet south of first telephone pole south of James B. Lyon's house. Established by J.U.B. Engineers, Inc.

OUTSIDE CORPORATE LIMITS

KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	ZONE A1
Zone Designations*	ZONE A5
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	— — —
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

INITIAL IDENTIFICATION:
FEBRUARY 8, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
DECEMBER 12, 1975

FLOOD INSURANCE RATE MAP EFFECTIVE:
OCTOBER 15, 1982

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

N

APPROXIMATE SCALE
1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
IDAHO FALLS, IDAHO
BONNEVILLE COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
160029 0005 B

EFFECTIVE DATE:
OCTOBER 15, 1982

Federal Emergency Management Agency

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Bonneville County, Idaho

Local office

Idaho Fish And Wildlife Office

☎ (208) 378-5243
📠 (208) 378-5262

1387 South Vinnell Way, Suite 368
Boise, ID 83709-1657

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Yellow-billed Cuckoo Coccyzus americanus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-

measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American White Pelican pelecanus erythrorhynchos This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6886	Breeds Apr 1 to Aug 31
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black Tern Chlidonias niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
California Gull Larus californicus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
Cassin's Finch Carpodacus cassinii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15

Clark's Grebe Aechmophorus clarkii — Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Evening Grosbeak Coccothraustes vespertinus — Breeds May 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Franklin's Gull Leucophaeus pipixcan — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Marbled Godwit Limosa fedoa — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Olive-sided Flycatcher Contopus cooperi — Breeds May 20 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3914

Pinyon Jay Gymnorhinus cyanocephalus — Breeds Feb 15 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9420

Rufous Hummingbird selasphorus rufus — Breeds Apr 15 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Sage Thrasher Oreoscoptes montanus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9433	Breeds Apr 15 to Aug 10
Western Grebe aechmophorus occidentalis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (🟩)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (🟨)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

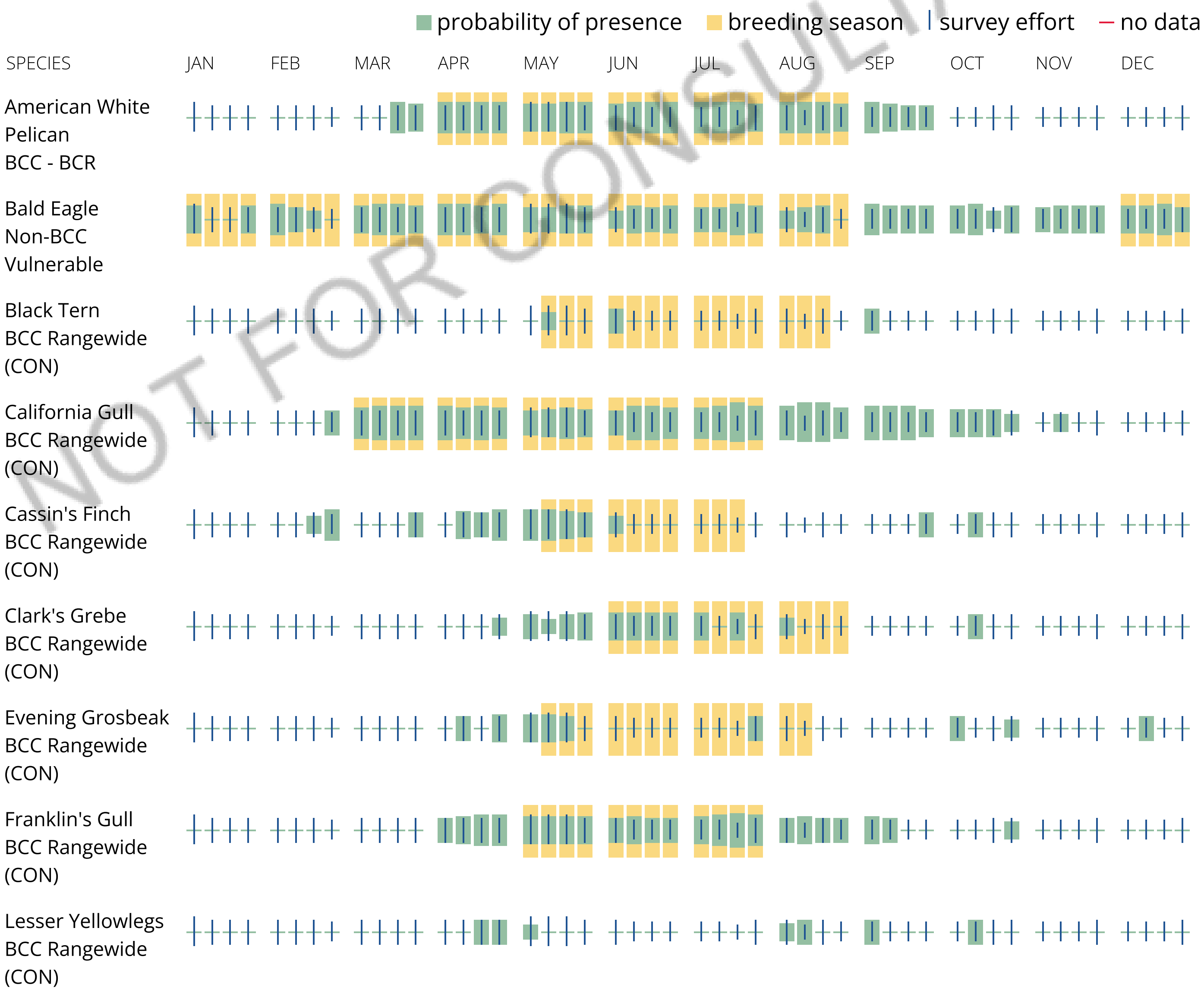
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam

Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND
- PSS1C

FRESHWATER POND
- PUBK

RIVERINE
- R3UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Description	No Action Alternative	Remove Storm Water Connections	Upgrade 3 Lift Stations per Year and Backup Generation	Upgrade at least 1% of Collection System	Procure Biosolids Handling Trucks	Facility Plan Update	Collection System Master Plan & Model Update	Developer Participation	Facility Asset Management	Secondary System Evaluation	Clean B System	Liquid Chlorine Disinfection and Gate Replacement	Screening/ Washer Compactor Improvements	Headworks Improvements	Moving Bed Biofilm Reactor (MBBR)	Makeup Air Unit and Corrosion Improvements
Physical Aspects	No Adverse Impact	Some Rock excavation may be necessary	Some Rock excavation may be necessary	Some Rock excavation may be necessary	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	Some Rock excavation may be necessary	No Impact	No Impact	No Impact	Some Rock excavation may be necessary	Some Rock excavation may be necessary
Land Use	No Adverse Impact	No impact due to public right of way	No impact due to site already being used	No impact due to site already being used	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	Minimal Impact due to location of building already, land has previously been disturbed	Minimal Impact due to change occurring in current site	No impact due to site already being used	No impact due to site already being used	Minimal Impact due to location of building already, land has previously been disturbed	No impact due to site already being used
Wetlands and Water Quality	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	No impact to wetlands but would improve encroaching nutrient limits	No Impact	No Impact	No Impact	No impact to wetlands but would improve encroaching nutrient limits	No Impact
Flora and Fauna	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Air Quality & Noise	No Adverse Impact	Temporary Noise & Dust During Construction	Temporary Noise & Dust During Construction	Temporary Noise & Dust During Construction	Only slight increase when in use but not more than what current trucks make	No Impact	No Impact	Unknown. Dependent on Developer	Slight increase during maintenance phase	No Impact	Slight Noise increase with new process. Potential air quality odor decrease	Slight increase during construction	Slight Increase during construction. No noise louder than current screening	Slight Increase during construction.	Slight Noise increase with new process	Slight Noise increase with new process, but air odor quality decrease
Energy	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	Improved energy use	No Impact	Slight energy increase for new process	Slight energy increase	Slight energy improvement with new screen	Improved Efficiency	Slight energy increase for new process	Slight energy increase for new process
Public Health	Potential Contamination as Maintenance is Deferred	Positive Impact due to reduced infiltration and unnecessary process treatment of excess water at WWTP	Keeps maintenance to prevent public flooding	Keeps maintenance updated to prevent public flooding	No Impact	No Impact	Improves	Unknown. Dependent on Developer	No Impact	Determines upcoming nutrient loads to meet permitting requirements	Decreases the odors and improves was sludge for biosolid permitting before dewatering	Removes possible public health disaster with chlorine gas	Improves all processes by decreasing ragging	No Impact	Lowers upcoming nutrient loads to meet permitting requirements	Decreases H2S exposure

MEMO

TO: JARED RICHENS, P.E., KELLER ASSOCIATES
FROM: LADONN KAYLOR, DEPARTMENT OF ENVIRONMENTAL QUALITY GRANT AND LOAN PROGRAM
SUBJECT: CITY OF IDAHO FALLS WASTEWATER IMPROVEMENT PROJECT – THREATENED/ENDANGERED SPECIES AND ESSENTIAL FISH HABITAT
DATE: FEBRUARY 8, 2024

The proposed project for the City of Idaho Falls is located in Bonneville County and is proposing to make improvements to their wastewater system. The project consists of the following:

- Constructing a Clean B System at the wastewater treatment plant (WWTP);
- Constructing an Ultraviolet (UV) disinfection at the WWTP;
- Constructing a Moving Bed Biofilm Reactor (MBBR) at the WWTP; and
- Adding a new digester to the WWTP.

The project will address deficiencies with wastewater treatment.

Summary of Determinations

Based on the information presented in the following sections of this memorandum, DEQ has made the following impact determinations:

- The proposed project will have "**NO EFFECT**" on federally listed, proposed, or candidate species or critical habitat.
- The proposed project will have "**NO EFFECT"** on Essential Fish Habitat.

Endangered Species Act

DEQ utilized the Information Planning and Conservation (IPaC) Tool to aid in determining endangered and threatened species within the Area of Potential Effect (APE). The IPaC Tool can currently be accessed at the following internet address:

http://ecos.fws.gov/ipac/

The official species list obtained via the IPaC tool on February 6, 2024, indicated there are two (2) threatened, endangered, or candidate species on this species list. The species list indicated there are no critical habitats, wholly or partially located within the boundaries of the APE. The output from the IPaC tool is attached to this memorandum.

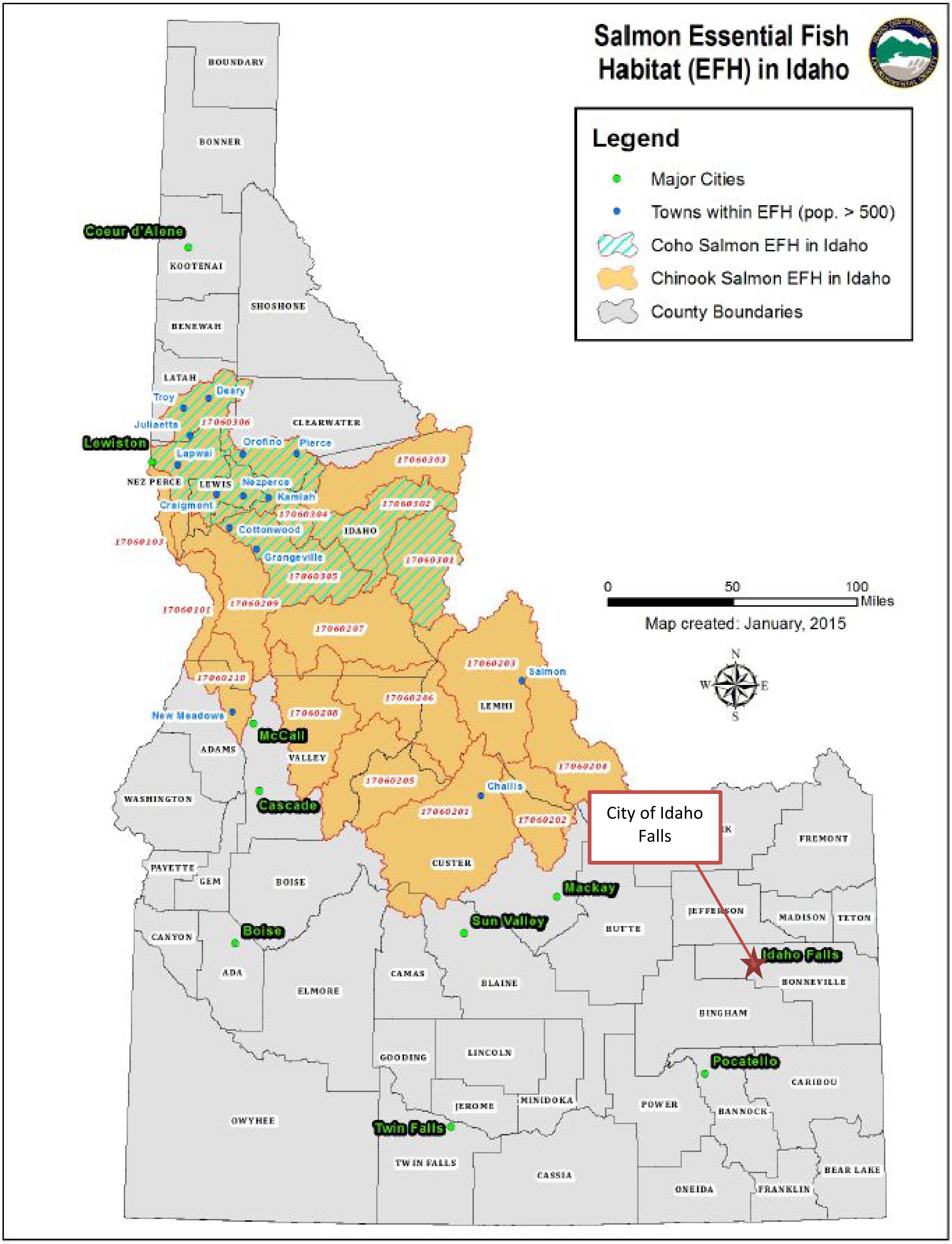
Yellow-billed Cuckoo (*Coccyzus americanus;* threatened) – Yellow-billed Cuckoos use wooded habitats with dense cover and water nearby, including woodlands with low, scrubby, vegetation, overgrown orchards, abandoned farmlands, and dense thickets along streams and marshes. In the west, nests are often placed in willows along streams and rivers, with nearby cottonwoods serving as foraging sites. The proposed improvements will have **"NO EFFECT"** on the species and its critical habitat as the proposed work is occurring within/adjacent to existing disturbance.

Monarch Butterfly (*Danaus plexippus*; candidate*)* – The monarch butterfly is large and conspicuous with bright orange wings surrounded by a black border and covered with black veins. In the regions they are present, monarchs breed year-round, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. The proposed improvements will have **"NO EFFECT"** on the species and its critical habitat as the proposed work is occurring within/adjacent to existing disturbance.

Therefore, the proposed project will have "**NO EFFECT**" on federally listed, proposed, or candidate species or critical habitat.

Essential Fish Habitat

The project is located **outside** of all Essential Fish Habitat (EFH) for Chinook Salmon (*Oncorhynchus tshawytscha*) and Coho Salmon (*Oncorhynchus kisutch*) as identified in the attached EFH map. "All those water bodies occupied or historically accessible" in the identified hydrologic units are considered EFH, according to 50 CFR 660.412. The project will have **"NO EFFECT"** on Essential Fish Habitat.



Salmon Essential Fish Habitat (EFH) in Idaho

City of Idaho Falls

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Idaho Fish And Wildlife Office
1387 South Vinnell Way, Suite 368
Boise, ID 83709-1657
Phone: (208) 378-5243 Fax: (208) 378-5262

In Reply Refer To:
Project Code: 2024-0045556
Project Name: Idaho Falls Wastewater Treatment Plant Project

February 06, 2024

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Idaho Fish And Wildlife Office
1387 South Vinnell Way, Suite 368
Boise, ID 83709-1657
(208) 378-5243

PROJECT SUMMARY

Project Code:	2024-0045556
Project Name:	Idaho Falls Wastewater Treatment Plant Project
Project Type:	Wastewater Facility - New Construction
Project Description:	Working within existing Wastewater Treatment Plant (WWTP) footprint to add a Clean B System, UV Disinfection, Moving Bed Biofilm Reactor (MBBR), and a New Digester.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@43.459351850000004,-112.0723825015035,14z

Counties: Bonneville County, Idaho

ENDANGERED SPECIES ACT SPECIES

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911 General project design guidelines: https://ipac.ecosphere.fws.gov/project/Q5BXCYKAOVC45MZ3PVXTTIUA2U/documents/generated/7151.pdf	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

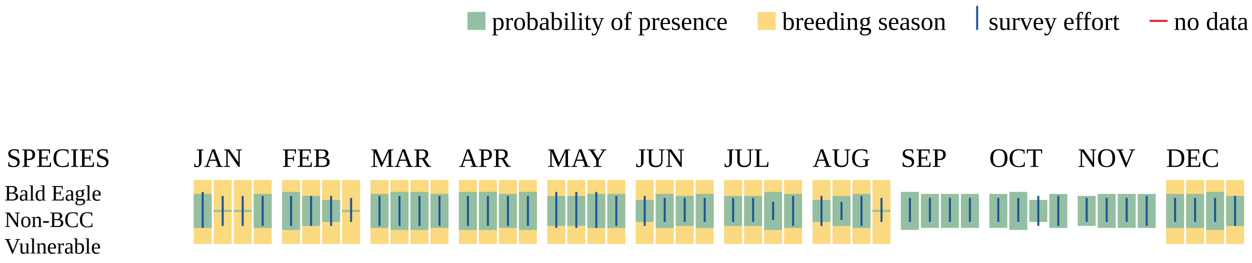
Probability of Presence (🟩)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (🟨)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (−)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American White Pelican *pelecanus erythrorhynchos* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6886	Breeds Apr 1 to Aug 31
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
California Gull *Larus californicus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10955	Breeds Mar 1 to Jul 31
Cassin's Finch *Carpodacus cassinii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10575	Breeds Jun 1 to Aug 31
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9465	Breeds May 15 to Aug 10

NAME	BREEDING SEASON
Franklin's Gull *Leucophaeus pipixcan* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10567	Breeds May 1 to Jul 31
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Pectoral Sandpiper *Calidris melanotos* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9561	Breeds elsewhere
Pinyon Jay *Gymnorhinus cyanocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9420	Breeds Feb 15 to Jul 15
Rufous Hummingbird *selasphorus rufus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds Apr 15 to Jul 15
Sage Thrasher *Oreoscoptes montanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9433	Breeds Apr 15 to Aug 10
Western Grebe *aechmophorus occidentalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31

NAME	BREEDING SEASON
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10669	Breeds Apr 20 to Aug 5

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (🟩)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (🟨)

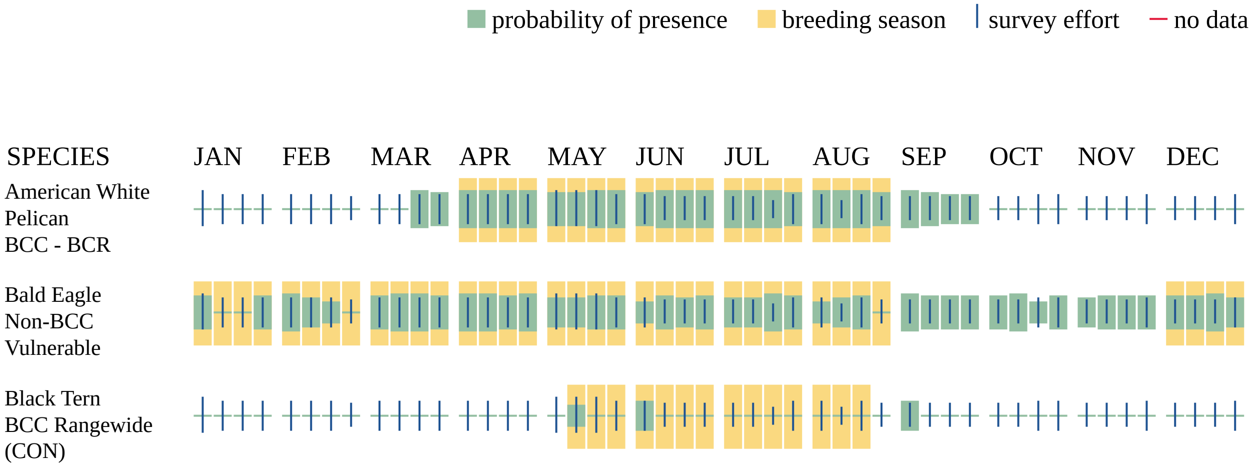
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

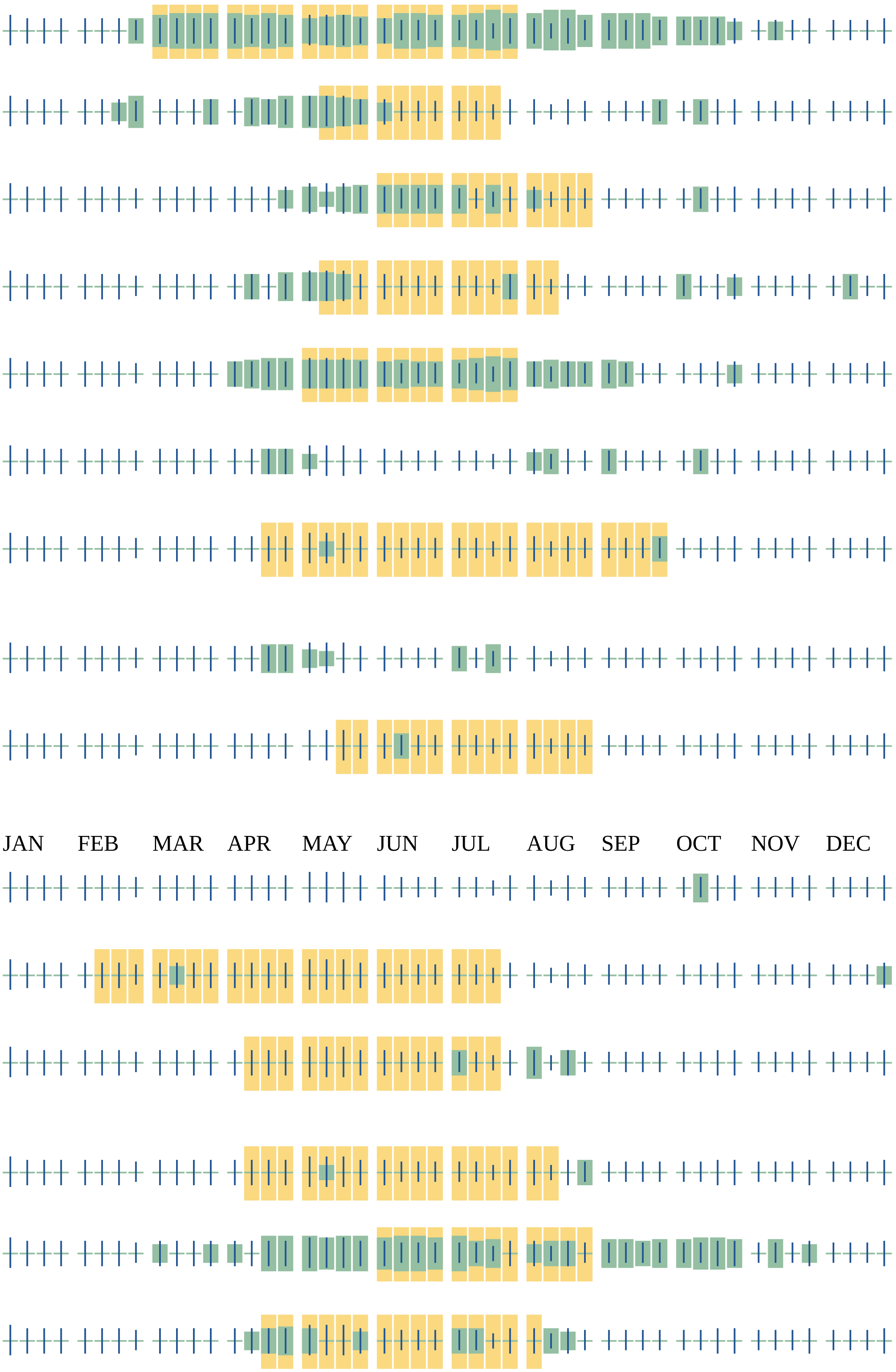
Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.





California Gull
BCC Rangewide
(CON)

Cassin's Finch
BCC Rangewide
(CON)

Clark's Grebe
BCC Rangewide
(CON)

Evening Grosbeak
BCC Rangewide
(CON)

Franklin's Gull
BCC Rangewide
(CON)

Lesser Yellowlegs
BCC Rangewide
(CON)

Lewis's Woodpecker
BCC Rangewide
(CON)

Marbled Godwit
BCC Rangewide
(CON)

Olive-sided Flycatcher
BCC Rangewide
(CON)

Pectoral Sandpiper
BCC Rangewide
(CON)

Pinyon Jay
BCC Rangewide
(CON)

Rufous Hummingbird
BCC Rangewide
(CON)

Sage Thrasher
BCC - BCR

Western Grebe
BCC Rangewide
(CON)

Willet
BCC Rangewide
(CON)

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R3UBH

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1C

FRESHWATER POND

- PUBK
- PUBHx

IPAC USER CONTACT INFORMATION

Agency:	Idaho Department of Environmental Quality
Name:	LaDonn Kaylor
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Email	ladonn.kaylor@deq.idaho.gov
Phone:	2083730556

APPENDIX B: HYDRAULIC PROFILE

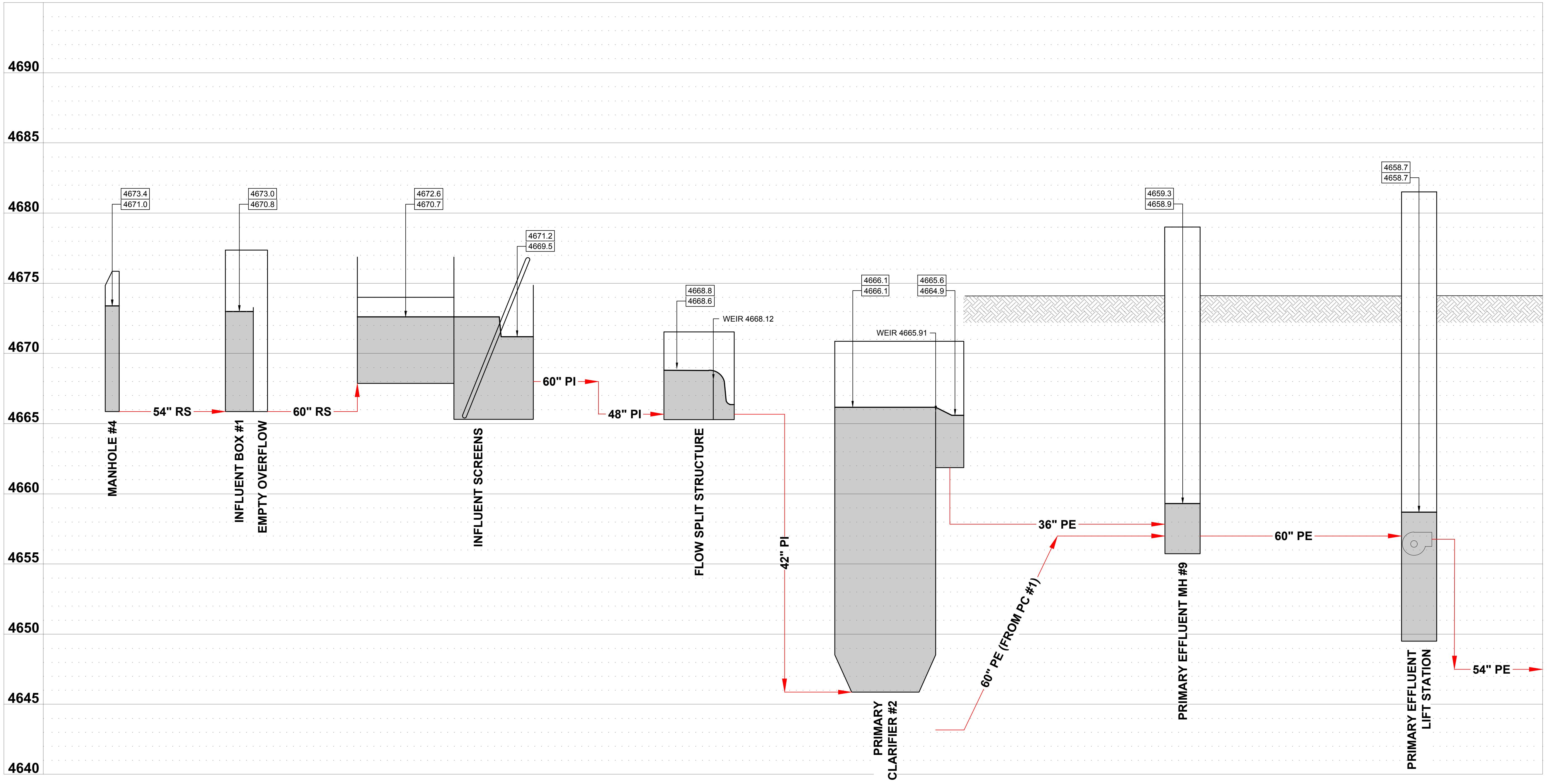
Figure 1/ 2 Hydraulic profile

J:\222229 IDAHO FALLS WWFPS\C_DESN_CAD\222229-HYD PROFILE.DWG LAST SAVED: 6/20/2023 1:50 PM PRINTED: 6/26/2023 11:32 AM

4665.6	2045 PROJECTED PHF: 44.6 MGD (FF), 23.9 MGD (RAS), 0 MGD (MLR)
4665.3	2022 ESTIMATED PHF: 27.5 MGD (FF), 22.0 MGD (RAS), 0 MGD (MLR)

NOTES:

1. WATER SURFACE SHOWN IS FOR THE "2045 PROJECTED PEAK HOUR FLOW"
2. UNITS ON-LINE: 2 SCREENS, 2 PRIMARY CLARIFIERS, 2 AERATION BASINS, 3 SECONDARY CLARIFIERS
3. SCREEN DESIGNED FOR MAX TAILWATER OF 4672.50 (CH2M, 2000)
4. ELEVATIONS SHOWN ARE BASED ON NEW CITY DATUM (NAVD 88) IN 2004. TO ADJUST OLD DATUM (NGVD 29) TO NEW DATUM, ADD 2.80 FT.
5. MODEL BASED ON DESIGN AND RECORD DRAWINGS DEVELOPED BY (CH2M, 1971; CH2M, 2003; MSA, 2012; MSA, 2017)



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Construction

NO.	REVISIONS	DATE

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IDAHO FALLS PUBLIC WORKS

IDAHO FALLS WWFPS

HYDRAULIC PROFILE

DRAWN: --- CHECK: ---

VERIFY SCALE: Scales based on 22"x34" prints.
1-1/2 Inches

PROJECT NO. 222229
PAGE

SHEET NO. HP-1

4665.62	2045 PROJECTED PHF: 44.6 MGD (FF), 23.9 MGD (RAS), 0 MGD (MLR)
4665.37	2022 ESTIMATED PHF: 27.5 MGD (FF), 22.0 MGD (RAS), 0 MGD (MLR)

NOTES:

1. WATER SURFACE SHOWN IS FOR THE "2045 PROJECTED PEAK HOUR FLOW"
2. UNITS ON-LINE: 2 SCREENS, 2 PRIMARY CLARIFIERS, 2 AERATION BASINS, 3 SECONDARY CLARIFIERS
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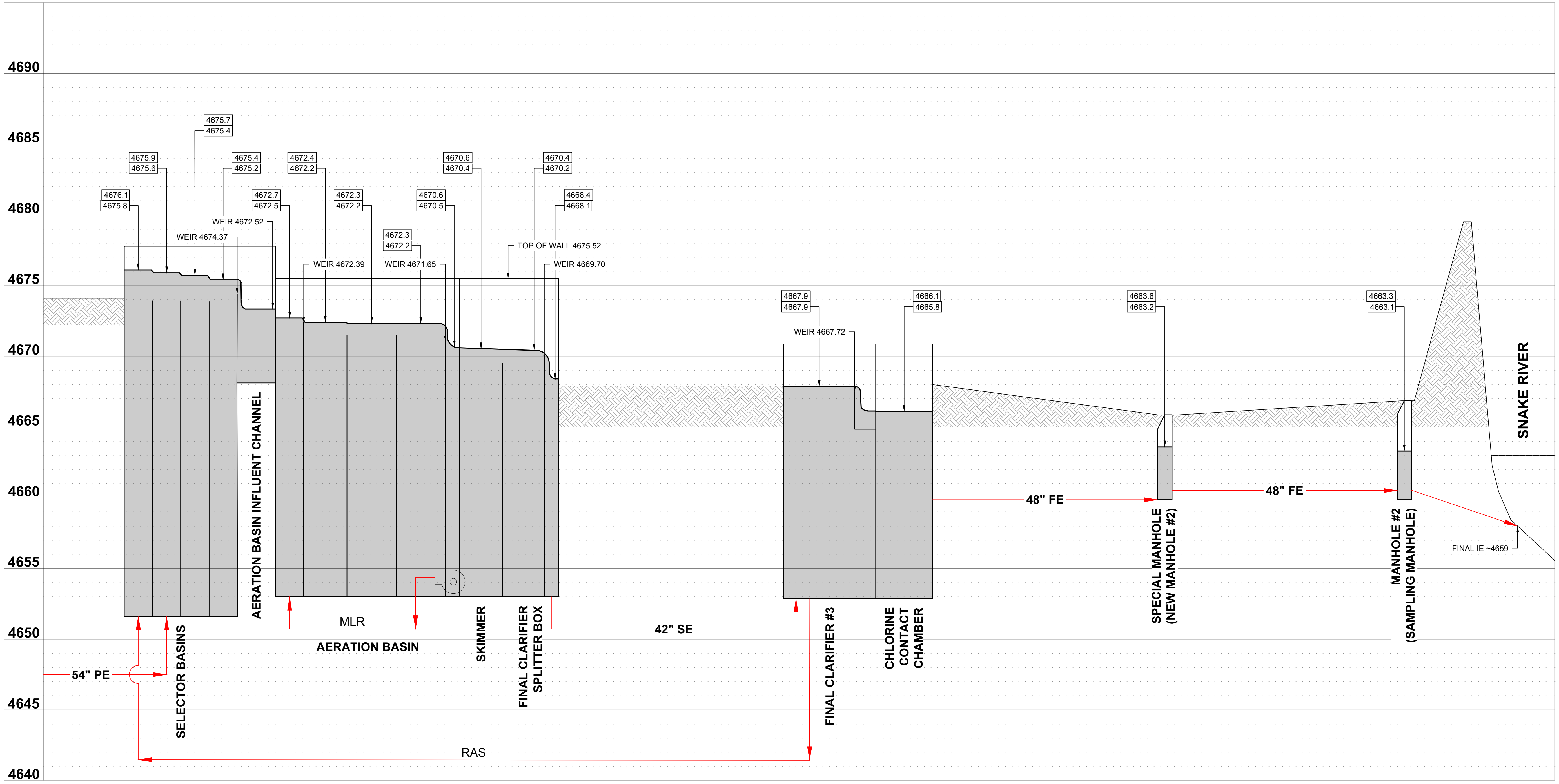

J:\222229 IDAHO FALLS WWFPS\C_DESN_CAD\222229-HYD PROFILE.DWG LAST SAVED: 6/20/2023 10:30 AM PRINTED: 6/20/2023 11:21 AM

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IDAHO FALLS WWFPS

HYDRAULIC PROFILE

DRAWN: --- CHECK: ---

VERIFY SCALE: Scales based on 22"x34" prints.

1-1/2 Inches

PROJECT NO. 222229

PAGE

SHEET NO. HP-2

APPENDIX C: BIOSOLIDS

BCR Pilot study

BCR Budget

CleanB® Demonstration Report: Idaho Falls WWTP

09/01/2023

BCR
Solid Solutions

Contents

Section 1 – Project Overview

1.1 - Project Background

The Idaho Falls Wastewater Treatment Plant (IFWWTP) currently employs an arrangement of four anaerobic digesters—two first stage and two second stage—to generate Class B biosolids that are suitable for land application. Given the recent surge in influent flow rates and projected future increases, the facility anticipates that the current digester capacity will fall short of accommodating these forthcoming flows. This necessitates a decision between an extensive and time-intensive digester expansion or exploring an alternative technology capable of treating and converting their waste activated sludge (WAS) into Class B biosolids, concurrently augmenting the digester capacity. A CleanB® was deployed as a full-scale demonstration to side-stream all the facilities' WAS, bypassing the digesters. Side-streaming the WAS from the digesters would allow for more than two times the current digester capacity.

Figure 1 - Aerial View of Idaho Falls WWTP

The primary objective behind the CleanB® demonstration was to showcase the capabilities in managing the entirety of the facility's waste activated sludge while substantiating its proficiency in disinfection efficacy and complying with vector attraction reduction (VAR) requirements. Furthermore, the assessment extended to secondary benefits, encompassing the curtailment of soluble nutrients in the filtrate and the enhancement of odors emanating from the thickened biosolids. Of particular interest was total and reactive phosphorus, one of the primary building blocks for struvite formation, which has been a problem at the facility. Operationally, the demonstration aimed to offer a clear depiction of the operational simplicity and effectiveness of the CleanB® technology to operational personnel.

BCR personnel and the CleanB® Mobile Product Demonstration unit were on-site during the period from August 14, 2023 (Monday) to August 17, 2023 (Thursday). The CleanB® system was operational for approximately 12 hours on both Tuesday and Wednesday, and around 8 hours on Thursday, processing a total volume of approximately 360,000 gallons of waste activated sludge (WAS). The treated material from the CleanB® system was directed to gravity belt thickener (GBT) #2, and subsequently fed into the first-stage digesters. The flow rate through the CleanB® system ranged from 140 to 220 gallons per minute (gpm).

1.2 - Facility Overview

Idaho Falls WWTP has an annual average daily flow (AADF) of 10 MGD that produces roughly 3,000 dry tons of solids per year. The influent enters the headworks where the material is passed through a rock trap and influent screens. The facility is equipped with both primary and secondary clarifiers. Primary settled sludge is passed through a grit removal process and then comingles with thickened secondary sludge in the primary digesters. Primary effluent is sent to an aeration basin followed by secondary clarification. The clarified WAS is fed to one of two GBTs where it is thickened from ~0.8-1.2%TS to ~4-6%TS and then is pumped to the primary digesters. Solids retention time (SRT) of the primary digesters is ~15-20 days, then is transferred to two secondary digesters for approximately the same retention time (15-20 days). After digestion, the material is currently pumped to a large on-site lagoon for storage and is hauled off for liquid land application. The facility has plans in the near future to include a dewatering building utilizing screw presses for sludge dewatering.

The primary digesters are heated to approximately 100°F. Due to the nature of the anaerobic digestion process, and the high levels of phosphorus in the clarified WAS, the treated material is heavily loaded with soluble nutrients, particularly phosphorus and ammonia, creating an ideal condition for struvite formation. Periodically, the facility expends hefty resources to tediously remove the built-up struvite from the digesters. By side-streaming the highly phosphorus loaded WAS material from the digesters, struvite formation would be considerably reduced, while providing more the two times the current capacity in the existing digesters.

1.3 - Demonstration of CleanB® Operability at Idaho Falls

Implementing the CleanB® biosolids processing system at Idaho Falls demonstrated to be straightforward. The CleanB® system is a modular design and would include the following standard major components (sizing may be adjusted to accommodate existing space):

- CleanB® System - chemical injection skid, chlorine dioxide generator, piping, valves, instrumentation, contact system, control panel and all internal electrical wiring/conduit and mechanical piping/valves.
- Chemical storage tanks – two 5,500-gallon HDPE cross linked double-walled chemical tanks to store sodium chlorite (15% w/w) and sulfuric acid (50% w/w) with leak detection and level indication.

The CleanB® demonstration utilized chemical supply from two (2) 270-gallon chemical totes of each chemical. WAS was pumped directly from the WAS pump to the CleanB® unit. Treated material exiting the system was sent directly to gravity belt thickener #2.

BCR personnel operated the CleanB® unit during the demonstration period. Idaho Falls WWTP personnel operated the gravity belt thickener.

1.4 - Demonstration Objectives

The objectives below were successfully achieved:

- Demonstrate that the CleanB® system can consistently disinfect to a Class B biosolid
- Demonstrate that the CleanB® system can consistently meet VAR (Option #4), soluble oxygen uptake rate (SOUR)
- Demonstrate that the CleanB® system can reduce odors
- Demonstrate that the CleanB® can enhance polymer utilization
- Demonstrate that the CleanB® can significantly reduce the amount of nutrient solubilization (ortho-P) compared to digestion, limiting struvite formation
- Demonstrate that the CleanB® can significantly improve operations and facility/digester throughput

1.5 - BCR CleanB® System Overview

The CleanB® system is approved by the EPA as an Equivalent PSRP process to treat waste activated sludge (WAS) to Class B standards, as established by 40 CFR 503. The system can also be used to generate a virtually odorless end-product with enhanced dewatering capabilities. The CleanB® process is a chemical oxidative process used for the disinfection and deodorization of biosolids.

The process utilizes BCR's patented chlorine dioxide generation and contact system to effectively treat the biosolids. Chlorine dioxide is a powerful oxidant commonly used for odor control and has the effect of reducing or eliminating odors related to hydrogen sulfide, mercaptans phenols and other Class IV odor forming compounds. When used for the treatment of municipal sludge, the process both disinfects and deodorizes municipal sludge.

Chlorine dioxide is generated onsite by acidification of sodium chlorite solution through BCR's proprietary process and chemistry.

The chemical reaction equation for this process is: $5H_2SO_4 + 10NaClO_2 \longrightarrow 8ClO_2 + 2HCl + 4\ H_2O$

1.6 - CleanB® Demo Setup Overview & Schedule

BCR mobilized the CleanB® demo unit the week of August 14th, 2023 and began setting up the demo equipment consisting of a CleanB® demo unit, 270-gallon chemical totes and piping connections. The CleanB® demo equipment was positioned next to the GBT and digester building. The demo unit was connected to the WAS pump via 4" camlock flexible hoses and fittings. See figure 2 below for CleanB® Demonstration setup.

Figure 2 – Demonstration Setup

Pictured below was the placement and connection lines for the full-scale CleanB® demonstration unit:

Figure 3 – CleanB® Inlet/Outlet Connections

The Table below displays the schedule that occurred during the demonstration.

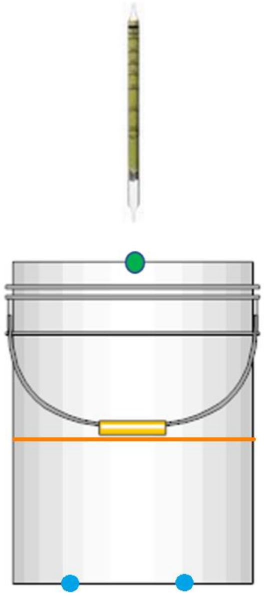
DATE	ACTIVITIES
08/14/2023	Equipment setup, CleanB processing and dewatering; SOUR and fecal testing
08/15/2023	CleanB processing and dewatering; SOUR and fecal testing
08/16/2023	CleanB processing and dewatering; SOUR and fecal testing
08/17/2023	CleanB processing and dewatering; SOUR and fecal testing; CleanB equipment disassembly

1.7 - CleanB® Demo Processing Flow and Total Solids

The CleanB® operated steady between 140 and 220 gpm with the total solids (TS) ranging from 0.60% to 1.65%TS. WAS solid concentrations dropped slightly throughout each day of processing.

Section 2 - Sampling and Data Collection/Analysis

2.1 - Odor Sampling Materials & Method



- Materials:
  - Six (6) RAE Dräger tubes of each Mercaptans, NH3 and H2S
  - One (1) Dräger hand pump
  - 2.5-gallons CleanB treated and thickened sludge
  - 2.5-gallons untreated thickened sludge
  - Two (2) 5-gallon buckets with:
    - Two (2) 1/4” holes drilled through the bottom of bucket, each at 1/3 the bucket diameter (blue dots)
    - One (1) ¼” hole drilled through lid of bucket (green dot)
- Method:
  - Fill each bucket with thickened sludge filled to halfway point of 5-gallon bucket (red line) and seal with bucket cover; wait 1 minute.
  - Insert gas detection tubes halfway through hole on lid and take reading with Dräger hand pump.
  - Perform Mercaptan, NH3 and H2S tests on both thickened untreated and CleanB treated material. Record Readings. Anaerobically digested material will be tested the same but collected from recirculation sample port.

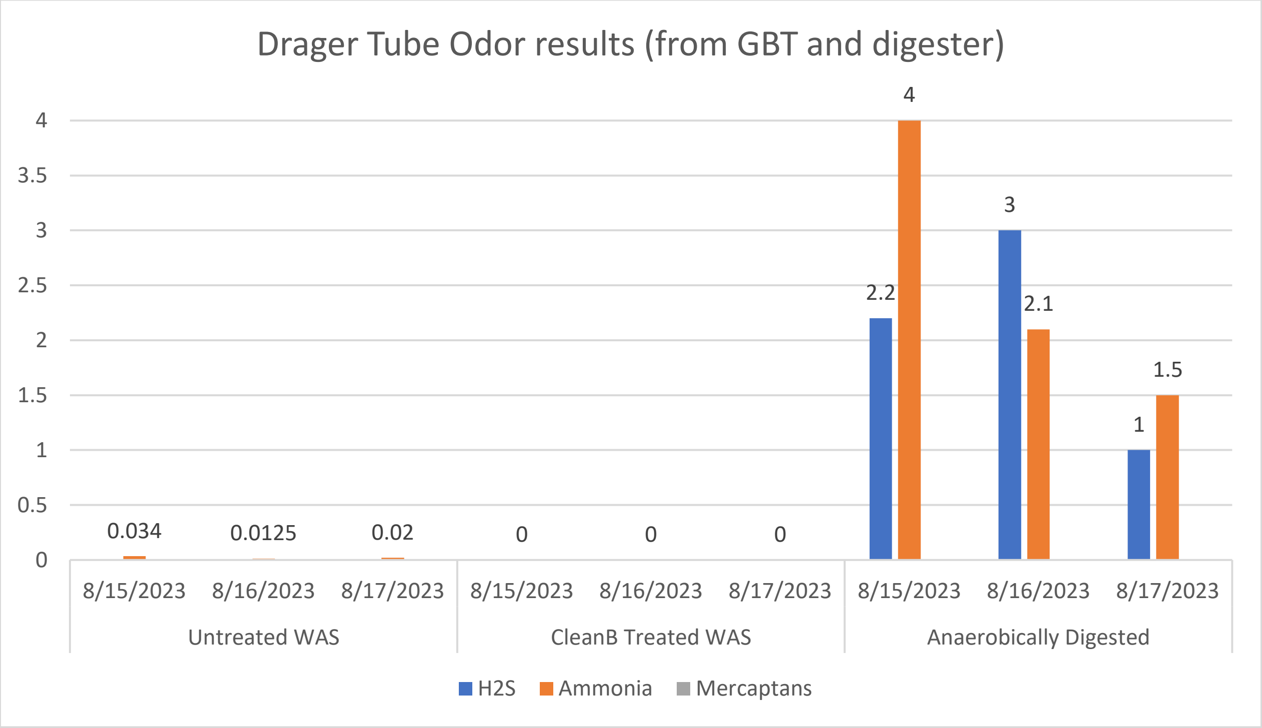
Section 3 - System Performance and Data Collection

3.1 - Odor Results

Dräger readings were collected from CleanB® treated and GBT thickened WAS, untreated thickened GBT WAS, and anaerobically digested sludge for comparison. The concentration for H_2S, mercaptans and ammonia were non-detect on the CleanB® treated material for all three days of testing. The untreated material registered 0.034, 0.0125, and 0.02 for ammonia, and non-detect for both mercaptans and hydrogen sulfide. The anaerobically digested material had very high readings for both ammonia and hydrogen sulfide, with readings of >4, 2.1, and 1.5 for ammonia and 2.2, 3.0, and 1.0 for hydrogen sulfide. Interestingly, the ammonia concentrations declined throughout the demonstration (picture of Dräger tubes from first day on left and last day on right), perhaps CleanB treated WAS being a contributing factor in the reduced ammonia concentrations in the digesters.

Figure 4 - Digester Ammonia Testing

Figure 5 – Odor Profiles of Different Sludges



The odor results from the Dräger tube tests showed improvements in ammonia on the CleanB treated material compared to untreated WAS and showed a significant improvement over the odorous anaerobically digested material.

Additionally, throughout the demonstration, the plant personnel noticed a significant decrease in odors inside the GBT building. No odors were noticed by plant personnel inside the GBT building while processing the CleanB® demo unit.

3.2 – Polymer Performance

Figure 6 – CleanB Treated WAS

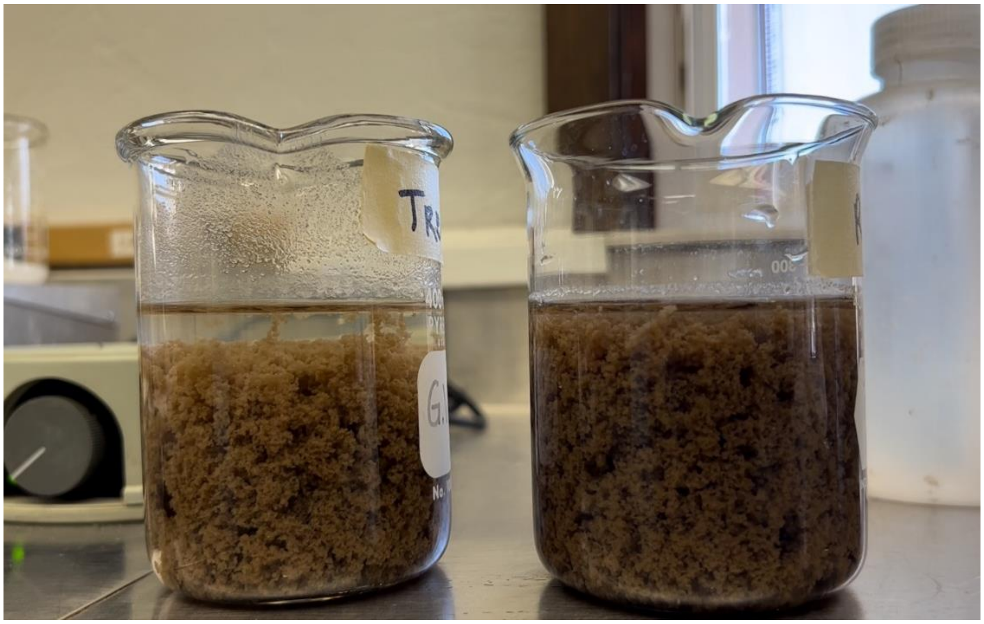
Due to the facility limiting the total solids achievable on the gravity belt thickeners (GBTs) to prevent excessive thickening and ensure optimal sludge transfer to the digesters, a series of bench scale tests were carried out. These tests focused on comparing the impact of chlorine dioxide treatment on both CleanB treated and untreated waste activated sludge (WAS), particularly highlighting the advantages of combining this treatment with polymer infusion.

In standard operations, a 50:1 v/v dilution of polymer is prepared using carrier water. This diluted solution is then introduced inline just before the GBT floc tank. Subsequently, the diluted polymer is incorporated into the WAS stream at a controlled rate of ~1.7% v/v. To provide a practical example, at a flow rate of 220 gallons per minute (gpm), approximately 3.74 gpm of the diluted polymer would be mixed into the WAS. Given the 50:1 water to polymer dilution ratio, this translates to an approximate utilization of 40 lbs of neat polymer per dry ton processed (assuming 1.62% total solids content in the WAS) — a notably high employment of polymer for effective WAS thickening.

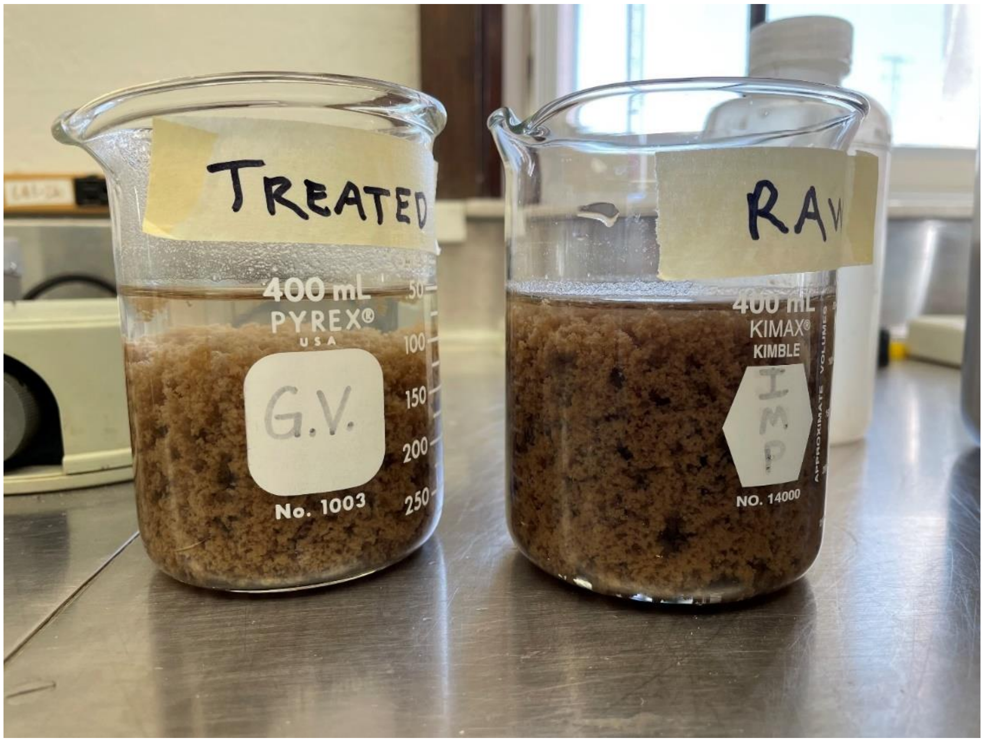
To comprehensively assess the impact of the CleanB® on polymer, bench-scale testing was conducted on both untreated and CleanB treated WAS. These tests encompassed three distinct polymer utilization rates: 40 lbs per dry ton (DT), 30 lbs/DT, and 15 lbs/DT. The polymer was carefully diluted to a 50:1 ratio, after which it was gently mixed in a flask using a stir bar and a stir plate. The samples were mixed with polymer via a stir plate for 60 seconds. Visual representations of the outcomes are presented below. Please note that all of the "Raw" samples were injected with polymer first, showing that CleanB treatment enhanced flocculation and settling in even less time than was depicted.

Treated (left) versus untreated (right) – no polymer added. A slight "floc" can be seen in the treated material without polymer addition:

Full Polymer dose of 40 lbs/DT – Treated (left jar) and untreated (right jar):



Reduced Polymer dose of 30 lbs/DT – Treated (left jar) and untreated (right jar):



Reduced Polymer dose of 15 lbs/DT – Treated (left jar) and untreated (right jar):

As shown from the bench-scale testing, CleanB® treated material showed a significant enhancement in both floccing properties and supernatant clarity at each level of polymer introduction. Additionally, due to CleanB chemistry affecting the charge of the sludge, a change to a BCR recommended polymer would create even greater floccing properties and lower polymer consumption once the facility utilizes dewatering practices.

3.3 - Disinfection Performance

During the full-scale demonstration, untreated and CleanB® treated WAS samples were collected and sent out for fecal analysis using Standard Method 9221E. Analyses on 8/15 and 8/16 were performed by Energy Laboratories, and samples on 8/17 were performed by the on-site lab at IFWWTP. Results of fecal coliform testing for each day of processing are presented in the table below (lab reports attached in Appendix):

Table 1 - Fecal Coliform Results

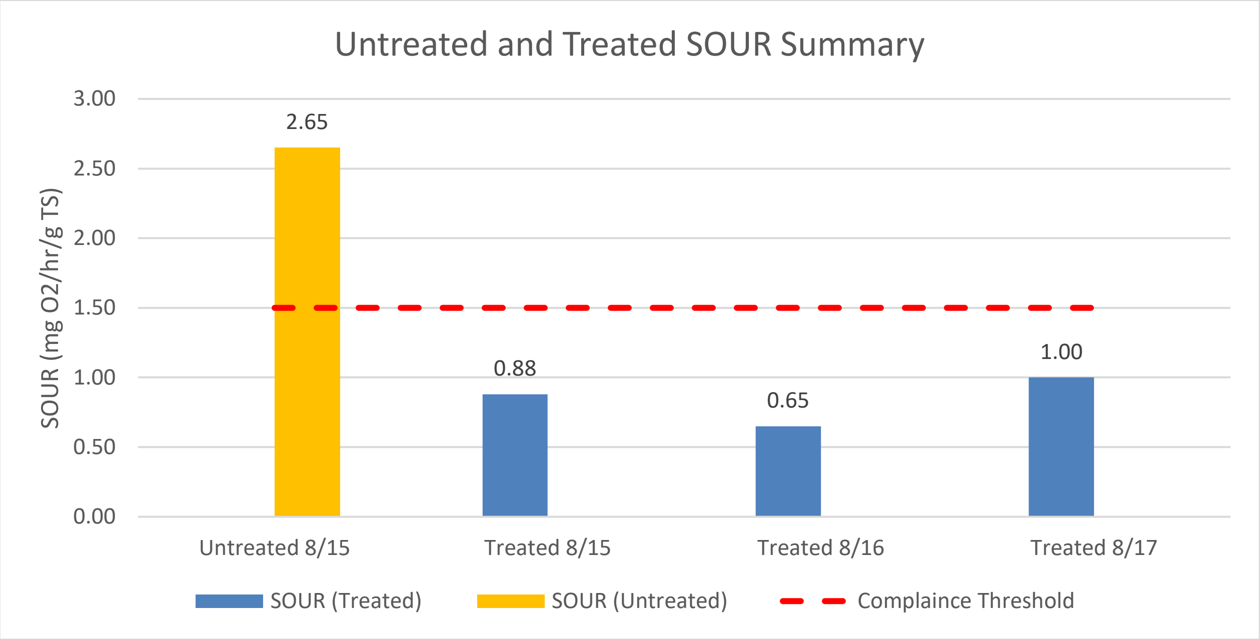
Date	Sample ID	Units	%TS	Results	Log Reduction
8/15/2023	Untreated	MPN/g DWS	1.23%	130,000,000	NA
8/15/2023	Treated 1	MPN/g DWS	1.35%	520,000	2.40
8/15/2023	Treated 2	MPN/g DWS	1.36%	360,000	2.56
8/16/2023	Treated 1	MPN/g DWS	1.21%	410,000	2.50
8/17/2023	Treated 1	MPN/g DWS	1.42%	55,634	3.37
8/17/2023	Treated 2	MPN/g DWS	1.38%	57,246	3.36

All CleanB® treated fecal coliform concentrations were well below the limits required for Class B disinfection (<2E+06 MPN/g DWS). The CleanB® demonstrated consistent disinfection and averaged greater than 2.8 log reduction in fecal coliform concentrations throughout the 3-day demonstration period.

3.4 - Vector Attraction Reduction (VAR) Performance

A soluble oxygen uptake rate (SOUR) test was performed on the CleanB® material each day. For VAR compliance, the SOUR must be below 1.5 mg O2/hr/g TS, and all treated samples were well below this limit. An untreated sample was collected and analyzed for comparison, and the untreated SOUR far exceeded the compliance threshold of 1.5 mg/hr/g TS. The standard operating procedure (SOP) that was used for SOUR testing is attached in the appendix. The following graph and table summarize the SOUR results from the demo:

Sample	Date	SOUR
Untreated	8/15/2023	2.65
Treated	8/15/2023	0.88
Treated	8/16/2023	0.65
Treated	8/17/2023	1.00



3.5 - Filtrate Improvements/Mitigation of Struvite Formation

The facility has encountered an ongoing challenge with the anaerobic digesters, specifically related to the occurrence of struvite formation. Periodically, the facility is required to empty and thoroughly clean the digesters, a process that demands a significant amount of time, financial resources, and labor. Given the prolonged retention times and the thermal environment within the anaerobic digesters, a substantial portion of the available reactive (ortho) phosphorus becomes solubilized. Additionally, due to the anaerobic conditions, ammonia is generated (as evidenced by the odor testing), creating an environment conducive to struvite formation. By completely bypassing the WAS stream from the digesters – which serves as the primary source of reactive phosphorous – the formation of struvite can be substantially mitigated. To provide clarity on this matter, an analysis on the filtrate of untreated WAS, CleanB treated WAS, and anaerobically digested solids was conducted to assess their total reactive phosphorus levels, which are pivotal factors in struvite formation.

Figure 7 - Phosphate pathways in WWTP. Source: Quelle,

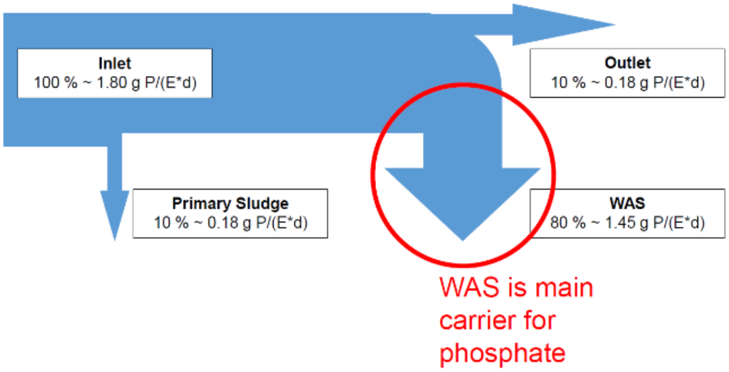
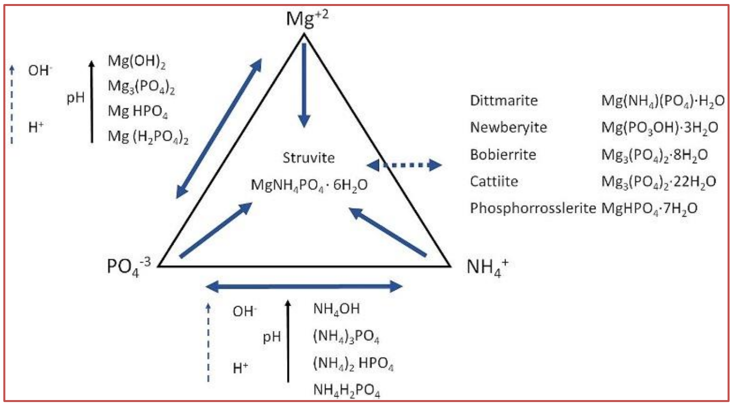
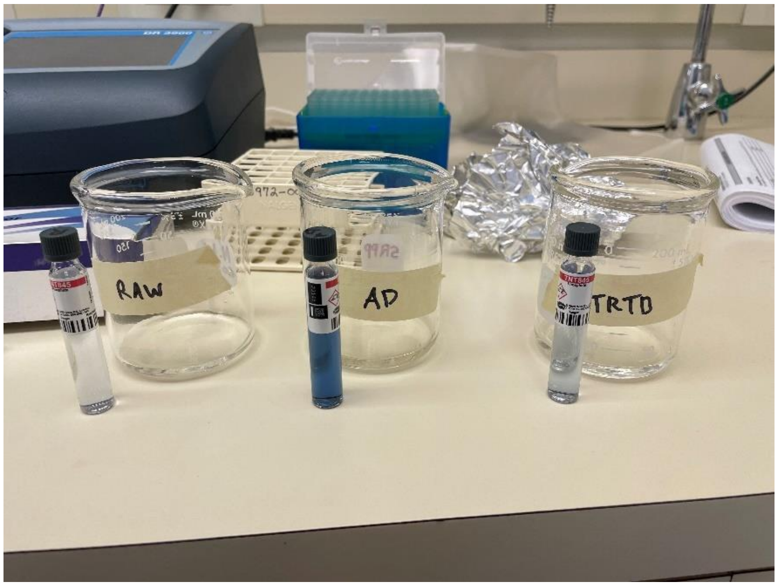


Figure 8 - The Struvite Triangle. Source: Tansel et Al (2017)

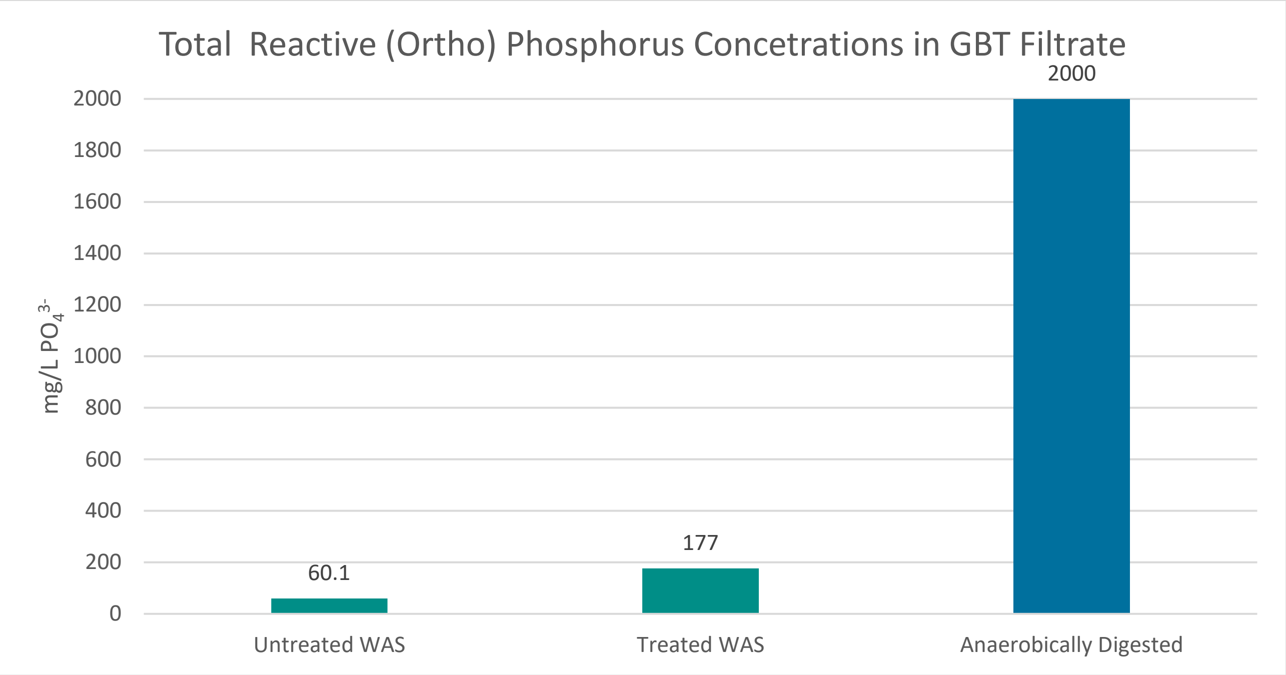


Experimental Setup:

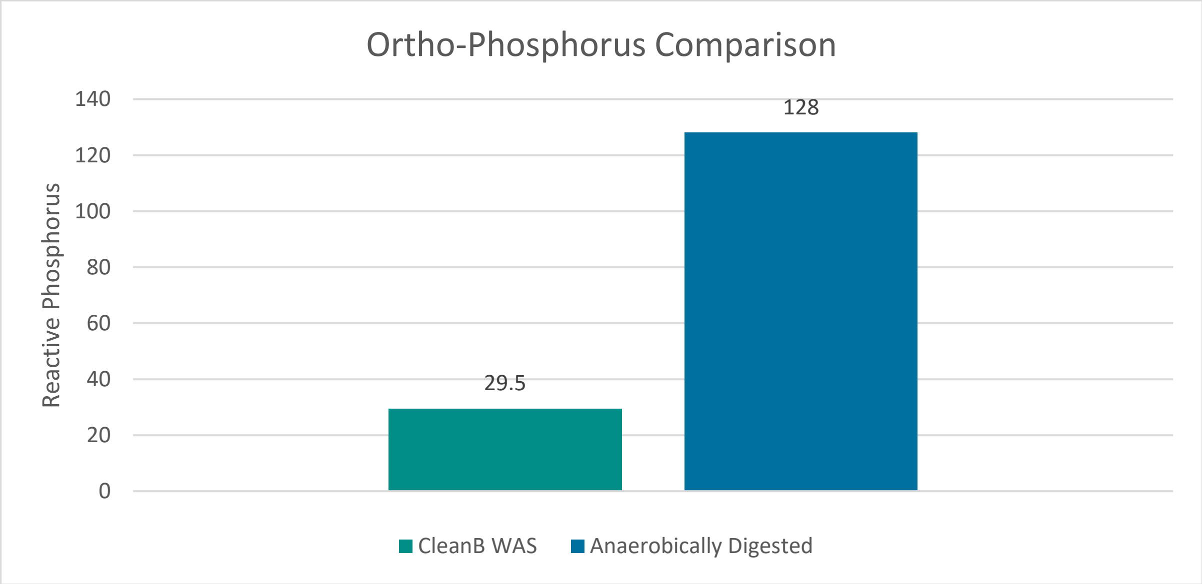
Untreated WAS, CleanB treated WAS and anaerobically sludge were collected and filtered through a vacuum flask using Whatman 934-AH™ 70mm glass microfiber filters. The filtrate samples were each collected and analyzed via a DR3900 spectrophotometer using TNT845 colorimetric vials.



Total soluble reactive (Ortho) phosphorus filtrate concentrations were very high on the anaerobically digested sludge (2000 mg/L). Untreated and CleanB treated WAS had low s-ortho-P concentrations with 60.1 mg/L and 177 mg/L, respectively. The high temperatures, anaerobic conditions and long retention times of the anaerobic digestion process increases soluble nutrient content in the filtrate. With just 10 minutes of contact time and without effecting the thermal-physical properties of the sludge, CleanB® allows for a high capture rate (captured within thickened biosolids) of nutrients and does not produce ammonia as a by-product. This resulted in a 91+% decrease in both soluble ortho phosphorus and total phosphorus concentrations in the digested filtrate compared to CleanB treated filtrate. The slight increase in s-ortho-P in the treated WAS, as compared to untreated WAS, is expected due to the slight acidification from the chemistry and the turbulent nature of the 10+ minute contact coil. The graph below illustrates the concentrations of each sample during the CleanB® demo:



Additionally, unfiltered samples of CleanB® treated WAS and anaerobically digested sludge were sent to a third-party lab (Energy Laboratories) to assess reactive (ortho) phosphorus levels. The CleanB® treated WAS had a 77% lower reactive phosphorus concentration compared to anaerobically digested material. The results as illustrated below:



By bypassing the WAS from the digesters, the facility would reap the benefit of capturing the nutrients within the dewatered biosolids, once dewatering is installed, and significantly reduce struvite formation at the facility. Without this addition, the plant could expect significant nutrients looping back to the headworks of the plant, consuming resources in oxidation and further treatment to continue to reach it's effluent limits.

Section 4 – Summary

4.1 Conclusions

The CleanB® demo at the Idaho Falls WWTP clearly demonstrated the following:

- CleanB® can consistently meet and exceed Class B disinfection requirements
- CleanB® can consistently meet VAR option #4, soluble oxygen uptake rate (SOUR)
- CleanB® is an effective odor reducing system (100% reduction in H_2S and ammonia compared to untreated WAS and anaerobically digested sludge)
- CleanB® can significantly improve operations and digester/facility throughput
- CleanB® can enhance polymer performance
- CleanB® can reduce struvite formation at the facility by reducing ortho-P and ammonia production
- CleanB® can create a safer working environment for facility operators (reduced odors in GBT building)
- CleanB® is easy to operate

In addition to the aforementioned process enhancements, the City would achieve substantial savings by adopting the CleanB® process, obviating the need for a capital-intensive digester expansion projected to cost between $8 and $10 million. This decision would spare the City from both capital outlays and ongoing energy and maintenance expenses linked to the digester's rotary mixers, pumps, and boilers. Furthermore, the facility would be equipped with more than a 100% surplus processing capacity in their current digester configuration for substantial future growth, reduce the cost of upstream processing from reduced nutrient looping, reduce greenhouse gas (GHG) emissions by 99+% compared to digestion, and create a dewatered biosolid with reduced nutrient solubility (measured P-index reduction of 66% compared to anaerobically digested cake).

Through the implementation of CleanB® treatment, Idaho Falls WWTP could effectively manage its existing and future wastewater flows, offering ample additional capacity, all while producing an essentially odorless Class B end-product. This not only ensures immediate operational cost savings but also results in significant capital cost avoidance, as compared to the alternative of a digester expansion.

Appendices

Appendix A - Lab Reports

ANALYTICAL SUMMARY REPORT

August 22, 2023

Idaho Falls City of WWTP
PO Box 50220
Idaho Falls, ID 83405-0220

Work Order: B23081584

Project Name: Not Indicated

Energy Laboratories Inc Billings MT received the following 3 samples for Idaho Falls City of WWTP on 8/16/2023 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
B23081584-001	RAW	08/15/23 12:50	08/16/23	Sludge	Bacteria, Fecal Coliform - MPN Moisture Solids Content
B23081584-002	TRTD 1	08/15/23 13:20	08/16/23	Sludge	Same As Above
B23081584-003	TRTD 2	08/15/23 13:25	08/16/23	Sludge	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 1120 S 27th St., Billings, MT 59101, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

If you have any questions regarding these test results, please contact your Project Manager.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client:	Idaho Falls City of WWTP	**Report Date:**	08/22/23
Project:	Not Indicated	**Collection Date:**	08/15/23 12:50
Lab ID:	B23081584-001	**DateReceived:**	08/16/23
Client Sample ID:	RAW	**Matrix:**	Sludge

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By
MICROBIOLOGICAL							
Bacteria, Fecal Coliform, as Received	1600000	mpn/g	H	2		A9221 E	08/16/23 12:20 / spb
Bacteria, Fecal Coliform, Dry Basis	130000000	mpn/g	H	2		A9221 E	08/16/23 12:20 / spb
PHYSICAL CHARACTERISTICS							
Moisture	98.8	wt%		0.20	0.01	A2540 G	08/17/23 12:29 / jlw
Solids, Total	1.23	wt%		0.01	0.01	A2540 G	08/17/23 12:29 / jlw

Report Definitions:

RL - Analyte Reporting Limit

MCL - Maximum Contaminant Level

ND - Not detected at the Reporting Limit (RL)

MDL - Method Detection Limit

QCL - Quality Control Limit

H - Analysis performed past the method holding time

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client:	Idaho Falls City of WWTP	**Report Date:**	08/22/23
Project:	Not Indicated	**Collection Date:**	08/15/23 13:20
Lab ID:	B23081584-002	**DateReceived:**	08/16/23
Client Sample ID:	TRTD 1	**Matrix:**	Sludge

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By
MICROBIOLOGICAL							
Bacteria, Fecal Coliform, as Received	7000	mpn/g	H	2		A9221 E	08/16/23 12:20 / spb
Bacteria, Fecal Coliform, Dry Basis	520000	mpn/g	H	2		A9221 E	08/16/23 12:20 / spb
PHYSICAL CHARACTERISTICS							
Moisture	98.7	wt%		0.20	0.01	A2540 G	08/17/23 12:29 / jlw
Solids, Total	1.35	wt%		0.01	0.01	A2540 G	08/17/23 12:29 / jlw

Report Definitions:

RL - Analyte Reporting Limit

MCL - Maximum Contaminant Level

ND - Not detected at the Reporting Limit (RL)

MDL - Method Detection Limit

QCL - Quality Control Limit

H - Analysis performed past the method holding time

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client:	Idaho Falls City of WWTP	**Report Date:**	08/22/23
Project:	Not Indicated	**Collection Date:**	08/15/23 13:25
Lab ID:	B23081584-003	**DateReceived:**	08/16/23
Client Sample ID:	TRTD 2	**Matrix:**	Sludge

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By
MICROBIOLOGICAL							
Bacteria, Fecal Coliform, as Received	4900	mpn/g	H	2		A9221 E	08/16/23 12:20 / spb
Bacteria, Fecal Coliform, Dry Basis	360000	mpn/g	H	2		A9221 E	08/16/23 12:20 / spb
PHYSICAL CHARACTERISTICS							
Moisture	98.6	wt%		0.20	0.01	A2540 G	08/17/23 12:29 / jlw
Solids, Total	1.36	wt%		0.01	0.01	A2540 G	08/17/23 12:29 / jlw

Report Definitions:	RL - Analyte Reporting Limit	MDL - Method Detection Limit
	MCL - Maximum Contaminant Level	QCL - Quality Control Limit
	ND - Not detected at the Reporting Limit (RL)	H - Analysis performed past the method holding time

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Idaho Falls City of WWTP **Work Order:** B23081584 **Report Date:** 08/22/23

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 G										Batch: R407418
Lab ID: B23081051-001ADUP		Sample Duplicate				Run: BAL #11_230817A			08/17/23 12:29	
Moisture		97.5	wt%	0.20				0	10	
Lab ID: B23081051-001ADUP		Sample Duplicate				Run: BAL #11_230817A			08/17/23 12:29	
Solids, Total		2.51	wt%	0.01				0.1	10	
Lab ID: MBLK_MOISTHZW230		Method Blank				Run: BAL #11_230817A			08/17/23 12:29	
Moisture		100	wt%	0.01						
Lab ID: MBLK_MOISTHZW230		Method Blank				Run: BAL #11_230817A			08/17/23 12:29	
Solids, Total		ND	wt%	0.01						

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

Work Order Receipt Checklist

Idaho Falls City of WWTP B23081584

Login completed by: Yvonna E. Smith
Reviewed by: gmccartney
Reviewed Date: 8/19/2023

Date Received: 8/16/2023
Received by: tjg
Carrier name: Return-UPS NDA N/C

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☐	No ☑	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	1.4°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

Contact and Corrective Action Comments:

The samples for Fecal Coliform Bacteria analysis were received past the 8 hour holding time. Proceeded past hold per Leslie Cadreau, Energy Laboratories Project Manager.

ENERGY LABORATORIES
Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page 1 of 1

Account Information (Billing information)

Company/Name City of Idaho Falls
Contact Sherry Holverson
Phone 208 612 8108
Mailing Address P.O. Box 50220
City, State, Zip Idaho Falls, ID 83405
Email sholverson@idahofalls.gov
Receive Invoice ☐Hard Copy ☒Email
Receive Report ☐Hard Copy ☐Email
Purchase Order (on file)
Quote
Bottle Order 176375

Report Information (if different than Account Information)

Company/Name City of Idaho Falls
Contact Neal France
Phone 208 612 8205
Mailing Address P.O. Box 50220
City, State, Zip Idaho Falls, ID 83405
Email nfrance@idahofalls.gov
Receive Report ☐Hard Copy ☒Email
Special Report/Formats:
☐ LEVEL IV ☐NELAC ☐ EDD/EDT (contact laboratory) ☐ Other______

Comments

- Need fecal (thermotolerant) coliform count using Standard Method 9221E.
- Need total solids results.
Untreated estimate is 2-10 million.
Treated estimate 100,000 to 1 million

Project Information

Project Name, PWSID, Permit, etc.
Sampler Name MIKE NORRIS
Sampler Phone
Sample Origin State Idaho
EPA/State Compliance ☐ Yes ☒No

URANIUM MINING CLIENTS MUST indicate sample type
☐ Unprocessed Ore
☐ Processed Ore (Ground or Refined) **CALL BEFORE SENDING
☐ 11(e)2 Byproduct Material (Can ONLY be Submitted to ELI Casper Location)

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Oil
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.

Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Analysis Requested	See Attached	RUSH TAT	ELI LAB ID Laboratory Use Only
1	RAW	8/15/2023	12:50	1	sludge				B23081584
2	TRTD1	8/15/2023	13:20	1	"				
3	TRTD2	8/15/2023	13:25	1	"				
4									
5									
6									
7									
8									
9									

ELI is REQUIRED to provide preservative traceability. If the preservatives supplied with the bottle order were **NOT** used, please attach your preservative information with this COC.

Custody Record MUST be signed						
Relinquished by (print) MIKE NORRIS	Date/Time 12/15/23	Signature	Received by (print)	Date/Time	Signature
Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print) Tyler Gasser	Date/Time 8/16/23 0920	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number (cash/check only)
		Y N C B	Y N	°C	Y N	Y N	CC Cash Check______	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

ANALYTICAL SUMMARY REPORT

August 30, 2023

Idaho Falls City of WWTP
PO Box 50220
Idaho Falls, ID 83405-0220

Work Order: B23081725

Project Name: Not Indicated

Energy Laboratories Inc Billings MT received the following 4 samples for Idaho Falls City of WWTP on 8/17/2023 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
B23081725-001	TRTD1	08/16/23 13:00	08/17/23	Sludge	Bacteria, Fecal Coliform - MPN Moisture Solids Content
B23081725-002	RAW	08/16/23 13:15	08/17/23	Sludge	Same As Above
B23081725-003	WAS	08/16/23 13:13	08/17/23	Waste Water	Moisture Preparation, Filtration for Orthophosphate MCAWW E365.1 Digestion, Total P Phosphorus, Orthophosphate as P Phosphorus, Total Solids Content
B23081725-004	PRIMARY	08/16/23 13:20	08/17/23	Waste Water	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 1120 S 27th St., Billings, MT 59101, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

If you have any questions regarding these test results, please contact your Project Manager.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Idaho Falls City of WWTP
Project: Not Indicated
Lab ID: B23081725-001
Client Sample ID: TRTD1

Report Date: 08/30/23
Collection Date: 08/16/23 13:00
DateReceived: 08/17/23
Matrix: Sludge

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By
MICROBIOLOGICAL							
Bacteria, Fecal Coliform, as Received	16000000	mpn/g	H	2		A9221 E	08/17/23 11:02 / spb
Bacteria, Fecal Coliform, Dry Basis	1500000000	mpn/g	H	2		A9221 E	08/17/23 11:02 / spb
PHYSICAL CHARACTERISTICS							
Moisture	98.9	wt%		0.20	0.01	A2540 G	08/17/23 12:29 / jlw
Solids, Total	1.05	wt%		0.01	0.01	A2540 G	08/17/23 12:29 / jlw

Report Definitions:

RL - Analyte Reporting Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)
MDL - Method Detection Limit
QCL - Quality Control Limit
H - Analysis performed past the method holding time

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client:	Idaho Falls City of WWTP	**Report Date:**	08/30/23
Project:	Not Indicated	**Collection Date:**	08/16/23 13:15
Lab ID:	B23081725-002	**DateReceived:**	08/17/23
Client Sample ID:	RAW	**Matrix:**	Sludge

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By
MICROBIOLOGICAL							
Bacteria, Fecal Coliform, as Received	4900	mpn/g	H	2		A9221 E	08/17/23 11:02 / spb
Bacteria, Fecal Coliform, Dry Basis	410000	mpn/g	H	2		A9221 E	08/17/23 11:02 / spb
PHYSICAL CHARACTERISTICS							
Moisture	98.8	wt%		0.20	0.01	A2540 G	08/17/23 12:29 / jlw
Solids, Total	1.21	wt%		0.01	0.01	A2540 G	08/17/23 12:29 / jlw

Report Definitions:	RL - Analyte Reporting Limit	MDL - Method Detection Limit
	MCL - Maximum Contaminant Level	QCL - Quality Control Limit
	ND - Not detected at the Reporting Limit (RL)	H - Analysis performed past the method holding time

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Idaho Falls City of WWTP
Project: Not Indicated
Lab ID: B23081725-003
Client Sample ID: WAS

Report Date: 08/30/23
Collection Date: 08/16/23 13:13
DateReceived: 08/17/23
Matrix: Waste Water

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	99.9	wt%		0.20	0.01	A2540 G	08/24/23 15:44 / jlw
Solids, Total	0.10	wt%		0.01	0.01	A2540 G	08/24/23 15:44 / jlw
NUTRIENTS							
Phosphorus, Orthophosphate as P	29.5	mg/L		0.2	0.2	E365.1	08/17/23 18:08 / jaw
Phosphorus, Total as P	718	mg/L		10	9	E365.1	08/21/23 16:45 / jaw

Report Definitions:

RL - Analyte Reporting Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)
MDL - Method Detection Limit
QCL - Quality Control Limit

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client:	Idaho Falls City of WWTP	**Report Date:**	08/30/23
Project:	Not Indicated	**Collection Date:**	08/16/23 13:20
Lab ID:	B23081725-004	**DateReceived:**	08/17/23
Client Sample ID:	PRIMARY	**Matrix:**	Waste Water

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	98.3	wt%		0.20	0.01	A2540 G	08/24/23 15:44 / jlw
Solids, Total	1.72	wt%		0.01	0.01	A2540 G	08/24/23 15:44 / jlw
NUTRIENTS							
Phosphorus, Orthophosphate as P	128	mg/L		0.4	0.4	E365.1	08/17/23 18:12 / jaw
Phosphorus, Total as P	882	mg/L		10	9	E365.1	08/21/23 16:47 / jaw

Report Definitions:

RL - Analyte Reporting Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)
MDL - Method Detection Limit
QCL - Quality Control Limit

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Idaho Falls City of WWTP **Work Order:** B23081725 **Report Date:** 08/30/23

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 G										Batch: R407418
Lab ID: B23081725-002ADUP		Sample Duplicate				Run: BAL #11_230817A				08/17/23 12:29
Moisture		98.8	wt%	0.20				0	10	
Lab ID: B23081725-002ADUP		Sample Duplicate				Run: BAL #11_230817A				08/17/23 12:29
Solids, Total		1.21	wt%	0.01				0.4	10	
Lab ID: MBLK_MOISTHZW230		Method Blank				Run: BAL #11_230817A				08/17/23 12:29
Moisture		100	wt%	0.01						
Lab ID: MBLK_MOISTHZW230		Method Blank				Run: BAL #11_230817A				08/17/23 12:29
Solids, Total		ND	wt%	0.01						
Method: A2540 G										Batch: R407784
Lab ID: B23081717-001A DUP		Sample Duplicate				Run: BAL #11_230824C				08/24/23 15:44
Moisture		24.6	wt%	0.20				3.9	10	
Lab ID: B23081717-001A DUP		Sample Duplicate				Run: BAL #11_230824C				08/24/23 15:44
Solids, Total		75.4	wt%	0.01				1.3	10	
Lab ID: MBLK_MOISTHZW230		Method Blank				Run: BAL #11_230824C				08/24/23 15:44
Moisture		100	wt%	0.01						
Lab ID: MBLK_MOISTHZW230		Method Blank				Run: BAL #11_230824C				08/24/23 15:44
Solids, Total		ND	wt%	0.01						

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Idaho Falls City of WWTP **Work Order:** B23081725 **Report Date:** 08/24/23

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1										Analytical Run: FIA202-B_230821A
Lab ID: ICV-181554		Initial Calibration Verification Standard								08/21/23 15:36
Phosphorus, Total as P		0.501	mg/L	0.0050	100	90	110			
Lab ID: CCV-181554		Continuing Calibration Verification Standard								08/21/23 16:41
Phosphorus, Total as P		0.502	mg/L	0.0050	100	90	110			
Method: E365.1										Batch: 181974
Lab ID: MB-181974		Method Blank				Run: FIA202-B_230821A				08/21/23 15:41
Phosphorus, Total as P		ND	mg/L	0.004						
Lab ID: LCS-181974		Laboratory Control Sample				Run: FIA202-B_230821A				08/21/23 15:43
Phosphorus, Total as P		0.219	mg/L	0.0050	109	90	110			
Lab ID: B23081733-001EMS		Sample Matrix Spike				Run: FIA202-B_230821A				08/21/23 15:51
Phosphorus, Total as P		0.204	mg/L	0.0050	94	90	110			
Lab ID: B23081733-001EMSD		Sample Matrix Spike Duplicate				Run: FIA202-B_230821A				08/21/23 15:54
Phosphorus, Total as P		0.211	mg/L	0.0050	98	90	110	3.4	10	
Method: E365.1										Analytical Run: FIA204-B_230817B
Lab ID: ICV		Initial Calibration Verification Standard								08/17/23 17:16
Phosphorus, Orthophosphate as P		0.246	mg/L	0.0050	98	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard								08/17/23 17:34
Phosphorus, Orthophosphate as P		0.506	mg/L	0.0050	101	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard								08/17/23 17:47
Phosphorus, Orthophosphate as P		0.507	mg/L	0.0050	101	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard								08/17/23 17:55
Phosphorus, Orthophosphate as P		0.518	mg/L	0.0050	104	90	110			
Lab ID: CCV		Continuing Calibration Verification Standard								08/17/23 18:06
Phosphorus, Orthophosphate as P		0.507	mg/L	0.0050	101	90	110			
Method: E365.1										Batch: 181920
Lab ID: MB-181920		Method Blank				Run: FIA204-B_230817B				08/17/23 17:21
Phosphorus, Orthophosphate as P		ND	mg/L	0.002						
Lab ID: LFB-181920		Laboratory Fortified Blank				Run: FIA204-B_230817B				08/17/23 17:22
Phosphorus, Orthophosphate as P		0.240	mg/L	0.0050	96	90	110			
Lab ID: B23081725-003AMS		Sample Matrix Spike				Run: FIA204-B_230817B				08/17/23 18:10
Phosphorus, Orthophosphate as P		53.2	mg/L	0.20	101	90	110			
Lab ID: B23081725-003AMSD		Sample Matrix Spike Duplicate				Run: FIA204-B_230817B				08/17/23 18:11
Phosphorus, Orthophosphate as P		53.0	mg/L	0.20	100	90	110	0.4	10	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

Work Order Receipt Checklist

Idaho Falls City of WWTP

B23081725

Login completed by:	Richard L. Shular	Date Received:	8/17/2023
Reviewed by:	ysmith	Received by:	dnh
Reviewed Date:	8/21/2023	Carrier name:	Return-UPS NDA

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☐	No ☑	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	2.0°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

The reference date for Radon analysis is the sample collection date. The reference date for all other Radiochemical analyses is the analysis date. Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

Contact and Corrective Action Comments:

The samples for Fecal Coliform Bacteria analysis were received past the 8 hour holding time. Proceeded past hold per Leslie Cadreau, Energy Laboratories Project Manager.

The sample for Orthophosphate was subsampled and filtered in the laboratory. According to 40CFR136, samples for Orthophosphate should be filtered within 15 minutes of collection.

ENERGY LABORATORIES
Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page 1 of 1

Account Information *(Billing information)*

Company/Name City of Idaho Falls
Contact Sherry Holverson
Phone 208 612 8108
Mailing Address P.O. Box 50220
City, State, Zip Idaho Falls, ID 83405
Email sholverson@idahofalls.gov
Receive Invoice ☐Hard Copy ☒Email
Receive Report ☐Hard Copy ☐Email
Purchase Order (on file)
Quote
Bottle Order 176375

Report Information *(if different than Account Information)*

Company/Name City of Idaho Falls
Contact Neal France
Phone 208 612 8205
Mailing Address P.O. Box 50220
City, State, Zip Idaho Falls, ID 83405
Email nfrance@idahofalls.gov
Receive Report ☐Hard Copy ☒Email
Special Report/Formats:
☐ LEVEL IV ☐NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other______

Comments

- Need fecal (thermotolerant) coliform count using Standard Method 9221E.
- Need total solids results.
- Untreated estimate is 2 - 10 million.
- Treated estimate is 100,000 to 1 million.

Project Information

Project Name, PWSID, Permit, etc.
Sampler Name
Sampler Phone
Sample Origin State Idaho
EPA/State Compliance ☐ Yes ☐ No

URANIUM MINING CLIENTS MUST indicate sample type
☐ Unprocessed Ore
☐ Processed Ore (Ground or Refined) **CALL BEFORE SENDING
☐ 11(e)2 Byproduct Material (Can ONLY be Submitted to ELI Casper Location)

Matrix Codes
A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Oil
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.

Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification *(Name, Location, Interval, etc.)*	Collection Date	Collection Time	Number of Containers	Matrix *(See Codes Above)*	Total Solids %	Fecal Coliform	Total P	Ortho - P							See Attached	RUSH TAT	ELI LAB ID *Laboratory Use Only*
1	TRTD1	8/16/2023	13:00	1	sludge	✓	✓											B23081725
2	RAW	8/16/2023	13:15	1	sludge	✓	✓											
3	WAS	8/16/2023	13:13	1	sludge	✓		✓	✓									
4	PRIMARY	8/16/2023	13:20	1	sludge	✓		✓	✓									
5																		
6																		
7																		
8																		
9																		

ELI is REQUIRED to provide preservative traceability. If the preservatives supplied with the bottle order were **NOT** used, please attach your preservative information with this COC.

Custody Record MUST be signed

Relinquished by (print) MIKE NORRIS
Date/Time 8/16/23
Signature
Received by (print)
Date/Time
Signature

Relinquished by (print)
Date/Time
Signature
Received by Laboratory (print) [illegible]
Date/Time 8/17/23 0912
Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number *(cash/check only)*
		Y N C B	Y N	°C	Y N	Y N	CC Cash Check______	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

ELI-COC-01/21 v.4

From: Neal France
To: Mike Norris
Cc: Darrin Lords
Subject: Fecal Coliform Results
Date: Monday, August 21, 2023 11:02:01 AM

Mike,

Here are the results for the fecal coliform samples (collected August 17, 2023) that we analyzed in the lab at the wastewater treatment plant.

Sample "TRTD1"

Total Solids = 1.42 %
Fecal Coliform (M.P.N. per gram of dry weight) = 55,634

Sample "TRTD2"

Total Solids = 1.38%
Fecal Coliform (M.P.N. per gram of dry weight) = 57,246

We will send the remainder of the results to you as we receive them.

Thanks,
Neal

Appendix B – SOUR Test Standard Operating Procedure

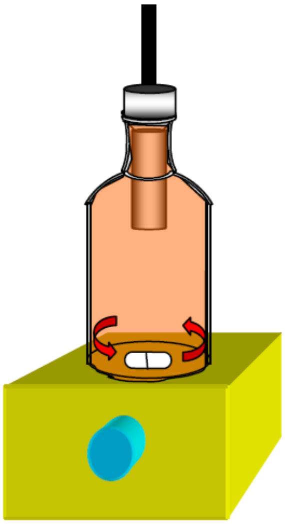
VAR Compliance Sampling Procedure for CleanB®: Option 4 SOUR Testing

1.0 - BACKGROUND

Specific Oxygen Uptake Rate (SOUR) is Option 4 for Vector Attraction Reduction (VAR) per 40 CFR Part 503.33(b) and may be the method utilized for CleanB® treated material when air is induced to the process. The SOUR test measures the respiration rate of organisms and the value must be equal to or less than 1.5 mg O_2/hour/gram total solids at 20°C. Frequency of testing is determined by the plant permit which is generally a result of dry tons produced per year. The chart below shows the frequency estimates based on solids output (DT/yr):

> 0 but < 290	Once per year
≥ 290 but < 1,500	Once per quarter (4/ yr)
≥ 1,500 but < 15,000	Once per 60 days (6 / yr)
≥ 15,000	Once per month (12 / yr)

2.0 – EXPERIMENTAL SET-UP



3.0 – MATERIALS & EQUIPMENT

Materials Needed:

1) 500 mL Container
2) ~375 mL CleanB® treated sample
3) Calibrated Dissolved Oxygen (DO) Meter – Calibrate via Standard Methods (SM 4500-O.G.)

4) 300 mL BOD Bottle
5) Magnetic Stir Bar
6) Magnetic Stir Plate
7) Stopwatch
8) Thermometer

2.0 – CONDUCTANCE OF EXPERIMENTAL PROCEDURE

Determine the Percent Total Solids

The sludge must be less than or equal to two percent (2%) total solids. If the solids are greater than 2% but less than 4%, dilute the sample to 2% solids using Deionized water.

Sample Preparation

Collect a CleanB® treated sample from the sample port in a 500 mL bottle and record temperature of sample. Fill the bottle only to 75% full. Increase the dissolved oxygen content by vigorously shaking the bottle for approximately 30 seconds. If DO is 5 mg/L or greater, the sample is sufficiently aerated. Proceed immediately with the analysis.

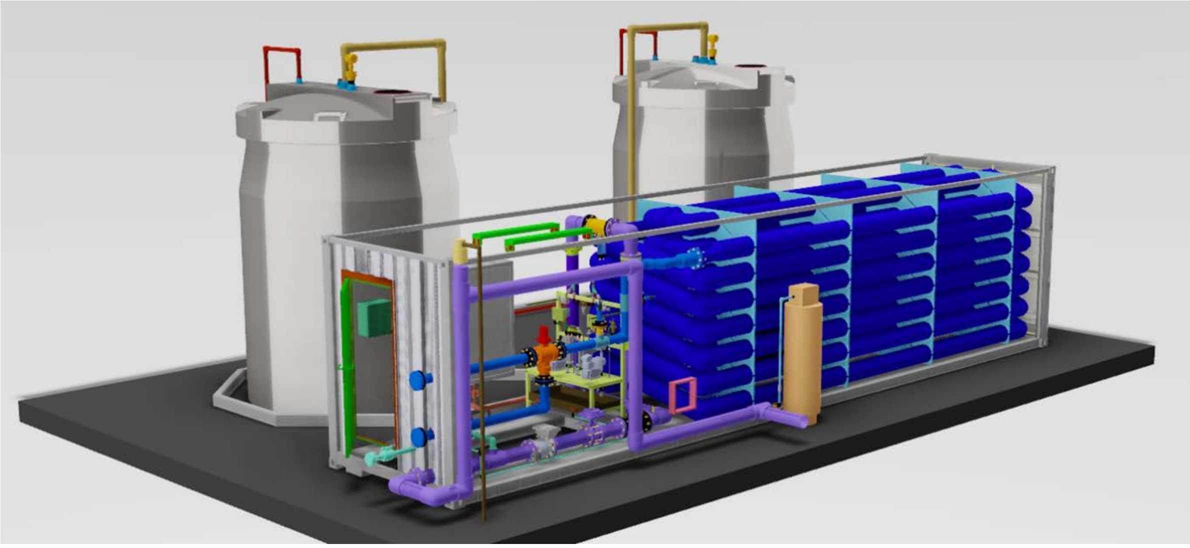
Determine Oxygen Uptake Rate

- Place the magnetic stir bar in a clean 300 mL BOD bottle.
- Pour the treated sample into the 300 mL BOD bottle.
- Immediately insert the oxygen-sensing probe into the BOD bottle. Displace enough sample with the probe to fill flared top of bottle and isolate its contents from the atmosphere. Be sure that no large bubbles are present. Activate the probe stirring mechanism or magnetic stirrer.
- After the meter reading has stabilized, record initial DO reading and start timing device. Record DO data at 15-second intervals for the first two minutes of the analysis, then every 60 seconds. Record data over a 15-minute period or until DO is no longer decreasing at a steady rate, whichever occurs first. When DO is no longer decreasing at a steady rate, this could indicate that DO has become rate-limiting.
- Record the temperature after the test.
- Utilize the SOUR Template worksheet and the SOUR rate will populate itself.

Note: The temperature correction used for the SOUR test is the average of the beginning and ending temperature readings. Temperature correction factor is 1.05 for temperatures between 20°C & 30°C.

5.0 – REFERENCES

Standard Method 1683 – *Specific Oxygen Uptake Rate in Biosolids*



CleanB® System

Prepared for: City of Idaho Falls
Project: Idaho Falls WWTP
Proposal: B2115B
Date: May 04, 2023

TABLE OF CONTENTS

1. INTRODUCTION

BCR appreciates the opportunity to submit this firm-fixed proposal #B2115B to the City of Idaho Falls for the treatment of biosolids at their wastewater treatment facility (WWTF). BCR's CleanB® system, with its inherent simplicity, odor reduction capabilities, and disinfection properties, is an ideal fit for this application. By by-passing WAS and treating with CleanB, the facility can significantly increase the current digester capacity, reduce struvite formation, improve disinfection and stabilization performance, reduce odors, and improve overall operations.

CleanB® is BCR's patented Class B biosolids treatment solution. CleanB® treatment disinfects the biosolids, eliminates odorous compounds by oxidation (of sulfides, phenols & mercaptans), and enhances total solids in dewatered biosolids for a better end product for either land application or landfilling with ultimate compaction with other household materials

The CleanB® process is a modular, one-touch Start/Stop system. The EPA has granted CleanB® National PSRP equivalency. It treats biosolids in just 10 minutes to meet Class B regulatory requirements for beneficial reuse (complies with Title 40 CFR Part 503) while requiring minimal energy consumption and minimal maintenance and labor.

There are many CleanB® installations with over 50 years of cumulative operating history. BCR would be pleased to provide a list of installations upon request.

Typically, CleanB® is installed upstream before the dewatering unit.

The system offered in this proposal is covered by one or more of the following patents: US 6,949,196 A1, US 2013/0,134,092 A1, US 7,452,511 & US 61/173,442.

2. FEATURES & BENEFITS of CLEANB®

CleanB® is BCR's patented process to achieve Class B biosoild requirements as per 40 CFR part 503 compliance.

Disinfection: Chlorine dioxide is highly water soluble and is a powerful disinfectant for bacteria and viruses. 2-log reductions are achieved at low concentrations, making it an ideal disinfectant in wastewater. Combined with Anaerobic Digestion, greater disinfection results can be expected

Enhanced Dewaterability: Dewatered CleanB® treated sludge holds less water compared to dewatered sludge from a digester with long retention times. Typically, there is a 3 to 5 percentage point increase in total solids with CleanB® treatment.

Reduction in Total Nitrogen (TN) in Filtrate/Centrate: Due to the short process times between the clarifier and dewatering device (10 min), the nutrients and solids do not solubilize like they would with long retention times in digesters (30-40 days). Anaerobic digesters solubilize nutrients further because of the heat generated – and any Thermal Hydrolysis Process (THP) will have high extremely high return loads. The CleanB® system typically captures 90-95% of Total Nitrogen (TN) when dewatering.

Reduction in Total Phosphorous (TP) in Filtrate/Centrate: Due to the shortened retention times with CleanB® treatment, typical TP capture rates when dewatering is 80-90%. This can often be a 90% reduction when compared to conventional process (e.g. digestion).

Reduction in Polymer consumption: The chlorine dioxide acts as a natural flocculant making it easier to dewater sludge when using a cationic emulsion polymer. On average, CleanB® processed sludge reduces polymer consumption by 25%-30% when compared to conventional sludge treatment process.

Footprint: The CleanB® process is compact and eliminates the space requirements needed for digesters and/or other equipment. The area needed for a typical CleanB® installation is ~600ft^2.

Safety: Chlorine dioxide is a volatile compound. However, the ClO2 generator in the CleanB® is in a closed chamber where ClO_2 is immediately injected into the WAS stream. In addition, chlorine dioxide is a very selective oxidant. It has this ability due to its unique one-electron exchange mechanisms. Chlorine dioxide attacks the electron-rich centers of organic molecules. One electron is transferred, and volatile chlorine dioxide is reduced to non-volatile chlorite (ClO_{2-}), and then react further to produce chloride (Cl-). The CleanB® scope of supply includes a ClO_2 monitor which continually monitors for ClO_2. In the unlikely even that the sensor is triggered, the CleanB® will automatically shut-down, chemical pumps will stop, chemcial valves will close, and the generator will be flushed.

Odor Control: Chlorine dioxide is an extremely selective oxidizer. It reacts with sulfide substances, phenols, mercaptans and other organic odor causing substances.

Disinfection By-Products (DBPs): ClO_2 is reduced to chlorite (ClO_2-). The chlorite is reactive and reduces to chloride (Cl-). Hence DBPs like chlorinated byproducts and haloacetic acids (HAA's) are not formed by chlorine dioxide disinfection. In contrast, there are DBPs formed from ozonation and other sludge disinfection treatments.

3. DESIGN BASIS & EQUIPMENT DATA

Table 1: GENERAL DESIGN BASIS:

Feed Description : Waste Activated Sludge
Feed rate : Up to 270 gallons per minute
Total Solid (TS) : <3.0 % Average Blended Sludge

Table 2: EQUIPMENT SPECIFICATION:

Bulk density – WAS : 62.4 lb./cu.ft – **Assumed**
WAS Volatile Solids (%) : ≤ 75% – **Assumed**
WAS ORP (mV) : ≥ 0.0 – **Assumed**
WAS Dissolved Oxygen : > 0.1 PPM
Model selected **: CB-10**
Contact Coil pipe size : 10”

Table 3: OPERATING PARAMETER:

CleanB® Feed Flow rate : 85 - 270 GPM

Table 4: UTILITY REQUIREMENT

Electrical Power requirement : 120VAC/1P/60Hz – 15 Amp
Filter Reuse Water : 120 GPM @ 60 PSI – Intermittent Flow

Table 5: ESTIMATED OPERATING COST RECONCILIATION:

(Current Flows – 111 gpm)

Cost Item	Year 1	Notes
Total Sludge Volume- GPD	**48,669,116**	
CleanB® Energy	**$539**	**1,2**
CleanB® Treatment Costs	**$160,431**	**3**

Notes

(1) All utilities assume energy cost of $0.07 per kWHr.

(2) 0.5 HP CleanB® treating 43M gallons WAS per year at 111 gpm and 1.2%TS.

100 N. Laura Street, Suite 601, Jacksonville, FL 32202 904.819.9170 | bcrinc.com
Page **5** of **13**
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(3) Includes CleanB® chemical management plan (chemicals procured and supplied by BCR), service agreement, operator training, remote monitoring, system support, and repair & maintenance.

(Future 2045 Flows – 181 gpm)

Cost Item	Year 1	Notes
Total Sludge Volume- GPD	**79,361,351**	
CleanB® Energy	**$590**	**1,2**
CleanB® Treatment Costs	**$261,603**	**3, 4**

Notes

(1) All utilities assume energy cost of $0.07 per kWHr.

(2) 0.5 HP CleanB® treating 79M gallons WAS per year at 181 gpm and 1.2%TS.

(3) Includes CleanB® chemical management plan (chemicals procured and supplied by BCR), service agreement, operator training, remote monitoring, system support, and repair & maintenance.

(4) Represented at today's chemical pricing

4. BCR CleanB® OVERVIEW

4.1. Description of Operations

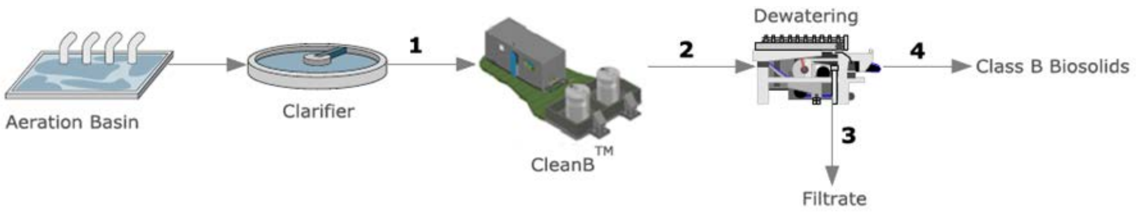
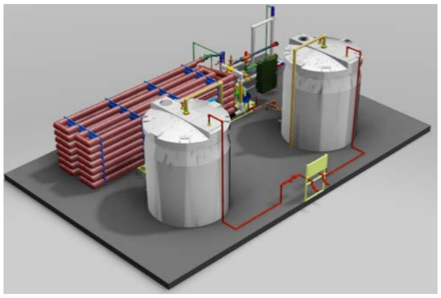


Figure 1: Type Municipal Secondary treatment process train with CleanB® Process.



The CleanB® process is a modular, plug-flow, chemical oxidation process for Waste Activated Sludge (WAS).CleanB® uses a two chemical system to safely generate chlorine dioxide (ClO_2) for disinfection and odor elimination. Chlorine dioxide is both a disinfectant and oxidant commonly used in the treatment of municipal drinking water. The CleanB process chemicals are as follows:

- Sodium Chlorite ($NaClO_2$)
- Sulfuric Acid (H_2SO_4)

ClO_2 is a strong oxidant with good combination of selectivity & reactivity. ClO_2 effectively disinfects the municipal sludge and removes odor causing compounds by scavenging sulfides, phenols, mercaptans and other Class IV odor forming compounds. Therefore the CleanB® treated sludge is disinfected and the odor-causing compounds are eliminated.

BCR's patented ClO_2 Generating System injects ClO_2 directly into the sludge stream and is an innovative method for maintaining the desired ClO_2 concentration. The ClO_2 dosing rate is adjusted automatically on a volumetric and/or total solids basis by the PLC/SCADA Process Controls system to ensure optimal disinfection and odor elimination.

Figure 2: CleanB® process system general arrangement.

Figure 3: CleanB® installation at a Municipality.

4.2. Major Equipment

The standard CleanB® Process system includes the following major components:

4.2.1. WAS Pump (supplied from Facility)

The WAS Pump(s) feeds sludge from the clarifier at a maximum of 2% solids (or up to 3% if not running as a PSRP equivalent process) into the CleanB® Process Unit. The PLC/SCADA for the CleanB® will monitor the flow rate and adjust the WAS pump speed accordingly. On the SCADA/HMI, the operator can set either the time, totalized flow, or totalized solids for an automatic shutdown.

4.2.2. Chemical Tanks

Double-walled HDPE bulk storage tanks safely store sulfuric acid and sodium chlorite. The bulk storage tanks include leak detectors and level sensors. The tanks are filled utilizing BCR's standard chemical fill station which is designed to accept chemicals directly from tanker trucks with zero operator exposure.

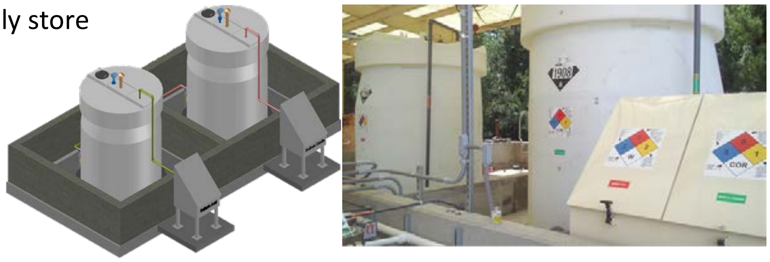


Figure 4: Chemical tanks

4.2.3. ClO_2 Generator & Chemical Dosing system

There are two chemical dosing pumps that meter the required amount of each chemical based on either just the flow meter (volumetric basis) or the flow and solids meter (solids basis) to the Chlorine Dioxide (ClO_2) generator. BCR's patented ClO_2 generation process utilizes a proprietary ClO_2 generator that has a demonstrated track record of safe, efficient and consistent operation. It is machine fabricated out of Kynar® and consists of Kynar® check valves entering the generator. The outlet of the generator is placed directly into an enclosed and contained WAS stream where the ClO_2 is readily introduced.

Figure 5: ClO2 Generator

Figure 6: Chemical Dosing Skid

4.2.4. Contact Coil (Not required for Pre-Treatment Option)

Following the chemical injection, the contact coil is comprised of continuous piping. This provides adequate mixing at the specified flow rates and adequate contact time of the sludge stream and ClO_2. The contact chamber is designed to provide a turbulent flow regime and a minimum of 10 minutes of contact time. Depending on the CleanB® process system model, the hold volume in the contact chamber coils will be ≥10 times the feed flow rate.

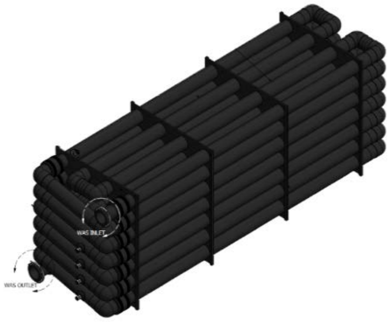


Figure 7: Contact Coil

4.2.5. Control System

The CleanB® control system includes NEMA 4 control panel which will house the PLC hardware, & HMI screen. The control system will interface with WAS pump VFD via ethernet and also dewatering control panel.

When the CleanB® start push button activated, the PLC will check the permissive from the dewatering panel before initiating the start-up sequence. The CleanB® can be stopped either manually or based on throughput or on operating time. Upon issuing the stop command, the system shutdown sequence will be initiated, and the PLC will coordinate the shutdown of WAS pump and the dewatering unit.

5. CleanB® SCOPE OF SUPPLY

The below scope of supply is for a typical CleanB® Process system:

QTY	Description	By BCR	By Client	Comments
Lot	WAS Pump VFD Supply		✓	WAS Pump and VFD supplied by Client
Lot	WAS Pump VFD control programming	✓		CleanB® control system will operate the pump and modulate the speed as necessary
Lot	Polymer Feed and dosing system		✓	BCR can supply if requested
1	Inlet Flow transmitter	✓		Magnetic flowmeter
1	Solids Meter	✓		Solids meter is microwave type meter from Metso or equal.
1	Sulfuric Acid Bulk storage tank	✓		5,500-gallon Double walled tank from Snyder or equal. Also includes float switch-based leak detector and a level sensor/transmitter
1	Sodium Chlorite Bulk storage tank	✓		5,500-gallon Double walled tank from Snyder or equal. Also includes float switch-based leak detector and a level sensor/transmitter
1	Chemical Fill station	✓		Enables the transfer of chemical from tanker or truck to the bulk storage tank.
1	Sulfuric Acid, & Sodium Chlorite delivery system	✓		Includes metering pump, flow transmitter, calibration column, pulsation damper, pressure gauge for each chemical and on a single skid.
1	Chlorine Dioxide Generator	✓		BCR's Proprietary design. Generator is made of Kynar
1	ClO2 gas detector	✓		Compact gas monitor for the continuous detection and measurement of toxic &corrosive gas leaks
1	pH Analyzer & Transmitter	✓		
1	Contact Chamber	✓		10" continuous piping for hold up volume
1	Sludge Dewatering Equipment		✓	Dewatering equipment along with the polymer dosing skid.
1	Air Compressor & ORP Analyzer			Optional. If PSRP compliance is required
1	Caustic Dosing System with Tote			Optional. If seeking pH correction
Lot	Transmitter/Field Devices	✓		As per BCR P&ID
Lot	Control Panel– PLC/HMI	✓		
Lot	Supply & termination of power supply		✓	This includes power to BCR control panel
Lot	Electrical & Pneumatic works on-site		✓	Components supplied loosed or not on skid
Lot	Process & Instrumentation Diagram (PID)	✓		
Lot	Process Flow Diagram (PFD)	✓		
Lot	General Arrangement (GA) Drawing (GA)	✓		
Lot	Electrical & Instrumentation Drawings	✓		
Lot	Operation & Maintenance Manual (O&M)	✓		
Lot	Factory Acceptance Test	✓		At BCR fabrication facility

QTY	Description	By BCR	By Client	Comments
Lot	QC Inspections	✓		BCR Internal Quality Assurance
Lot	Temporary Facilities		✓	On-site for storage
Lot	Site Grading, roads etc.,		✓	
Lot	Civil/Foundation Work		✓	
Lot	Buildings, HVAC, Emission control		✓	
Lot	Job Site Unloading & Storage		✓	
Lot	Field Installation Labor, Materials, and Equipment		✓	Includes all mechanical interconnecting piping, duct work & electrical wiring.
Lot	Packing and Marking for Shipment	✓		
Lot	Shipping from FCA to job site		✓	Freight is not included
Lot	Start-up and Testing Supervision	✓		Start-up and Performance Testing is included
Lot	Process & Operation Training	✓		
Lot	Any Local, State or Federal Permits		✓	
Lot	Aftermarket maintenance service contract		Option	BCR offers comprehensive service contact that can include chemical inventory monitoring, supply and logistics.
Lot	First Fill of chemicals ($NaClO_2$ & H_2SO_4)		✓	BCR Can be contracted to supply the chemical
Lot	Electric Power, Water, and Fuel for Construction, Checkout, Testing, Start-up, Testing, and Operation		✓	
Lot	Drawings & Submittal Approval		✓	Any Professional Engineer (PE) stamp and/or any state or local approval is by Engineer of Record (EOR)

6. PRICING & TERMS

One (1) 10” CleanB® PSRP System (as per scope of supply): **US$ 665,000**

Note: One (1) 10” CleanB is suitable for both current and future flows (111 & 181 gpm)

Delivery: Ex-Works, Point of Manufacture

Validity: 30 days

Clarifications:

1. *Incoterms apply to Delivery.*
2. *All prices are in US Dollars. Price does not include any local, state or federal permits or taxes, customs duties/tariffs or other fees and taxes.*
3. *BCR Inc. Terms and Conditions will apply to items or equipment purchased under this proposal.*
4. *Equipment sold by BCR contains intellectual property; BCR will not transfer title to such intellectual property by way of sale of equipment. Drawings and data provided will remain the property of BCR.*
5. *Material Escalation. The parties hereby agree that certain Services are subject to unforeseen market fluctuations. Accordingly, at the time of purchase, BCR will affix a cost index to its major components via the 20-city average Material Cost Index (“MCI”). BCR will be able to take a 5% increase without escalation, above this level, escalation costs will be invoiced separately to the customer.*

PAYMENT TERMS

Payments are to be secured by Irrevocable Letter of Credit, issued by an agreed upon financial institution, with drawdown provisions per the following Payment Schedule:

Milestone	or	Time Bound	% of Price	Brief Description of Milestone
Purchase Order		n/a	25%	Upon signing a purchase order to indicate the placement of an order
Notice to Proceed (NTP)	or	Earlier of: (a) 180 days after “final submittal of Engineered Drawings” or (b) 365 days after purchase order execution date (only if delays are outside control of BCR)	25%	Upon BCR receiving a notification letter or e-mail message from the Owner or Owner’s Engineer of Record stating that can begin work to assemble the equipment.
Ready to Ship	or	n/a	30%	Upon Delivery to Client of “Certificate of Completion of Major Equipment”.
Substantial Completion	or	90 Days after ready to ship date (only if delays are outside control of BCR)	10%	Upon Delivery to Client of “Certificate of Delivery and Substantial Completion”
Final Completion	or	180 Days after ready to ship date (only if delays are outside control of BCR)	10%	Final Completion defined as completion of the final punch list and start-up & training.
		Total	100%	

DELIVERY SCHEDULE

Typical Estimated shipment to ready to ship notice from U.S. factory is 14-18 weeks from receipt of Purchase Agreement with clarification of commercial and technical details AND receipt of deposit. Delivery for shipment assumes the following:

Technical drawings and submittals to consultant	4-6 weeks
Consultant review and approve drawings & submittals	1-2 weeks
Fabrication and Assembly	12-16 weeks from submittal approval
Factory Acceptance Test	2 weeks before shipment

APPENDIX A: CLEANB® BROCHURE

CleanB®

BCR
Solid Solutions

CleanB®

The BCR CleanB® process puts world-class biosolids expertise at your fingertips, reducing processing time from days to minutes.

The modular, one-button CleanB® system has been granted National PSRP equivalency by the EPA. It treats biosolids in just 10 minutes to meet Class B regulatory requirements for beneficial reuse,* while requiring minimal energy consumption and minimal maintenance and labor.

Our patented CleanB® technology has been proven in 10 installations with nearly 30 years of cumulative operating history.

Why choose CleanB®?

Improve regulatory compliance: complies with Class-B disinfection requirements and VAR requirements utilizing the SOUR test.

Reduce operating footprint: modular and highly scalable system also eliminates space requirements for digesters and other equipment.

Simplify operations: one-button start-up/shutdown; minimal maintenance and labor demands; minimal moving parts (5 MOVs, 1 air compressor, 2 chemical pumps).

Reduce energy consumption: average energy cost of only $450 per year.

Reduce polymer use and expense: average 20% reduction in polymer.

Reduce both capital and operating expenses.

Reduce odors typically associated with biosolids processing.

Improve the process: enhanced dewaterability / average 20% decrease in hauling costs.

Improve value captured: average 90-95% dewatering capture rates for total nitrogen and total phosphorus; and minimal nutrient leaching from end-product.

Improve process documentation: automatically generates batch and monthly reports on chemical consumption, dry solids processed, gallons processed, and batch times.

Requirements

General Footprint: 320 ft^2 (40′ x 8′) for CleanB® plus approximately 300 ft^2 for chemical storage and containment.

Scalability: One CleanB® unit can process up to 265 gpm; multiple units can be run in parallel for larger facilities.

Uses 120V electrical service.

Requires potable or reuse connection rated at 40-60 psi and 60-120 gpm.

Complies with Title 40 CFR Part 503

Product Specifications

CleanB® is offered with three different coil sizes (6", 8", and 10") capable of treating 55 to 265 gpm (1 – 20 MGD) at 0.5%TS to 3%TS (2% total solids limit for running as a PSRP process).

Process is equipped with remote monitoring capabilities, alerts, and notifications. Provides text and email alerts for faults and alarms to up to 5 users.

The system automatically doses on a flow-proportioned (ppm), mg ClO_2/kg dry weight solids, or PSRP basis.

Uses a patented chlorine dioxide generating system proven safe in multiple installations. BCR's chemical management plan and remote monitoring capabilities ensure chemical tanks are never empty and the facility never has to handle CleanB® chemicals.

CleanB® Installations	State	Commissioned
Alachua	FL	01/26/2011
NASJAX	FL	10/16/2012
FPUA	FL	09/03/2014
Pembroke Pines – Phase 1	FL	03/15/2015
Lake Wales	FL	12/01/2015
Opequon	WV	02/01/2016
Hedgesville	WV	02/01/2016
Berkeley	WV	02/01/2016
Inwood	WV	02/01/2016
Loganville	GA	07/01/2016
Vero Beach	FL	02/09/2018

BCR
Solid Solutions

BCR | Solid Solutions

6621 Southpoint Drive N.
Suite 200
Jacksonville, FL 32216

bcrinc.com

APPENDIX B: CLEANB® CUTSHEET

BCR
Solid Solutions

CleanB®
Specifications

SCOPE OF SUPPLY

SYSTEM MAJOR EQUIPMENT

1) Contact Coil
2) Chemical Delivery
3) ClO2 Generator
4) Chemical Storage Tanks
5) Valves and Inlet / Oulet Piping
6) Air Compressor
7) 40' Conex Container

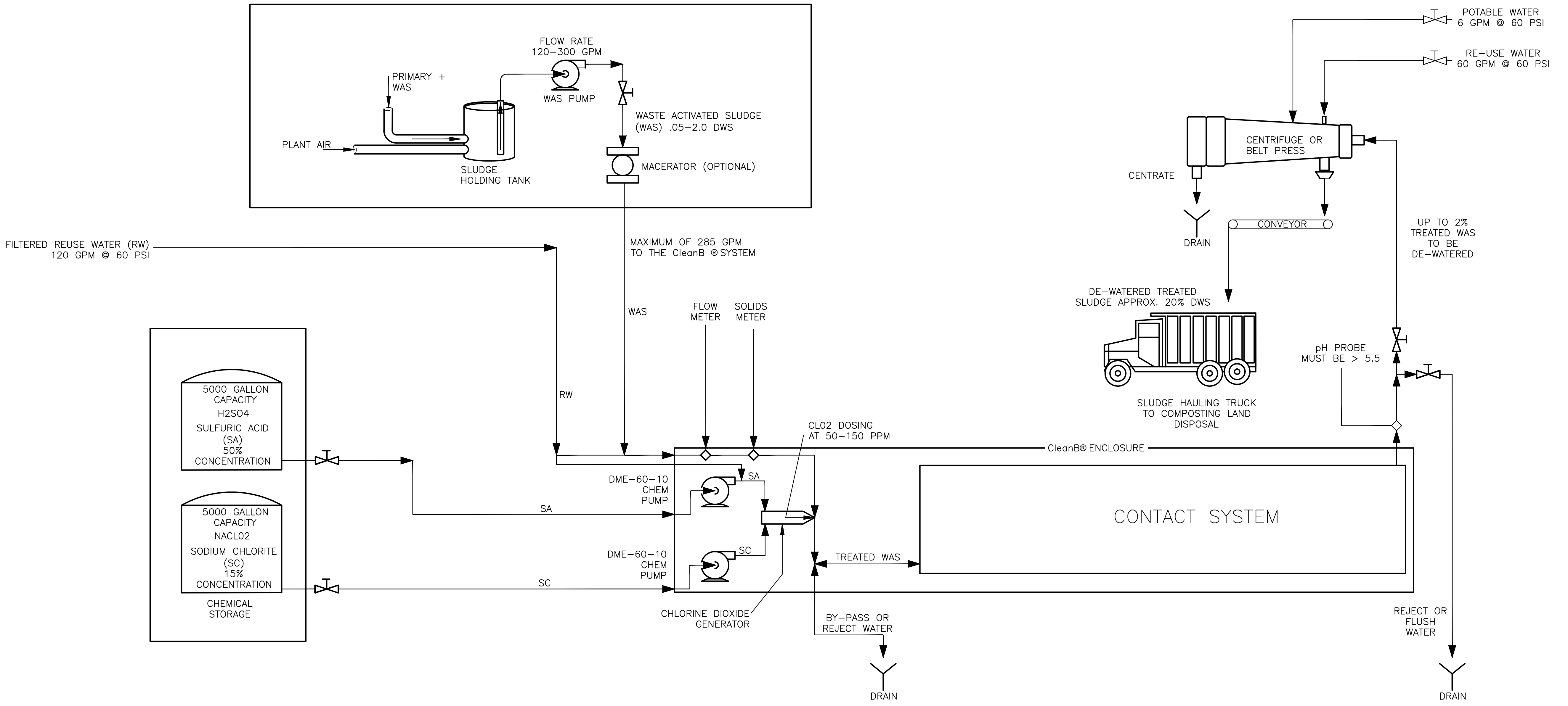
GENERAL SPECIFICATIONS[1]

Model		**CB-6**	**CB-8**	**CB-10**
WAS Feed Rate	GPM	55 - 100	105 - 170	175 - 265
WAS TS	%	0.6 - 2.0	0.6 - 2.0	0.6 - 2.0
Processing Rate[2]	DT/Day	2.0 - 12.0	3.8 - 20.4	6.3 - 31.8
Overall Length[3]	FT-IN	40'-0"	40'-0"	40'-0"
Overall Width[3]	FT-IN	8'-0"	8'-0"	8'-0"
Overall Height[3]	FT-IN	8'-0"	8'-0"	8'-6"
Weight (Shipping)	LBS	13,735	15,452	18,086
Weight (Operating)	LBS	22,075	29,630	40,187
Electrical Load (Connected)[4]	kW	3.6	3.6	3.6
Potable or Reuse Connection	psi/gpm	40-60 / 40-80	40-60 / 40-80	40-60 / 40-80

NOTES

1. Standard BCR specifications; subject to change without notice.
2. Assumes 24 hours per day processing; ranges from minimum %TS and gpm to maximum %TS and gpm.
3. Includes equipment within conex only; does not include interconnections, chemical tanks, etc..
4. Includes equipment within conex only; excludes WAS pump, dewatering, etc..
5. Class I solution price. Excludes freight, taxes, bond, installation, commissioning, testing.

APPENDIX C: PRELIMINARY PROCESS FLOW DIAGRAM (PFD)



CleanB® PROCESS FLOW DIAGRAM

DISTRIBUTION STATEMENT
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BCR ENVIRONMENTAL CORPORATION. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF BCR ENVIRONMENTAL CORPORATION IS STRICTLY PROHIBITED.

UNLESS OTHERWISE SPECIFIED
DIM ARE IN INCHES
TOL ANGLE ± .XX°
2 PL ± .03 3 PL ± .010
INTERPRET DIM AND TOL PER
AMSE Y14.5M-2009

THIRD ANGLE PROJECTION

DRAWN CFAITH	3/7/16
CHECKED KEN WOOD	3/14/16
CCB:	
O&M:	
ENG APPROVED:	

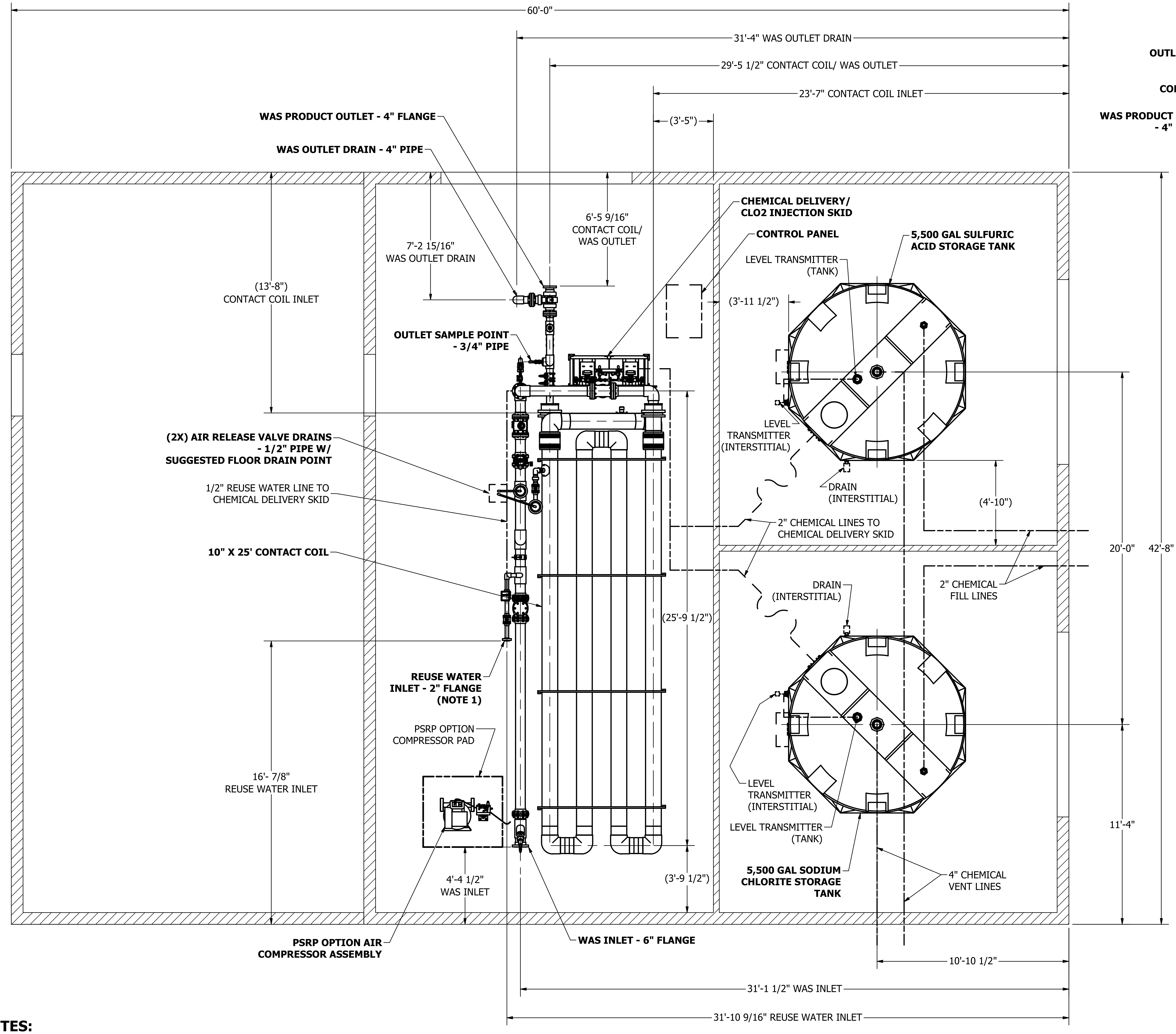
BCR
4063 SALISBURY ROAD,
SUITE 203
JACKSONVILLE, FL 32216
PHONE: (904) 819–9160

CLEANB SYSTEM
PROCESS FLOW DIAGRAM (PFD)
FLOW DIAGRAM

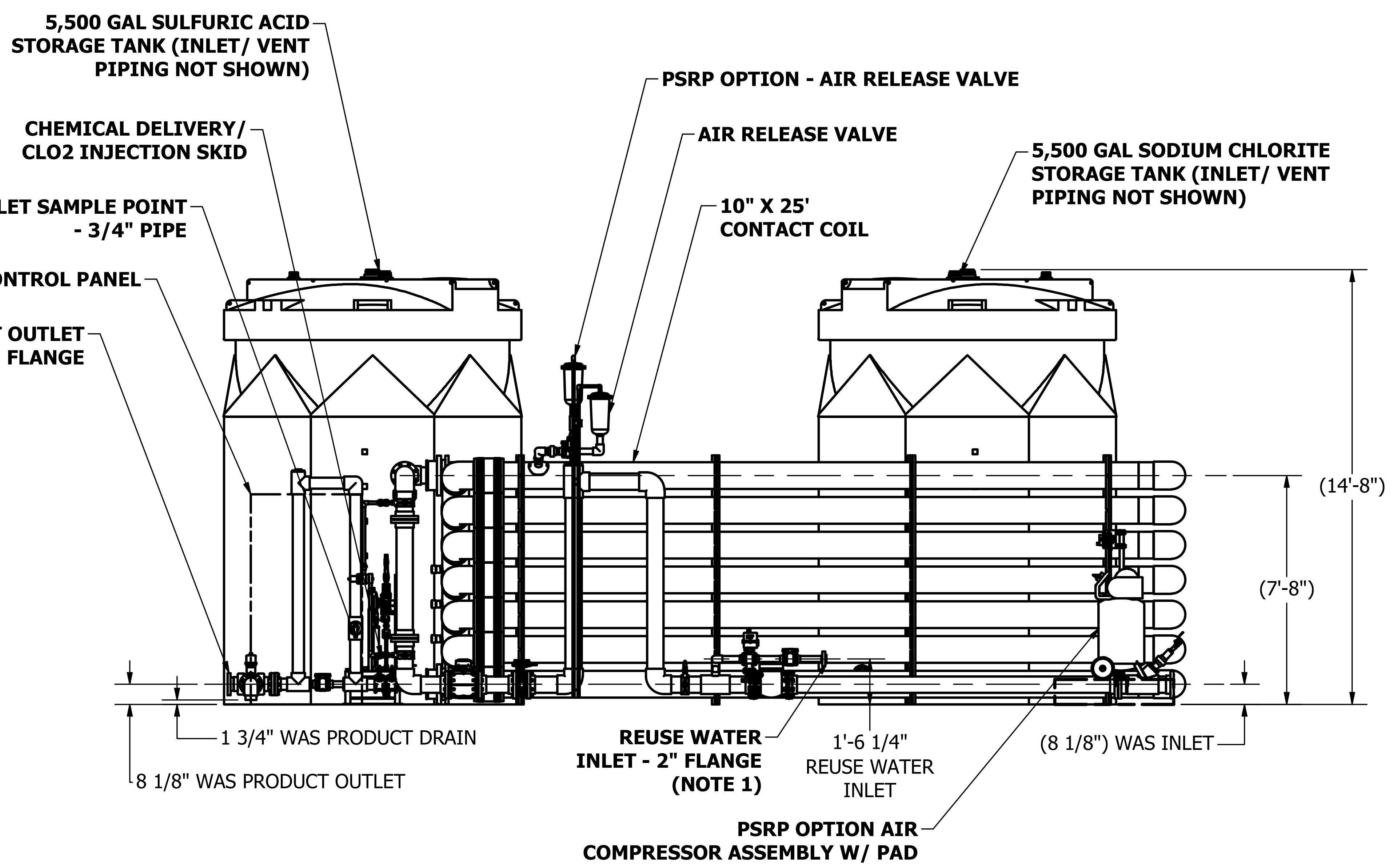
SIZE		DWG NO	REV
D		3901-E-10001	0

SCALE SCALE
WT.(LBS.) WT
SHEET 3 OF 3

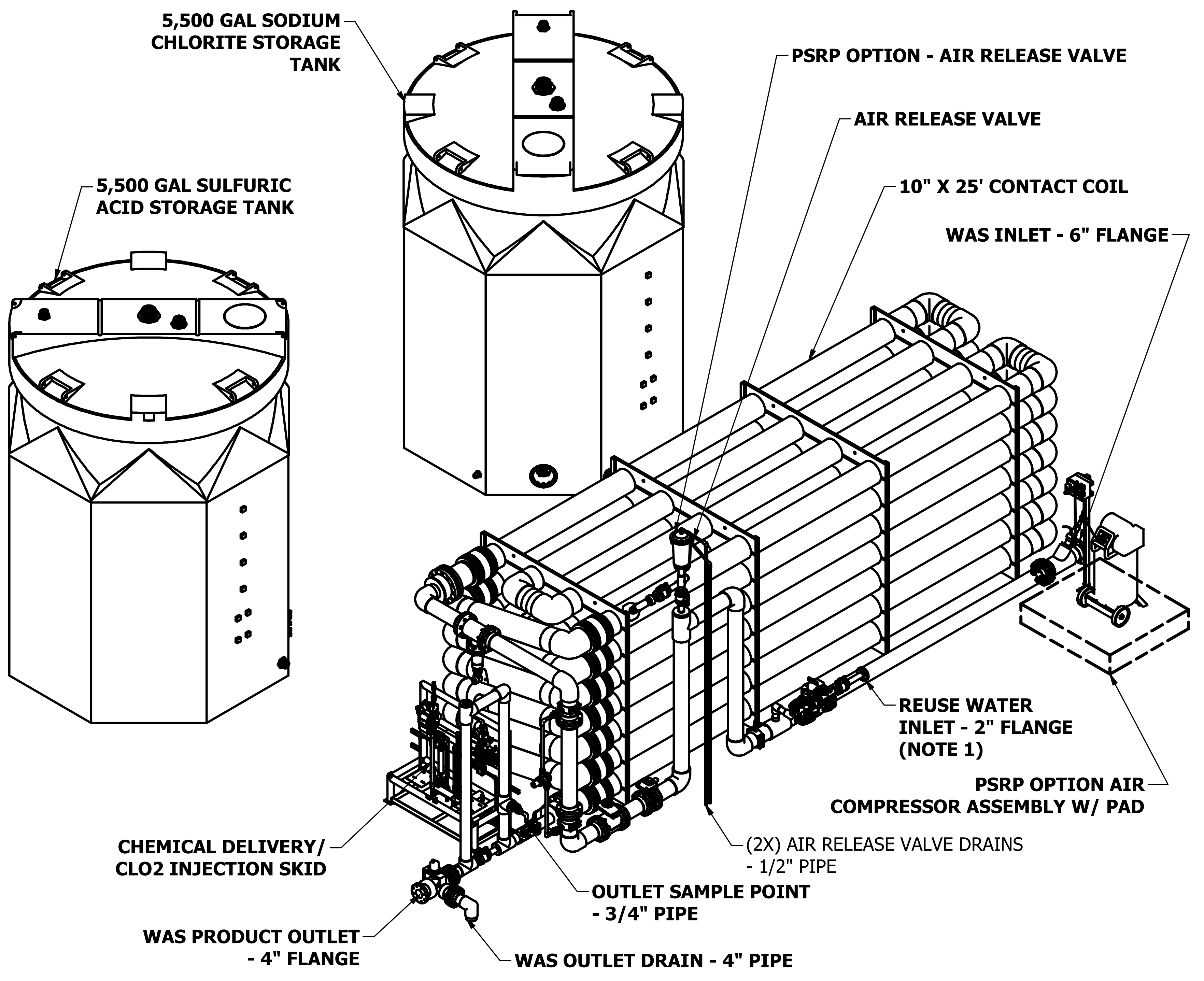
APPENDIX D: PRELIMINARY GA DRAWING



EQUIPMENT PLAN VIEW



EQUIPMENT ELEVATION



NOTES:

1. CLIENT TO COMPLY WITH LOCAL REGULATION FOR CONNECTING REUSE WATER OR POTABLE WATER.
2. DRAWING FOR REFERENCE ONLY, NOT FOR CONSTRUCTION.

REVISION HISTORY

REV	ECN NO.	DESCRIPTION	REV'D BY	DATE
A		NEW DRAWING PER UPDATED BUILDING AND EQUIPMENT LAYOUT	RKK	7/29/2022

UNLESS OTHERWISE SPECIFIED
DIM ARE IN INCHES
TOL ANGLE ± .XX°
2 PL ± .XX 3 PL ± .XXX
INTERPRET DIM AND TOL PER
AMSE Y14.5M-2009

THIRD ANGLE PROJECTION

DRAWN BY	R. KING	DATE 7/29/2022
CHECKED BY	S. MERRITT	DATE 8/1/2022
APPROVED BY	L. RODEMAN	DATE 8/1/2022

TITLE
CLEAN B SYSTEM EQUIPMENT
GENERAL ARRANGEMENT

SIZE D
DWG NO 1021-M-10001
REV A
SCALE N/A
SHEET 1 OF 1

BCR
4063 SALISBURY ROAD, SUITE 203
JACKSONVILLE, FL 32216
PHONE: (904) 819-9160

APPENDIX E: PROJECT REFRENCE LIST

CleanB® Projects List

BCR
Solid Solutions

Project References and Corporate References

To Whom It May Concern:

BCR Overview

BCR Environmental Corporation (BCR) is a U.S.-based developer of innovative, scalable, economical, and environmentally advantageous wastewater treatment and conversion technologies. BCR's patented solutions — CleanB®, Neutralizer® and Bio-Scru® —are EPA-approved technologies for reducing solid mass of biosolids and producing high-value marketable end products. The company has a 100 percent successful track record and has delivered an average savings of 40-plus percent in operating costs and 90- plus percent in energy consumption.

Joshua R. Scott
President and Chief Executive Officer
BCR Environmental Corporation
Phone: (904) 819-9170
Email: jscott@bcrinc.com

City of Alachua CleanB® Treatment Facility, Alachua, FL

Owner: City of Alachua

Contact: John Swilley, Public Works Director / (386) 462-7590
WWTP Capacity: 0.6 MGD (ADF)

Contract Type: System Delivery

Project Duration: 2 Months

Completion Date: November 2010

Operation Contract Duration: 10 Years

Project Description

In 2010, The City of Alachua installed BCR's CleanB® system to upgrade to an odor free Class B product. The CleanB® installation processes WAS from the City of Alachua's wastewater treatment plant. WAS from the clarifier is sent to a single sludge holding tank for decanting. After sufficient quantities of waste activated sludge are accumulated the sludge is processed through the CleanB® system and dewatered. The dewatered Class B cake is then land applied to a permitted Class B land application site or composted. The biosolids facility was designed, permitted, and constructed by Haskell and BCR in 2010.

Project Scope:

- CleanB® System

Operations Contract Scope:

- CleanB® System Repair and Maintenance
- Total Chemical Management Program
- Remote Data Management
- Regulatory Reporting and Permit Management

Naval Air Station Jacksonville CleanB® Facility, Jacksonville, FL

Owner: Naval Air Station Jacksonville
Contact: Gerald “Jay” Caddy, Utilities Commodity Manager / 904-542-6440
WWTP Capacity: 0.6 MGD (ADF)
Contract Type: System Delivery
Project Duration: 4 Months
Completion Date: September 2012
Operation Contract Duration: 5 Years

Project Description

In 2012, the Naval Air Station Jacksonville installed BCR’s CleanB® system at their 0.6 MGD ADF wastewater treatment plant to upgrade from digestion to produce an odor free Class B product. With the CleanB® system installed, Waste Activated Sludge (WAS) from the clarifier is sent to a single sludge holding tank for decanting. After sufficient quantities of waste activated sludge are accumulated the sludge is processed through the CleanB® system and dewatered. The dewatered Class B cake is then either land applied to a permitted Class B land application site, composted, or managed through disposal services. The CleanB® facility was designed, permitted, and constructed by BCR and Aerostar Environmental Services in 2012.

Project Scope:

- CleanB® System

Operations Contract Scope:

- CleanB® System Repair and Maintenance
- Total Chemical Management Program
- Remote Data Management
- Regulatory Reporting and Permit Management

Fort Pierce CleanB® Treatment Facility, Fort Pierce, FL

Owner: Fort Pierce Utility Authority, Florida
Contact: Dominic Lane, (772) 446-1600 Ext. 5514/
dlane@fpua.com
WWTP Capacity: 8.0 MGD
Contract Type: Design-Build-Operate
Project Duration: 12 Months
Completion Date: May 2014
Operation Contract Duration: 10+5+5 Years

Project Description:

In 2013, Fort Pierce Utility Authority, Florida (FPUA), contracted to install BCR's CleanB® and dewatering solution at its 8.0 MGD wastewater treatment plant to upgrade from sub Class B biosolids to a Class B product. Fort Pierce faced several challenges, including nutrient loading issues in the local environment, escalating energy costs, odor issues, digester capacity issues, and stringent environmental regulations. In addition, FPUA faced budgetary and financial resource constraints as a result of outsourced dewatering, hauling and disposal services. BCR provided FPUA with a Design-Build CleanB® and dewatering solution to upgrade the residuals to Class B and diversify the disposal outlets. The solution consisted of a CleanB® system with a Centrisys centrifuge for sludge dewatering.

The CleanB® installation processes WAS from the City's wastewater treatment plant. WAS from the clarifier is sent to a single sludge holding tank for decanting. After sufficient quantities of WAS are accumulated, the sludge is processed through the CleanB® system and dewatered. The dewatered Class B cake is then land applied to a permitted Class B land application site. As part of the process improvements at FPUA, BCR installed a SCADA system that provides central control, monitoring, and real-time facility performance reporting. The system includes a user-friendly, logically-structured operator interface for comprehensive monitoring and control of the CleanB® process. The biosolids facility was designed, permitted and constructed by BCR and Arcadis Engineering.

Project Scope:

- CleanB® System
- SCADA Process System and Integration
- Treated Sludge Dewatering System
- Influent pump station

Operations Contract Scope:

- CleanB® System Repair and Maintenance
- Total Chemical Management Program
- Remote Data Management
- Regulatory Reporting and Permit Management
- Hauling and Disposition
- Capacity Expansion and System Upgrades
- Disaster Recovery Program
- Performance Analytics and Reporting

Loganville, GA CleanB®

Owner: City of Loganville, GA
Contact: Chris Yancey, Utility Director / 770-466-1306
WWTP Capacity: 1.5 MGD (Permitted)
Contract Type: Design-Build
Project Duration: 16 months
Completion Date: 2017

Project Description:

In 2016, the City of Loganville, Georgia installed BCR's CleanB® solution at its 1.5 MGD wastewater treatment plant. Prior to the CleanB® installation, the facility used a sequence batch reactor (SBR) followed by a digester. Due to strong residential growth rates in the area, the facility had to plan for a significant increase in their average daily flow. The estimated flow increase would far exceed their digester capacity and put the City at risk of meeting Class B disinfection requirements. The facility also brings in septic sludge periodically and had issues with odors both at the facility and disposition sites.

The decision to install a CleanB® system addressed capacity, regulatory, and odor concerns. Currently, the facility uses the existing digester (fed from the SBR) as a pass-through "wide-spot" to feed the CleanB® system, which allows for operational flexibility. The CleanB® consistently meets Class B and VAR requirements, and the dewatered end-product is beneficially reused. The treated WAS is dewatered using an existing Centrysis centrifuge. In addition to eliminating foul odors, increasing capacity and decreasing regulatory risks, the facility has realized significant costs savings due to: 1) significantly lowering the digester blower output, 2) decreased polymer consumption and 3) increasing cake solids from 18% to 22%, significantly reducing hauling and disposition costs.

Project Scope:

- CleanB® System
- SCADA Process System and Integration
- Treated Sludge Dewatering System
- Influent pump station

Operations Contract Scope:

- CleanB® System Repair and Maintenance
- Total Chemical Management Program
- Remote Data Management
- Regulatory Reporting
  and Permit Management
- Hauling and Disposition
- Capacity Expansion and System Upgrades
- Disaster Recovery Program
- Performance Analytics and Reporting

Berkeley County PSSD Opequon Hedgesville WWTP CleanB®

Owner: Berkeley Count, WV
Contact: Curtis Keller, Utility Director/304-263-8344
WWTP Capacity: 2.0 MGD
Contract Type: Design-Build-Operate
Project Duration: 18 Months
Completion Date: December 2015
Operation Contract Duration: 20 Years

Berkeley County PSSD North Berkeley WWTP CleanB®

Owner: Berkeley Count, WV
Contact: Curtis Keller, Utility Director/304-263-8344, cbkeller@bcpssd.com
WWTP Capacity: 2.5 MGD
Contract Type: Design-Build-Operate
Project Duration: 18 Months
Completion Date: December 2015
Operation Contract Duration: 20 Years

Berkeley County PSSD Baker Heights WWTP CleanB®

Owner: Berkeley Count, WV
Contact: Curtis Keller, Utility Director/304-263-8344
WWTP Capacity: 2.0 MGD
Contract Type: Design-Build-Operate
Project Duration: 18 Months
Completion Date: December 2015
Operation Contract Duration: 20 Years

Berkeley County PSSD Inwood WWTP CleanB®

Owner: Berkeley Count, WV
Contact: Curtis Keller, Utility Director/304-263-8344
WWTP Capacity: 2.0 MGD
Contract Type: Design-Build-Operate
Project Duration: 18 Months
Completion Date: December 2015
Operation Contract Duration: 20 Years

Vero Beach WWTP CleanB®

Owner: Vero Beach, FL
Contact: Robert Bolton, Utility Director/772-978-5228, robolton@covb.org
WWTP Capacity: 3.0 MGD
Contract Type: Design-Build-Operate
Project Duration: 20 Months
Completion Date: January 2016
Operation Contract Duration: 10 Years

Mebane Bridge WWTP CleanB®

Owner: Eden, NC
Contact: Melinda Ward, Superintendent/(336) 623-4041, mward@edennc.us
WWTP Capacity: 13.5 MGD
Contract Type: Sole Source
Project Duration: 8 Months
Completion Date: August 2020
Operation Contract Duration: 10 Years

Upper Mill Creek WWTP CleanB®

Owner: Butler County, OH

Contact: Jack Thornsberry, Div. Head of Operations / (513) 887-3929, jack.thornsberry@bcohio.us

WWTP Capacity: 8 MGD

Contract Type:

Project Duration: 8 Months

Completion Date: August 2020

Operation Contract Duration: 10 Years

BCR | PROVEN BIOSOLIDS TREATMENT

ACROSS NORTH AMERICA

THERMAL DRYING

Bio-Scru®

Wisconsin Dells, WI

Rogers, AR

Wilmington, DE

Albertville, AL

Rio Dell, CA

Lindhenhurst, NY

Branson, MO – Tri Lakes

Wilsonville, OR

Magnolia, AR

Laurel, MD – Ft. Meade

COMING 2023/2024

Coweta County, GA

Clinton, IA

ADVANCED OXIDATION

CleanB®

City of Alachua, FL

Naval Air Station,
Jacksonville, FL

City of Ft. Pierce, FL

City of Loganville, GA

Berkeley County PSSD
Opequon Hedgesville, WV
North Berkeley, WV
Baker Heights, WV
Inwood, WV

City of Vero Beach, FL

Mebane Bridge, Eden, NC

Upper Mill Creek, Butler County, OH

City of Marengo, IL

Westville, IN

ADVANCED OXIDATION

Neutralizer®

CCUA, Clay County, FL
Spencer, Orange Park
Fleming Island, Orange Park
Ridaught, Middleburg
Miller Street, Orange Park
Mid Clay, Middleburg

Haines City, FL

Pembroke Pines, FL

COMING 2023/2024

Davenport, FL

Fleming Island II,
Orange Park, Clay County, FL

bcrinc.com | 866-724-9145

CASE STUDY:

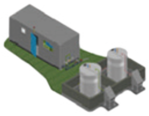
Ft. Pierce WWTF

EXECUTIVE SUMMARY

In September of 2014, a CleanB® system was installed at the Ft. Pierce WWTF. Before the CleanB® installation, the plant wasted to a DAF unit for thickening and held sludge in an aerobic holding tank prior to contract dewatering and landfill disposition. After installation of the CleanB® system, the plant started wasting directly from the clarifier to the CleanB® unit and centrifuge dewatering.

The following chart illustrates the timing of sample collections and CleanB® installation. Differences in nutrients leaving the clarifier were noted and were attributed to the timing of the samples. The capture rates of solids and nutrients after installation of the CleanB® show a substantial improvement when compared to the previous practice. Percent capture of Nitrogen went from 25.9% with DAF thickening and aerobic holding to 92.9% with CleanB® treatment. Percent capture of Phosphorous went from 21.1% to 83.1% with CleanB® treatment.

CleanB® INSTALLATION



Samples collected for
Mass Balance on Aerobic Holding

August 22, 2014

CleanB®

September 1, 2014

Samples collected for
Mass Balance on CleanB®

October 22, 2014

The key conclusions from this work effort are:

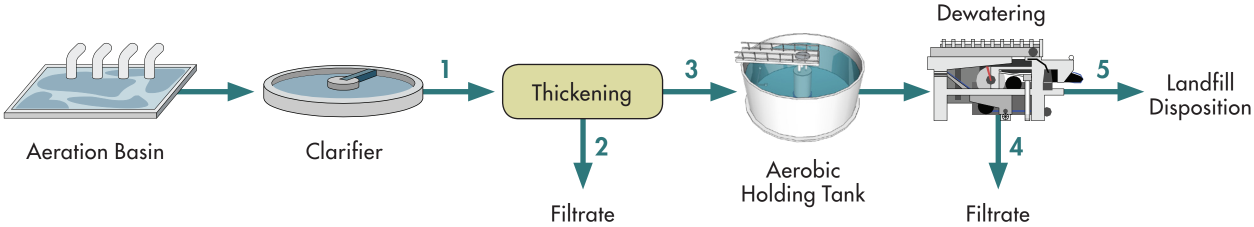
1. Solids return via filtrate was reduced by 70% (76 tons/year)
2. Total Nitrogen return via filtrate was reduced by 92% (45 tons/year)
3. Total Phosphorous return via filtrate was reduced by 66% (9 tons/year)
4. %TS on dewatered biosolids improved by 21% (52 less Truckloads/year)
5. Total polymer consumption was reduced by 34% (reduction of 26.8 lbs/DT)
6. Total Nitrogen leaving with the biosolids was increased by 182% (35 tons/year)
7. Total Phosphorous leaving with the biosolids was increased by 476% (20 tons/year)
8. A $57k per annum expense from the aerobic holding tank blowers were taken off-line
9. Energy/GHG emission savings equates to 50.8 cars per year or 86.4 tons of waste sent to the landfill

In addition to the advantages of higher capture rates and reductions in greenhouse gas (GHG) emissions, it is estimated that Ft. Pierce WWTF will now realize a $242,000 savings per year in operating cost using the CleanB® vs. their original aerobic holding processing. Below is a summary of the net impact to operations utilizing the CleanB® as compared to aerobic holding at Ft. Pierce:

NET IMPACT TO OPERATIONS		
Total per DT	[$/DT]	$ (254.38)
Total per Year @ 952 DT	[$/yr]	$ (242,166.87)

AEROBIC HOLDING MASS BALANCE

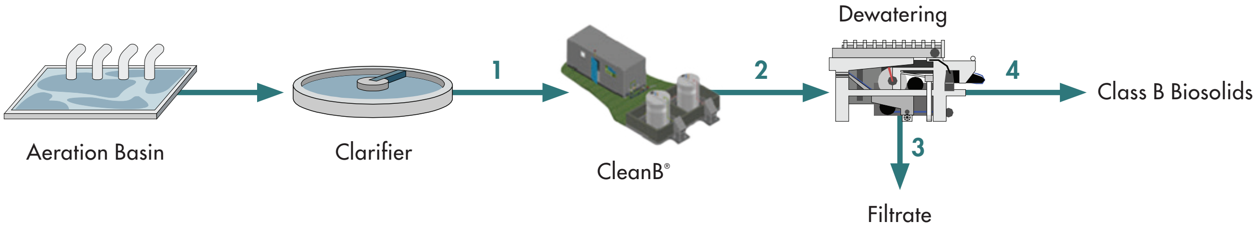
The following is a mass balance for the aerobic holding process while treating 2.6 DT/day. Using the results provided by the lab analyses, a complete mass complete balance was calculated around the Aerobic holding process at Ft. Pierce WWTF. The balance was done by simultaneously solving equations to calculate the filtrate and dewatered biosolids flow by using the *Thickener Inflow* %TS, *Thickener Outflow* %TS, *Thickener Filtrate* %TS, *Dewatered Filtrate* %TS, and *Dewatered Biosolids* %TS. The mass balance represents a 952 DT/yr facility operating 7 days a week. Since surface aerators were used at Ft. Pierce with a short SRT, their aerobic holding process did not achieve a volatile solids reduction.



Process Stream	Stream #	Total Solids [%]	Flow [gpd]	Wet Solids [lbs/day]	Dry Solids [lbs/day]	Total Nitrogen [lbs/day]	Total Phosphorous [lbs/day]
Thickener In	1	0.80	88,091	734,678	5,892	410	109
Thickener Filtrate	2	0.06	75,588	630,404	366	182	47
Thickener Out	3	5.30	12,503	104,273	5,526	228	62
Dewatered Filtrate	4	0.41	8,927	74,450	307	122	39
Dewatered Biosolids	5	17.50	3,576	29,823	5,219	106	23

CleanB® MASS BALANCE

The following is a mass balance for the CleanB® process while treating 2.6 DT/day. Using the results provided by the lab analyses, a complete mass complete balance was calculated around the whole CleanB® unit. The mass balance represents the CleanB® installed directly after the clarifier and treating 952 DT/yr operating 7 days a week.



Process Stream	Stream #	Total Solids [%]	Flow [gpd]	Wet Solids [lbs/day]	Dry Solids [lbs/day]	Total Nitrogen [lbs/day]	Total Phosphorous [lbs/day]
WAS in	1	0.62	104,706	873,244	5,405	322	160
CleanB® Treated	2	0.62	104,706	873,244	5,405	322	160
Dewatered Filtrate	3	0.02	101,886	849,733	186	23	27
Dewatered Biosolids	4	22.20	2,819	23,511	5,219	299	133

MASS BALANCE COMPARATIVE

The table below summarizes the results of lbs of nutrients returned to the plant via centrate and the solids concentration of dewatered biosolids requiring disposal:

	Units	Aerobic Holding	CleanB®	Tons of filtrate removed/yr	Percent Improvement
Dry Solids (filtrate return)	[lbs/DT]	228.5	68.8	76	70%
TN (filtrate return)	[lbs/DT]	103.1	8.5	45	92%
TP (filtrate return)	[lbs/DT]	29.1	10.0	9	66%
%TS Biosolids	[%]	17.5%	22.2%	N/A	27%
Lbs Wet/DT	[lbs/DT]	11,429	9,009	N/A	21%
Truckloads Hauled*	[TL/yr]	247	195	N/A	21%

*Truckload = 44,000 wet lbs

It should be noted that the filtrate returns were summed for aerobic holding (thickening and dewatering) and then compared to the filtrate return for the CleanB® process (dewatering). The total nitrogen return on a dry ton basis with their aerobic holding was 103.1 lbs, whereas the CleanB® showed 8.5 lbs return per dry ton, or a 92% reduction. The high capture rate of nitrogen in the biosolids reduces 45 tons of nitrogen being returned to the head works per year for this size facility (952 DT/yr). Total phosphorous returned via the centrate is smaller, 66%, reduction or 9 tons per year, but still is significant. The benefits of reducing the amount of nutrients returning to the plant are two fold, less returned nutrients means less reprocessing within the liquid treatment train, and secondly more captured nutrients in the biosolids means a more valuable soil amendment.

The CleanB® produced a much drier cake; there was an observed 27% increase in cake solids (17.5% to 22.2% cake solids) for the dewatered biosolids. The change in cake solids equates to a 21% reduction in wet weight. When considering this facility produces 952 DT/year, the facility can now expect to decrease the number of truckloads hauled per year by 52 (assuming 44,000 lbs per truckload), or a 21% decrease in hauling. In addition to a producing a drier cake, there was an observed 40% reduction in polymer consumption (see below).

POLYMER COMPARISON

In addition to an increase of nutrient capture and greater dewatered solids concentrations, the CleanB® has significantly reduced polymer consumption of the plant. Below are the consumption rates of each process.

Aerobic Holding:

Thickening polymer Consumption:	19.3 lbs/DT
Dewatering Polymer Consumption:	59.5 lbs/DT
Total Polymer Consumption:	78.8 lbs/DT

CleanB®:

Total Polymer Consumption:	52.0 lbs/DT

DEWATERING & HAULING COSTS

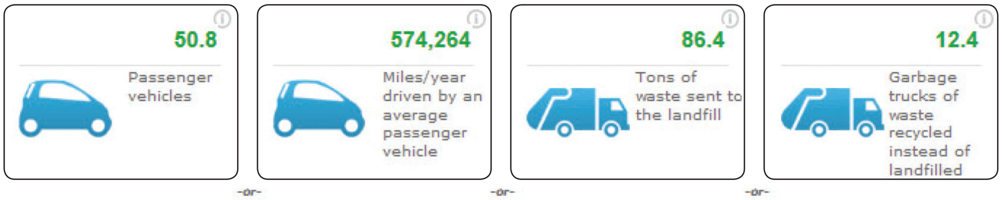
In normal operation FPUA WWTF dilutes its stream from the digester from 5.3% TS to 2.5%TS in order to dewater. They were paying 5.39 cents per gallon dewatered. This cost included dewatering, hauling and disposition. Assuming an annual output of 952 dry tons per year, their dewatering, hauling, and disposition costs amounted to $492,209 per year.

PROJECT ECONOMICS

+	CleanB® Chemical Cost
-	CleanB® Impact on Polymer
-	CleanB® Impact on Cake Solids
-	Aerobic Digestion Blower
=	CleanB® Net Impact to Operations of – $254.38/DT
=	$242,166.87 Annual Savings @ 952 DT/year

ANNUAL GHG EMISSION SAVINGS & EPA EQUIVALENCIES

Annual Greenhouse Gas Emissions from:



50.8 Passenger vehicles

-or-

574,264 Miles/year driven by an average passenger vehicle

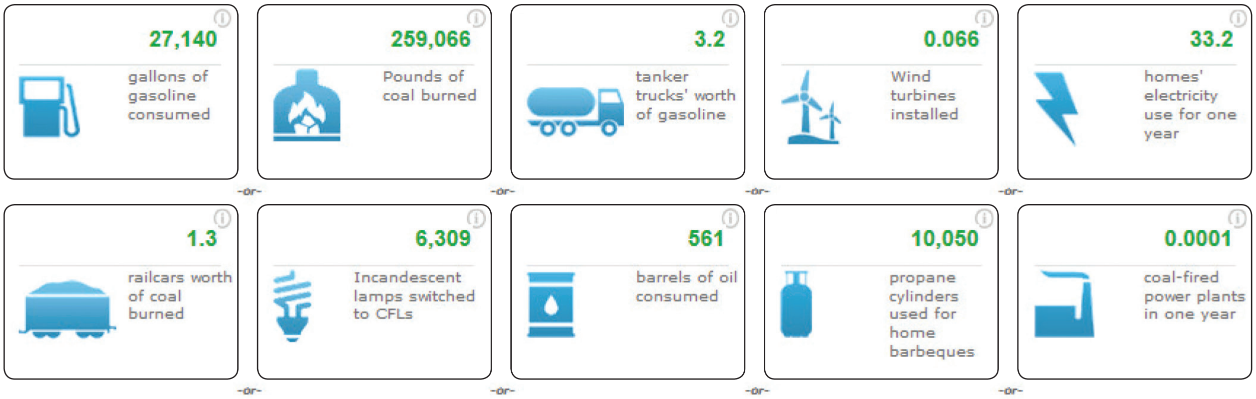
-or-

86.4 Tons of waste sent to the landfill

-or-

12.4 Garbage trucks of waste recycled instead of landfilled

CO$_2$ Emissions from:



27,140 gallons of gasoline consumed

-or-

259,066 Pounds of coal burned

-or-

3.2 tanker trucks' worth of gasoline

-or-

0.066 Wind turbines installed

-or-

33.2 homes' electricity use for one year

1.3 railcars worth of coal burned

-or-

6,309 Incandescent lamps switched to CFLs

-or-

561 barrels of oil consumed

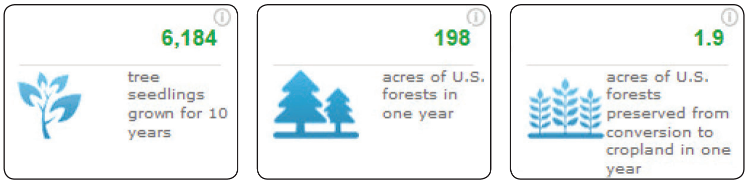
-or-

10,050 propane cylinders used for home barbeques

-or-

0.0001 coal-fired power plants in one year

Carbon sequestered by:



6,184 tree seedlings grown for 10 years

198 acres of U.S. forests in one year

1.9 acres of U.S. forests preserved from conversion to cropland in one year

CASE STUDY:

NAS Jacksonville, FL

BCR
Solid Solutions

NAVAL AIR STATION JACKSONVILLE, FLORIDA TAPS BCR TO UPGRADE WASTEWATER TREATMENT FACILITY

BCR upgraded the U.S. Naval Air Station (NAS) Jacksonville's wastewater treatment facility plant with their CleanB® system, resulting in a 95% reduction in energy consumption for biosolids treatment and a reduction in greenhouse gas emissions of approximately 480 tons per year.

Cost/Risk Challenges:

- Meet the U.S. Navy's aggressive energy reform targets
- Find a more energy-efficient, cost-effective alternative to aerobic digestion

Long-Term Success:

- Energy cost savings of $75,000
- 99% reduction in energy consumption
- Operating cost savings of $111,000
- Cumulative operating savings of $2.2M
- Payback on equipment projected at 5.0 years; 6.5 years including installation
- Reduction in greenhouse gas emissions
- Improved dewatering of biosolids
- 71% less polymer consumption

About the CleanB® Solution

CleanB® is a simple process that meets pathogen and vector attraction reduction requirements as defined by 40 CFR Part 503. The system is highly scalable, has a small footprint, and may be mobilized or permanently installed onsite. Every CleanB® system is outfitted with a control system and monitoring devices to record process parameters and ensure efficient operation.

CASE STUDY:

NAS Jacksonville, FL

CleanB® operations data collected during the first full year of use confirmed projected significant reductions in energy consumption and overall operating costs.

CHALLENGING SITUATION

NAS Jacksonville is the largest Navy base in the Southeast and the third largest in the nation. In order to meet the U.S. Navy's aggressive energy reform targets, the base searched for efficient and environmentally sustainable technologies to reduce energy consumption.

A RECOMMENDATION BASED ON THE FACTS

BCR completed a detailed financial analysis based on verified operating data that compared aerobic digestion operations to the CleanB® system at NAS Jacksonville. Data collected over the first full year of CleanB® operations confirmed projected significant reductions in energy consumption and overall operating costs related to biosolids treatment.

BCR'S SOLUTION DELIVERS

The base opted to have BCR implement its recommendation— install the CleanB® system into the NAS Jacksonville wastewater treatment plant. Not only did the project substantially reduce energy consumption, but it also lowered overall operating costs related to biosolids treatment by eliminating the need for aerobic digestion. BCR installed a CleanB® unit to treat waste activated sludge from the clarifier to Class B standards prior to dewatering. What's more, the CleanB® solution produced a U.S. EPA-approved Class B biosolids beneficial reuse product suitable for land application.

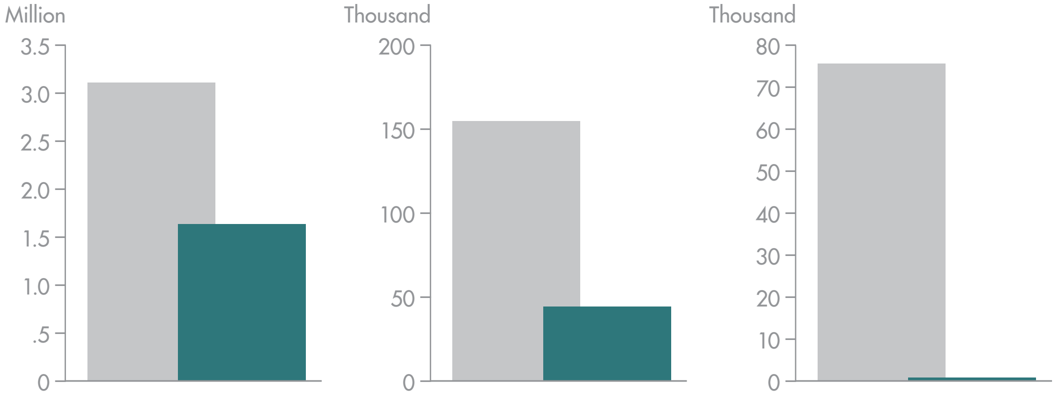
CASE STUDY:

NAS Jacksonville, FL

Following full-scale operation of the solution in 2012, BCR's project delivered NAS Jacksonville these benefits:

- Energy cost savings of approximately $75,000
- 99% reduction in energy consumption for biosolids treatment
- Total operating cost savings of approximately $111,000
- Cumulative operating savings of approximately $2.2 million over 20 years compared with aerobic digestion operations
- Payback on equipment projected at 5.0 years; 6.5 years including installation
- Reduction in greenhouse gas emissions of approximately 480 tons and 9,653 tons over the next 20 years
- Improved dewatering of biosolids reduced total volume to eliminate 12 truckloads of biosolids, with an average annual savings in hauling and disposition costs greater than $10,000 over the project life
- 71% less polymer consumption

The following chart shows before-and-after 20-year life cycle costs (LCC) and before-and-after average annual operating and energy costs:



20 year LCC

$/20 year
$1.5m savings
48% savings

Operating Expense

$/year
$111,110 savings
72% savings

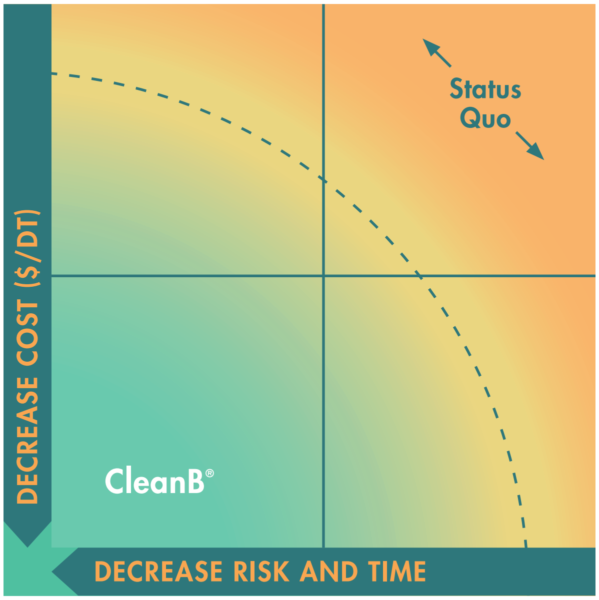
Energy Expense

$/year
$75,306 savings
99% savings

WHAT MAKES BCR A TRUSTED PARTNER?

BCR designs, builds, and assumes full project accountability for long-term, sustainable wastewater treatment/organic waste and biosolids management solutions that deliver municipalities on average savings of 40-plus percent in operating costs and 90-plus percent in energy consumption. Our partnerships meet capital and operating expense constraints, assure regulatory compliance, buoy public sentiment, and enhance environmental stewardship.

- Only provider using scalable, lowest-cost solutions certified by the U.S. EPA that provide high quality end products for beneficial reuse/land application.
- Only company with economically viable solutions for <15MGD / <15 DTPD operations.
- Only fully integrated platform with proven technologies and 100% project success.
- Only progressive project delivery approach with financial and risk analysis models designed specifically for biosolids & organics operations/management.



SAFETY DATA SHEET

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

1. IDENTIFICATION

Product identifier

Sodium Chlorite Solution 5%-41%

Other means of identification

Not available.

Recommended use

Generation of chlorine dioxide for use as a disinfectant, or for use as an oxidant.

Recommended restrictions

None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name	ERCO Worldwide
Address	302 The East Mall Suite 200 Toronto, ON M9B 6C7 Canada
Telephone	Information #: (416) 239-7111 (Monday – Friday 8:00 am – 5:00pm EST)
Website	http://www.ercoworldwide.com
E-mail	info@ercoworldwide.com
Emergency phone number	24 Hr. #: Canada: 613-996-6666 (CANUTEC) USA: 1-800-424-9300 (CHEMTREC)
Supplier	Refer to Manufacturer

2. HAZARD(S) IDENTIFICATION

Physical hazards	Oxidizing liquids	Category 2
Health hazards	Acute toxicity oral	Category 4
	Acute toxicity, inhalation	Category 3
	Acute toxicity, dermal	Category 1
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, repeated exposure	Category 2

Environmental hazards	This mixture does not meet the classification criteria according to OSHA HazCom 2012.
OSHA defined hazards	This mixture does not meet the classification criteria according to OSHA HazCom 2012.

Label elements

Signal word

Danger

Hazard statement

May intensify fire; oxidizer.
Harmful if swallowed.
Toxic in contact with skin or if inhaled
Causes serious eye and skin damage.
May cause damage to organs through prolonged or repeated exposure.

Precautionary statement

Prevention

Keep away from heat. Keep/Store away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection.

Response

If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. Wash with plenty of soap and water. Take off immediately all contaminated clothing and wash it before reuse. Immediately call a POISON CENTER or doctor/physician. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center/doctor. In case of fire: Use water for extinction.

Storage

Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)

No OSHA defined hazard classes.
Other hazards which do not result in classification:
Contact with water will generate considerable heat.
Contact with most metals will generate flammable hydrogen gas.
Chronic skin contact with low concentrations may cause dermatitis.
Contact with acids or reducing agents will generate toxic chlorine dioxide gas.

Supplemental information Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Sodium Chlorite		7758-19-2	5-41
Water		7732-18-5	Balance

4. FIRST-AID MEASURES

Inhalation: If Inhaled: Remove person to fresh air and keep comfortable for breathing. If breathing is difficult, trained personnel should give oxygen. If breathing stops, provide artificial respiration. Call a physician or poison control center immediately.

Skin Contact: Take off immediately all contaminated clothing. Immediately flush skin with running water for at least 20 minutes. Cover wound with sterile dressing. Do not rub affected area. Wash contaminated clothing before reuse. Leather and shoes that have been contaminated with the solution may need to be destroyed. Get medical attention immediately.

Eye Contact: Immediately flush eyes with plenty of water for at least 20 minutes. Continue rinsing. Take care not to rinse contaminated water into the unaffected eye or onto the face. Get medical attention immediately.

Ingestion: If swallowed: Rinse mouth. Do NOT induce vomiting. Never give anything by mouth to a victim who is unconscious or is having convulsions. Call a physician or poison control center immediately.

Inhalation Move to fresh air, give artificial respiration if required, get medical attention.

Most important symptoms/effects, acute and delayed

Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May be harmful or fatal if swallowed. Symptoms may include pain, headache, nausea, vomiting, dizziness, drowsiness and other central nervous system effects. May be harmful in contact with skin. Symptoms may include redness, edema, drying, defatting and cracking of the skin. Prolonged exposure may cause chronic effects. Material is irritating to mucus membranes and upper respiratory tract. Symptoms may include bloody nose and sneezing. High concentrations may cause lung damage.

Indication of immediate medical attention and special treatment needed

Immediate medical attention is required. Causes chemical burns. May be harmful or fatal if swallowed. Symptoms may be delayed.

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. FIRE-FIGHTING MEASUSRES

Suitable extinguishing media:

This product itself does not burn. Water spray, fog (flooding amounts). Water only; no dry chemical, CO2 or Halon.

Unsuitable extinguishing media:

DO NOT use dry chemical fire extinguishing agents containing ammonium compounds (such as some A:B:C agents), since an explosive compound can be formed. DO NOT use carbon dioxide, dry chemical powder or other extinguishing agents that smother flames, since they are not effective in extinguishing fires involving oxidizers. Use chemical extinguishing agents with caution.

Specific hazards arising from the chemical

May intensify fire; oxidizer. Drying of this product on clothing or combustible materials may cause fire.

Special protective equipment and precautions for firefighters:

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Firefighting equipment/instructions:

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Evacuate area. Remove all sources of ignition. In case of fire: Stop leak if safe to do so. Move combustibles out of path of advancing pool if you can do so without risk. Move containers from fire area if you can do so without risk. Fight fire from upwind to avoid exposure to combustion products. In case of fire and/or explosion do not breathe fumes.

Specific methods: Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards May intensify fire; oxidizer.

Hazardous combustion products:

Disodium oxide. Hydrogen chloride. Oxygen.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Immediately evacuate personnel to safe areas. Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

Ventilate the contaminated area. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Use non-sparking tools and explosion-proof equipment. Stop the flow of material, if this is without risk. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Absorb in vermiculite, dry sand or earth and place into containers. Use water spray to reduce vapors or divert vapor cloud drift. Do not let the product dry.

Small Spills: Absorb spill with vermiculite or other inert material. Neutralize the spilled material before disposal.

Large Spills: Stop the leak, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. If not recoverable, dilute with water or flush to holding area and neutralize. Use water spray to reduce vapors or divert vapor cloud drift. Prevent entry into waterways, sewer, basements or confined areas.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions:

Avoid release to the environment. Avoid discharge into drains, water courses or onto the ground.

Contact local authorities in case of spillage to drain/aquatic environment.

7. HANDLING AND STORAGE

Precautions for safe handling

Use only in a well-ventilated area. Wear chemically resistant protective equipment during handling. Avoid breathing mist or vapor. Do not taste or swallow. Keep away from heat. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Do not let the product dry. When using, do not eat, drink or smoke. When preparing or diluting solution, always add to water, slowly and with stirring. When diluting, always add the product to water. Never add water to the product. Keep away from clothing and other combustible materials. Observe good industrial hygiene practices. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Store in a cool, dry place out of direct sunlight. Store in a well-ventilated place. Store locked up. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Store away from incompatible materials (see Section 10 of the SDS). Store in original tightly closed container. Do not store near combustible materials. Do not handle or store near an open flame, heat or other sources of ignition.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational exposure limits

No exposure limits noted for ingredient(s).

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields (or goggles) and a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin protection

Hand protection

Gloves impervious to the material are recommended. Advice should be sought from glove suppliers.

Other

Where contact is likely, wear chemical-resistant gloves, a chemical suit, rubber boots, and chemical safety goggles plus a face shield. Wear chemical protective equipment that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Eye wash facilities and emergency shower must be available when handling this product.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment. A NIOSH/MSHA approved air-purifying respirator with the appropriate chemical cartridges or a positive-pressure, air-supplied respirator may be used to reduce exposure. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. Respirators should be selected based on the form and concentration of contaminants in air, and in accordance with OSHA (29 CFR 1910.134). Seek advice from respiratory protection specialists.

General hygiene considerations

Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Upon completion of work, wash hands before eating, drinking, smoking or use of toilet facilities. When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Aqueous solution.
Physical state	Liquid.
Form	Liquid.
Color	Clear water-white
Odor	Odorless to slight Chlorine-like.
Odor threshold	Not available.
Ph	12.5 - 13 (Depends on concentration)
Melting point/freezing point	24.8 - 78.8 °F (-4 to 26 °C) (Depends on concentration)
Initial boiling point and boiling range	215.6 - 233.6 °F (102 - 112 °C)
Flash point	Not applicable
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit – lower (%)	Not applicable
Flammability limit – lower (%) temperature	Not applicable
Flammability limit - upper(%)	Not applicable
Flammability limit – upper (%) temperature	Not applicable
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility (ies)	
Solubility (water)	Soluble
Partition coefficient (N-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available
Other information	
Density	1.12 - 1.39 g/cm3 (Depends on concentration)
Flammability	Not applicable

Specific gravity	1.12 - 1.39 (Depends on concentration)
Surface tension	Not available

10. STABILITY AND REACTIVITY

Reactivity

The product is stable and non-reactive under normal conditions of use, storage and transport.

Chemical stability

Material is stable under normal conditions. Will decompose if heated.

Possibility of hazardous reactions

Contact with acids, organic materials, reducing agents and oxidizing agents will release toxic gases of chlorine and/or chlorine dioxide.

Conditions to avoid

Keep away from heat, sparks and open flame. Keep away from direct sunlight. Contact with incompatible materials. May ignite or explode on contact with combustible materials. This product may react with reducing agents.

Incompatible materials

Combustible material. Acids. Organic compounds. Oxidizing agents. Metals. Sulfur. Ethylene glycol. Ammonia. Amines. Reducing agents.

Hazardous decomposition products

In the event of fire the following can be released: Chlorine, Chlorine Dioxide.

11. TOXICOLOGOCAL INFORMATION

Information on likely routes of exposure

Inhalation	May be harmful if inhaled.
Skin contact	Harmful in contact with skin.
Eye contact	Causes serious eye irritation.
Ingestion	May be harmful or fatal if swallowed.

Most important symptoms/effects, acute and delayed

Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May be harmful or fatal if swallowed. Symptoms may include pain, headache, nausea, vomiting, dizziness, drowsiness and other central nervous system effects. May be harmful in contact with skin. Symptoms may include redness, edema, drying, defatting and cracking of the skin. Prolonged exposure may cause chronic effects.

Information on toxicological effects

Acute toxicity May be harmful or fatal if swallowed. May be harmful in contact with skin.

Product	Species	Test Results
Sodium Chlorite Solution 15%-41%		
Acute		

Dermal LC50	Rabbit	30.67 mg/kg
Oral LC50	Rat	14.45 mg/kg

Components	Species	Test Results
Sodium Chlorite (CAS 7758-19-2)		
Acute		
Dermal LD50	Rabbit	134 mg/kg
Inhalation LC50	Rat	No data in Literature
Oral LD50	Rat	284 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation

Prolonged skin contact may cause temporary irritation. Causes mild skin irritation.

Serious eye damage/eye irritation

Can cause severe eye irritation. Serious eye damage/eye irritation - Category 1

Respiratory or skin sensitization

Respiratory sensitization

Not expected to be a respiratory sensitizer.

Skin sensitizer

May cause mild skin irritation.

Germ cell mutagenicity

Not expected to be mutagenic.

Carcinogenicity

This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

IARC Monographs. Overall Evaluation of Carcinogenicity

Sodium Chlorite (CAS 7758-19-2) 3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity

This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure

Not classified as a specific target organ toxicity -single exposure.

Specific target organ toxicity - repeated exposure

Specific Target Organ Toxicity (STOT), Repeated Exposure: Blood. Kidneys. Liver, Spleen.

Aspiration toxicity

Not expected to be an aspiration hazard.

Chronic effects

Chronic skin contact with low concentrations may cause dermatitis. Prolonged or repeated overexposure may cause blood, liver, spleen and kidney effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Sodium Chlorite (CAS 7758-19-2)			
Aquatic			
Acute			
Algae	EC50	Green algae (Selenastrum capricornutum)	1.2 mg/l
Crustacea	EC50	Water flea (Daphnia)	0.025 mg/l
Fish	LC50	Sheepshead minnow (Cyprinodon variegatus)	110 mg/l
Chronic			
Algae	EC50	Green algae (Selenastrum capricornutum)	1 mg/l

* Estimates for product may be based on additional component data not shown.

Persistence and degradability

Biodegradation is not applicable to inorganic substances.

Bioaccumulative potential

The product itself has not been tested.

Mobility in soil

No data available.

Other adverse effects

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. DISPOSAL CONSIDERATIONS

Disposal instructions

Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations

Dispose in accordance with all applicable regulations.

Hazardous waste code

The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products

Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging

Empty containers should be taken to an approved waste handling site for recycling or disposal.
Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. TRANSPORT INFORMATION

DOT

UN number	UN 1908
UN proper shipping name	Sodium chlorite, solution (Sodium Chlorite)
Transport hazard class(es)	
Class	5.1
Subsidiary risk	-
Label(s)	5.1
Packing group	II
Environmental hazards	
Marine pollutant	Yes
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	A9, IB8, IP2, IP4, N34, T3, TP33
Packaging exceptions	None
Packaging non bulk	212
Packaging bulk	242

IATA

UN number	UN 1908
UN proper shipping name	SODIUM CHLORITE SOLUTION
Transport hazard class(es)	
Class	5.1
Subsidiary risk	-
Packing group	II
Environmental hazards	No.
ERG Code	5L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Other information	

IMDG

Passenger and cargo aircraft	Allowed.
Cargo aircraft only	Allowed.
UN number	UN1496
UN proper shipping name	SODIUM CHLORITE SOLUTION (Sodium Chlorite)
Transport hazard class(es)	
Class	5.1
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	Yes
EmS	F-H, S-Q

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

DOT

Not available.

IATA; IMDG

Marine pollutant

General information DOT Regulated Marine Pollutant. IMDG Regulated Marine Pollutant.

15. REGULATORY INFORMATION

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous Chemical

No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)

Not regulated.

US state regulations

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. Massachusetts RTK - Substance List

Sodium Chlorite (CAS 7758-19-2)

US. New Jersey Worker and Community Right-to-Know Act

Sodium Chlorite (CAS 7758-19-2)

US. Pennsylvania Worker and Community Right-to-Know Law

Sodium Chlorite (CAS 7758-19-2)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes

Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Issue date	05-05-2015
Version #	0

List of abbreviations

ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstract Services
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR: Code of Federal Regulations
DOT: Department of Transportation
DSL: Domestic Substance List
HMIS: Hazardous Materials Identification System
HPA: Hazardous Products Act
HSDB® - Hazardous Substances Data Bank
IARC: International Agency for Research on Cancer
IATA: International Air Transport Association
IMDG: International Maritime Dangerous Goods
IUCLID: International Uniform Chemical Information Database
LC: Lethal Concentration
LD: Lethal Dose
NFPA: National Fire Protection Association
NIOSH: National Institute of Occupational Safety and Health
NTP: National Toxicology Program

OECD: Organization for Economic Cooperation and Development
OEL: National occupational exposure limits
OSHA: Occupational Safety and Health Administration
PPE: Personal Protective Equipment
RTECS: Registry of Toxic Effects of Chemical Substances
SARA: Superfund Amendments and Reauthorization Act
STEL: Short Term Exposure Limit
TWA: Time Weighted Average

Disclaimer

Prepared by: ICC The Compliance Center Inc.
1-888-442-9628
http://www.thecompliancecenter.com

Disclaimer

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Bibliography

Canadian Centre for Occupational Health and Safety, CCInfoWeb Databases, 2014 (Chempendium, RTECs, HSDB, INCHEM)
European Chemicals Agency, Classification Legislation, 2014. Material Safety Data Sheet from manufacturer.
OECD - The Global Portal to Information on Chemical Substances - eChemPortal, 2014.

SAFETY DATA SHEET

1. Identification

Product identifier **SULFURIC ACID 50% NSF**

Other means of identification None.

Recommended use ALL PROPER AND LEGAL PURPOSES

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name Brenntag Mid-South, Inc.

Address 1405 Highway 136, West
Henderson, KY 42420

Telephone 270-830-1222

E-mail Not available.

Emergency phone number 800-424-9300 CHEMTREC

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, inhalation	Category 2
	Skin corrosion/irritation	Category 1A
	Serious eye damage/eye irritation	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3
OSHA defined hazards	Not classified.	

Label elements

Signal word Danger

Hazard statement Causes severe skin burns and eye damage. Causes serious eye damage. Fatal if inhaled. Harmful to aquatic life. Harmful to aquatic life with long lasting effects.

Precautionary statement

Prevention Do not breathe vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear eye protection/face protection. Wear protective gloves/protective clothing/eye protection/face protection. Wear respiratory protection.

Response If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Specific treatment is urgent (see this label). Wash contaminated clothing before reuse.

Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
SULFURIC ACID		7664-93-9	49.941
Other components below reportable levels			50.059

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician or poison control center immediately.
Skin contact	Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Powder. Foam. Carbon dioxide ($CO2$).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe vapors or spray mist. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Prevent product from entering drains. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. Inform appropriate managerial or supervisory personnel of all environmental releases.

7. Handling and storage

Precautions for safe handling	Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Avoid prolonged exposure. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Avoid release to the environment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store locked up. Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	PEL	1 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
SULFURIC ACID (CAS 7664-93-9)	TWA	0.2 mg/m3	Thoracic fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
SULFURIC ACID (CAS 7664-93-9)	TWA	1 mg/m3

Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection	Chemical respirator with organic vapor cartridge and full facepiece.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
Other	Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.
Respiratory protection	Chemical respirator with organic vapor cartridge and full facepiece.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Liquid.
Color	CLEAR COLORLESS
Odor	NO CHARACTERISTIC
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	50.56 °F (10.31 °C) estimated / 999 °F (537.22 °C)
Initial boiling point and boiling range	382.8 °F (194.89 °C) estimated
Flash point	999.0 °F (537.2 °C)
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	0.00005 hPa estimated
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	15.02 lbs/gal estimated
Explosive properties	Not explosive.
Flammability class	Combustible IIIB estimated
Oxidizing properties	Not oxidizing.
Percent volatile	50.06 % estimated
Specific gravity	1.8 estimated

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Fatal if inhaled.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Ingestion	Causes digestive tract burns.
Symptoms related to the physical, chemical and toxicological characteristics	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity	Fatal if inhaled.

Components	**Species**	**Test Results**
SULFURIC ACID (CAS 7664-93-9)		
<u>Acute</u>		
Inhalation		
LC50	Guinea pig	0.018 mg/l, 8 Hours

Components	Species	Test Results
	Rat	347 mg/l, 1 Hours

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
SULFURIC ACID (CAS 7664-93-9)			
Aquatic			
Fish	LC50	Western mosquitofish (Gambusia affinis)	42 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN2796

UN proper shipping name SULFURIC ACID (WITH NOT MORE THAN 51% ACID)

Transport hazard class(es)

Class 8

Subsidiary risk -

Packing group II

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

ERG number 157

DOT information on packaging may be different from that listed.

DOT

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

SULFURIC ACID (CAS 7664-93-9) Listed.

SARA 304 Emergency release notification

SULFURIC ACID (CAS 7664-93-9) 1000 LBS

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Chemical name	CAS number	Reportable quantity	Threshold planning quantity	Threshold planning quantity, lower value	Threshold planning quantity, upper value
SULFURIC ACID	7664-93-9	1000	1000 lbs		

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
SULFURIC ACID	7664-93-9	49.941

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

SULFURIC ACID (CAS 7664-93-9) 6552

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

SULFURIC ACID (CAS 7664-93-9)	20 %WV

DEA Exempt Chemical Mixtures Code Number

SULFURIC ACID (CAS 7664-93-9)	6552

US state regulations

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. Massachusetts RTK - Substance List

SULFURIC ACID (CAS 7664-93-9)

US. New Jersey Worker and Community Right-to-Know Act

SULFURIC ACID (CAS 7664-93-9)

US. Pennsylvania Worker and Community Right-to-Know Law

SULFURIC ACID (CAS 7664-93-9)

US. Rhode Island RTK

SULFURIC ACID (CAS 7664-93-9)

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	05-08-2015
Revision date	06-10-2015
Version #	06
HMIS® ratings	Health: 4 Flammability: 0 Physical hazard: 0
NFPA ratings	Health: 4 Flammability: 0 Instability: 0
Disclaimer	BNA cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

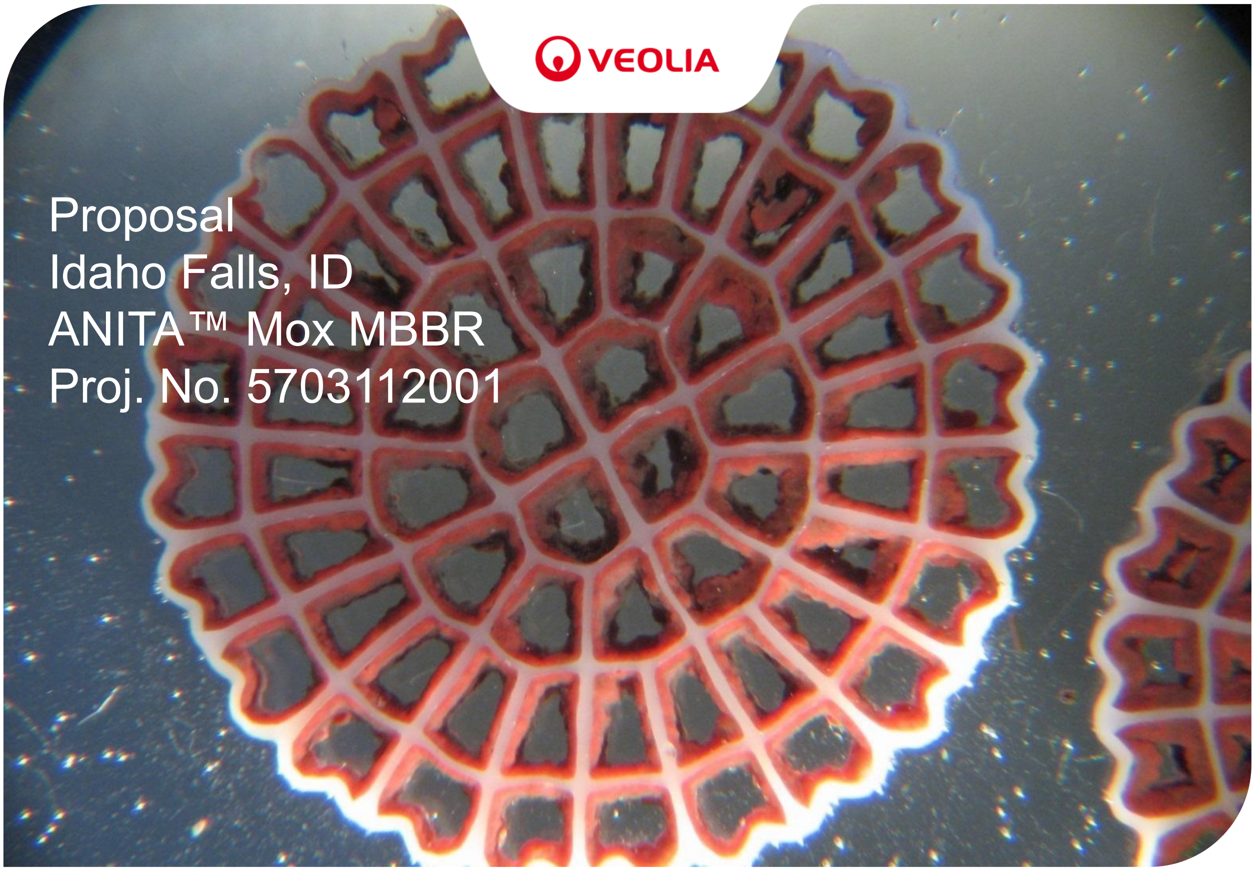
APPENDIX D: SIDESTREAM

Anita Mox MBBR proposal

Anita Mox MBBR Budget

Pearl B Proposal

Pearl B Budget



Proposal
Idaho Falls, ID
ANITA™ Mox MBBR
Proj. No. 5703112001

Submitted to: Skylar Watnick EIT
Stantec

Submitted by: Sarah Spivey
Application Engineer

Date: March 14, 2023

Veolia Water Technologies Inc. (dba Kruger)
4001 Weston Parkway
Cary, NC 27513
tel. +1 919-677-8310 | fax. +1 919-677-0082
www.veoliawatertech.com

Water Technologies

Dear Skylar,

Veolia Water Technologies, Inc (dba Kruger) appreciates the project opportunity and is pleased to present this budgetary proposal for our ANITA™ Mox MBBR process for deammonification of the anaerobic digester centrate in Idaho Falls, ID.

Based on the design basis provided, we have proposed a two (2) train ANITA Mox MBBR system, each train consisting of one reactor with the dimensions of 20 L × 20 W × 16 SWD.

Please note the following:

- The number of trains and dimensions of each reactor can be adjusted if site specific conditions or certain engineering design goals/drivers necessitate such adjustments.
- The proposed design is a greenfield design. However, if the plant has existing tanks with similar volume as the proposed reactors, it is possible to retrofit the ANITA Mox system into existing tanks. The ANITA Mox systems at James River VA, Howard County MD, South Durham NC and Denver CO are all retrofits in existing tanks.
- It is understood that equalization volume will be included as part of this project. Due to the high BOD and TSS concentrations provided in the design basis, it is recommended that there be some method of settling and TSS removal incorporated into the EQ tank design, if possible. If that is not feasible, please discuss with Kruger.
- An effluent ammonia concentration of less than 25 mg/L ammonia was requested. For sidestream systems, an ammonia removal of 70-85% removal is typical, resulting in an effluent ammonia concentration of less than 200 mg/L ammonia. For Idaho Falls, an effluent goal of less than 150 mg/L ammonia has been used. If greater removal is required, please discuss with Kruger. We offer many other technologies such as MBBRs that can help reduce the ammonia concentration down to 25 mg/L.
- Positive displacement blowers have not been included in our scope. It may be possible to tap air from the blower station of the mainstream treatment plant if airflow and pressure are adequate. Most of our ANITA Mox MBBR systems get air by tapping air from the main plant blower station

The ANITA Mox system has proven to be simple, stable and robust with more than thirty full-scale projects and multiple pilot studies. We sincerely hope that our unique ANITA Mox technology, Veolia's unparalleled experience and excellent services discussed above and below add value to your proposal and enable you to achieve your overall project goals in this endeavor.

In summary, this unique and proven technology, together with Veolia's successful experience and vast resources will ensure the ANITA Mox process for the sidestream nitrogen removal system is designed for optimum performance and best economic value.

We appreciate the opportunity to provide this proposal to you. If you have any questions or need further information, please contact our local Representative, Scott Forsling, PE of Coombs Hopkins Company or our Regional Sales Manager, Rodrigo Lara, at (503) 380-3995 (rodrigo.lara@veolia.com).

cc: Process, Sales, project file (Kruger)
Scott Forsling, PE (Coombs
Hopkins Company)

Revision	Date	Process Eng.	Comments
0	3/9/2023	MH	Initial, budgetary proposal.

ANITA Mox Unique Advantages

ANITA Mox provides several key differentiators for deammonification treatment as manifested in multiple full scale installations and pilot studies:

- The media based process is proven to be extremely simple and requires fewer specialty equipment than suspended/granular sludge technologies and significantly less maintenance and attention.
- Proven. All Veolia's installations show that the performance of the system is very stable and much less prone to process upset due to unforeseen or random fluctuations in sidestream characteristics.
- Anammox bacteria grow as a fixed film on HDPE media carriers and are securely retained within the reactor by maintenance-free media retention screens. Unlike suspended growth/granular technologies, there is little risk of anammox washout, substantially improving operational simplicity and reducing maintenance and life cycle cost of the system.
- The AnoxK™ 5 media has a very high protected surface area per unit volume (244 ft2/ft3) for biofilm growth, retention and protection, enabling a compact system design.
- The ANITA Mox system is tolerant of temporary limitations or fluctuations in pH, temperature and parameter concentrations. Therefore, the system can withstand a wide range of short-term influent variations without being upset.
- The ANITA Mox process can tolerate higher design TSS concentrations without the need for dedicated pretreatment equipment. This is another benefit of the anammox bacteria being securely retained on the carriers.
- The ANITA Mox System can be expanded without the need for additional construction. As flows and loads increase carriers can be incrementally added, which provides the ultimate flexibility for future system expansion.
- Carriers are manufactured from HDPE resins and are designed to last the life of the system. Veolia has MBBR installations in service for over 20 years without carrier replacement.
- Seed media is readily available from multiple US-based bio-farms for quick startup. Once one reactor is started up, the media in that reactor can be used as seed for the startup of other reactors.

Robustness

- The ANITA Mox system is tolerant of temporary limitations or fluctuations in pH, temperature and parameter concentrations. Therefore, the system can withstand a wide range of short-term influent variations without being upset.
    - Tolerates variability in dewatering schedules and dewatering starts/stops
    - Tolerates higher TSS and swings in TSS, do not typically require solids pretreatment.
    - Tolerates episodes of high polymer residual
    - Tolerates wide range of DO, BOD, TP, pH and other parameters
    - Tolerates episodes of high NO_2-N and ammonia residual
    - Proven by third-party robustness testing (by LA County) to be an incredibly resilient process that overcomes operational perturbations. For each of the following, LA County purposely upset the biofilm system for a 24-hour period and timed the system's recovery. In each case, ANITA Mox rebounded quickly and efficiently:

Scenario	Recovery Time
24 hour power outage	8 hr
24 hr no feed	8 hr
240 hr Excess Polymer (10x normal)	32 hr
24 hr Excess Polymer (3x normal)	8 hr
24 hr no aeration	16 hrs
24 hr over aeration (2x normal)	8 hr

    - Proven at various installations, the ANITA Mox system is able to withstand short term or even pro-longed system shutdowns. The system can be placed into low-flow and/or low-loading mode. This allows the facility to have flexibility in dewatering schedules and perform routine or even emergency maintenance to their digesters and/or dewatering equipment without significant impact to system performance.

Unparalleled ANITA Mox Expertise in Both the US and Rest of World

Veolia/Kruger is a leader in providing the media based deammonification solution to the US municipal market. The Veolia US team (i.e. Kruger) works directly with our counterparts at Veolia Engineering and Research Institute in France and AnoxKaldnes AB in Sweden to incorporate the latest knowledge and developments in the design of the media based deammonification technology. The delivery of cutting edge and global knowledge, coupled with the robustness of the technology, has enabled us to gain the trust of our customers and resulted in rapid adoption. Veolia has a total of more than thirty five (35) full scale ANITA Mox projects worldwide (including 10 projects in the US since 2013) since 2010 with more than one hundred years of combined successful operating history. The team has published numerous papers on the technology at various national and international conferences.

Strongest US Technical Support and Customer Service

Kruger, the Veolia US team, has served the US municipal market for more than 25 years and is headquartered in Cary, NC. A group of more than 10 core process and project experts have each been with Kruger for more than 10 to 25 years. All these experts have been involved in the modeling, design, delivery, startup and troubleshooting of our full scale ANITA Mox projects in the US and to some extent in those of the international installations. These experts have more than 250 years of combined experience and work as a team to provide critical technical support to our customers whenever it is needed.

For services and parts, we have a customer support center and warehouse in Raleigh, NC to respond to your needs in a timely manner. Our local representative, Wm. H. Reilly & Co., can also provide immediate support and spare parts in most cases.

Strongest Financial Backing

Veolia is the world's #1 ranked waste and water treatment company, bringing not only expertise and experience, but also vast resources and financial backing that can be leveraged by your project team and the City. Veolia will guarantee process performance and is willing to support such guarantee with a process performance Guarantee Bond. A bid bond and/or payment and performance bonds can also be supplied if desired. We believe such bonds provide more value and protection to your interest.

State of the Art Digital Services Offer

The ANITA Mox process includes the use of our Hubgrade Performance Plant start-up kit, which offers many advantages during the critical period of growth and acclimation of the Anammox bacteria. With the use of a Veolia-provided temporary nitrite probe and remote PLC access provided through a highly secure OPC bridge on a separate "DMZ" network, Veolia's advanced algorithms and ANITA Mox expert input ensure that the system is fully optimized 24/7 for the proper reactor conditions. Continued use of the Hubgrade Performance Plant system for full-time optimization is also available via an additional service contract. Key benefits include:

	Hubgrade Performance ANITA™Mox Start-Up Kit	**+Hubgrade Performance Advanced Offer**
Focus/Driver	Start-up Time Minimized Start-up Labor Minimized Sampling Minimized Optimized Conditions 24/7	Optimized Conditions 24/7 Energy Minimized

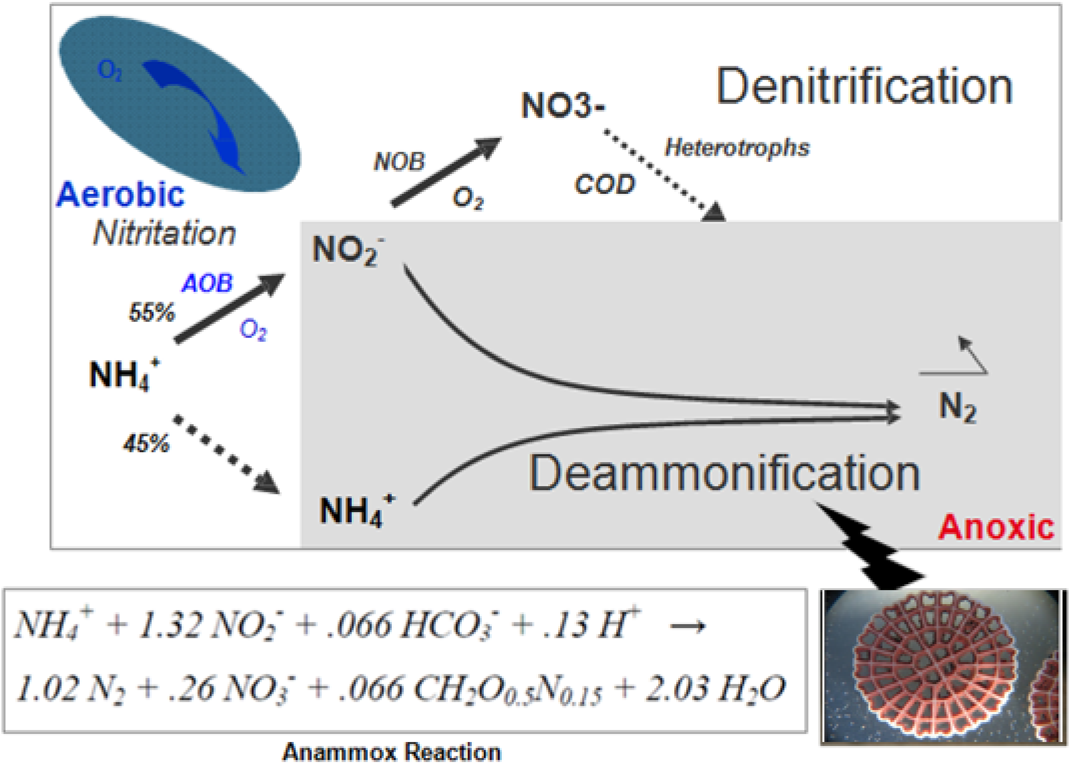
Process Description

AnoxKaldnes MBBR

The ANITA^{TM} Mox MBBR process is a single-stage nitrogen removal process based on the MBBR platform. It is a continuous-flow, non-clogging biofilm reactor containing moving “carrier elements” or media. The media flows with the water currents in the reactor and does not require backwashing or cleaning. The process is specifically designed for treatment of waste streams with high ammonia concentrations. The system can achieve ammonia removals of up to 80-90% and total nitrogen removals of up to 75-85%. The treatment method uses only 40% of the oxygen demand of conventional nitrification, and it requires no external carbon source.

The anammox biofilm (bacteria) that is critical to the deammonification process is attached to and securely protected by the surfaces of the media. The media is designed to provide a large protected surface area for the biofilm and optimal conditions for biological activity when suspended in water. Media of different shapes and sizes provide flexibility to use the most suitable type depending on wastewater characteristics, discharge standards and available volumes. In addition, a phased approach with different media fill percentage makes expansion of the ANITA Mox system much easier. More media can simply be added for future increase of flow and loads. AnoxKaldnes media is made from virgin HDPE and has a density slightly less than water.

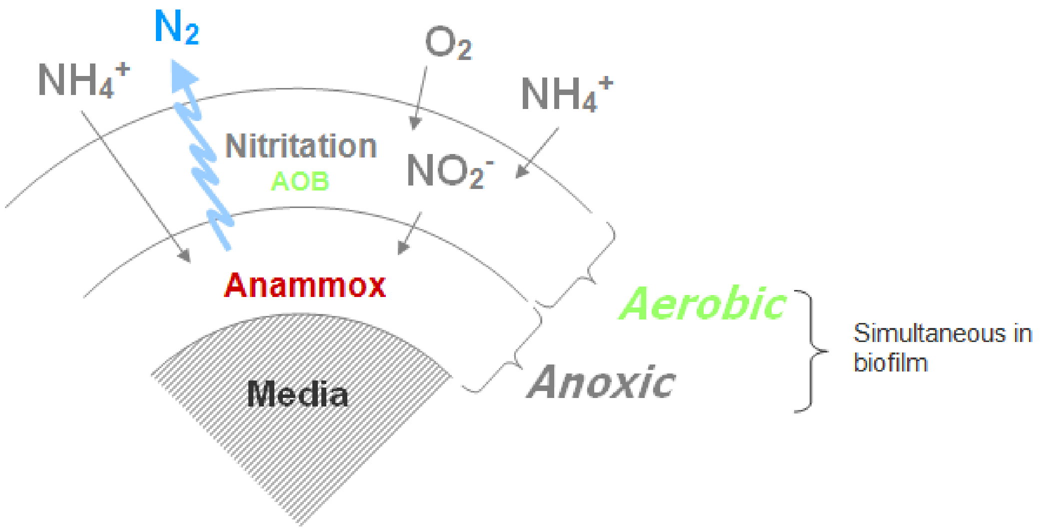
Nitrogen removal with ANITA Mox



$$NH_4^+ + 1.32\,NO_2^- + .066\,HCO_3^- + .13\,H^+ \rightarrow$$
$$1.02\,N_2 + .26\,NO_3^- + .066\,CH_2O_{0.5}N_{0.15} + 2.03\,H_2O$$

Anammox Reaction

The ANITA Mox process consists of an aerobic nitritation reaction and an anoxic ammonia oxidation (anammox) reaction. The two steps take place simultaneously in different layers of the biofilm. Nitritation occurs in the outer layer of the biofilm. Approximately 55% of the influent ammonia is oxidized to nitrite (NO_2^-). Anammox activity occurs in the inner layer. In this step, the nitrite produced and the remaining ammonia are utilized by the anammox bacteria and converted to nitrogen gas (N_2) and a small amount of nitrate (NO_3^-).



ANITA Mox minimizes the risk of anammox washout. With ANITA Mox, the retention of the anammox bacteria within the reactor is easily achieved through the retention of the AnoxKaldnes media by stainless steel media screens. This bacteria retention method is proven to be simple and effective in more than 1,000 AnoxKaldnes MBBR/IFAS systems. Unlike other anammox retention systems, this system is designed to be maintenance free and requires little attention/maintenance from the operators. Anammox retention is an important characteristic of the system, since the anammox bacteria growth rate is very slow compared to conventional wastewater bacteria growth rates. Washout of the anammox bacteria can cause serious upsets of the deammonification process and even irreversible loss of performance.

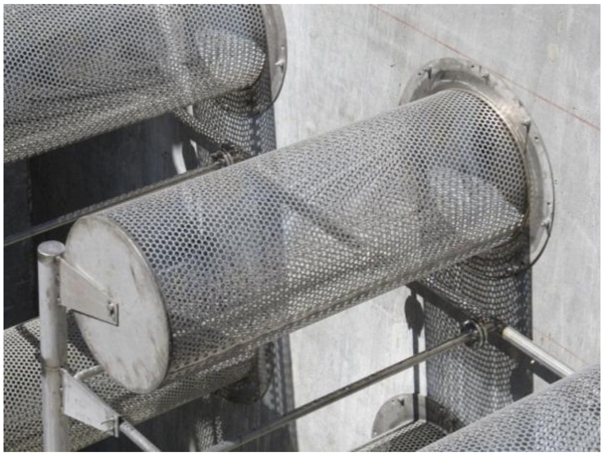
The ANITA Mox MBBR system consists of four major in-basin mechanical components, media, media retaining screens, air grids and mixers. The media, media retaining screens and air grids are designed to be maintenance-free throughout the lifetime of the system.

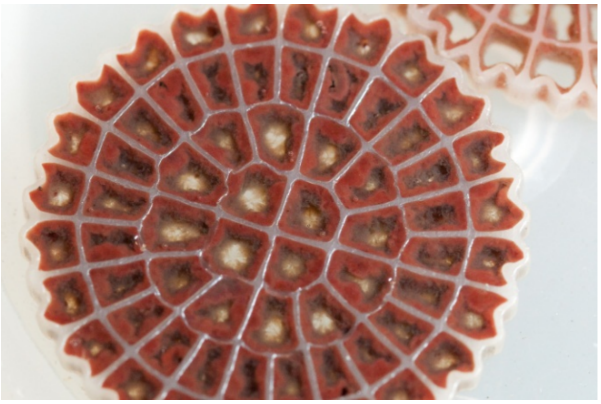
The ANITA Mox MBBR system does not require RAS/WAS pumps or recirculation pumps within the system. Moreover, it requires neither internal nor external sludge settlers because it’s a biofilm system with all biofilms attached to and securely protected by the media carriers.

Another benefit of the ANITA Mox MBBR system is that it does not require the addition of micronutrients for the process to work. Unlike certain suspended growth systems that need micronutrients for sludge conditioning or granule formation, the ANITA Mox system takes advantage of the more robust and adaptive biofilm that is more resistant to adverse influent centrate/filtrate conditions.

AnoxKaldnes ANITA™ Mox System Configuration

Kruger's minimum scope of supply includes the AnoxKaldnes media, screen assemblies (to keep media in each reactor), medium bubble aeration grids, and mixers. In cases where they are needed, Kruger also provides the blowers, instrumentation and controls, SCADA, and field instruments (dissolved oxygen, pH, nitrate, ammonia, etc.) for single-source responsibility.





Design Summary

The ANITA Mox influent design basis is summarized in Table 1. The target effluent criteria for the ANITA Mox system are listed in Table 2. In order to achieve the expected removals as summarized in Table 2, we recommend constructing two (2) ANITA Mox process MBBR process trains. The process design is summarized in Table 3.

If the reject water is from sludge that has been thermally hydrolyzed prior to anaerobic digestion or sludge from a process that co-digests municipal sludge and food waste, please discuss these details with Kruger, since there may be implications on the design approach.

It is important that each reactor have the capability for independent control of influent feed and aeration. This can be accomplished through dedicated pumps and blowers or by using high performance modulating valves. We have included two blowers as part of Kruger's scope to meet this need for aeration. Typically, influent pumps are supplied by the Contractor so those have not been included with this proposal. Veolia can provide these pumps if single source responsibility is desired.

The design assumes that the side stream entering into the proposed ANITA Mox system contains no toxic compounds and has sufficient alkalinity and that none of the equipment provided would be used in a classified area (e.g. Class 1, Division 1 or Class 1, Division 2).

Table 1: Influent Design Basis

Parameter	Units	Values
Flow, Design	MGD	0.08
Flow, Peak Hourly*	MGD	0.16
$cBOD_5$, Design Flow*	mg/L	290
COD, Design Flow*	mg/L	1,600
TSS, Design Flow	mg/L	1,400
TKN, Design Flow*	mg/L	1,060
NH3-N, Design Flow	mg/L	1,050
TP, Design Flow	mg/L	790
Min Rec'd Alkalinity, Design Flow*	mg/L	3,780
Elevation	ft	4,708
Design Temperature*	°C	30

*Assumed values.

Table 2: Target Effluent Concentrations

Parameter	Units	Value
NH4-N	mg/L	< 150
Total Inorganic Nitrogen	mg/L	< 260

Table 3: Process Design Summary

Parameter	Units	Values
Number of Process Trains	-	2
Reactor Dimensions (Each)	ft	20 L × 20 W × 16 SWD
Reactor Volume (Each)	ft^3	12,800
Recommended Freeboard for all reactors	ft	2 – 3
Media Type:	-	AnoxK™5
Fill of Biofilm Carriers, All Reactors	%	45
Media Volume (All Reactors)	ft^3	5,790
Aeration System Type	-	Medium Bubble
Residual DO, Design	mg/L	1.5
Estimated Process Air Requirement, Design	SCFM	~800
Pressure From Top of Drop Pipe	psig	6.8

Scope of Supply

Kruger is pleased to present our scope of supply which includes process engineering design, equipment procurement, and field services required for the proposed treatment system, as related to the equipment specified. The work will be performed to Kruger's high standards under the direction of a Project Manager. All matters related to the design, installation, or performance of the system shall be communicated through the Kruger representative giving the Engineer and Owner ready access to Kruger's extensive capabilities.

Process and Design Engineering

Kruger will provide process engineering and design support for the system as follows:

- Process Engineering consisting of aeration system sizing and configuration, sieve and outlet design.
- Review and approval of P&I Diagram for the AnoxKaldnes ANITA Mox portion of the process. Preliminary General Arrangement Drawings and review and approval of final General Arrangement Drawings for the process. Review of reactor drawings with respect to penetrations and dimensions, excluding structural design.
- Equipment installation instructions for all equipment supplied by Kruger.

Field Services

Kruger will furnish a Service Engineer to perform the following tasks:

- Inspect installation of key pieces of equipment during construction.
- Inspect the completed system prior to startup.
- Assist the Contractor with initial startup of the system.
- Train the Owner’s staff in the proper operation and maintenance of the AnoxKaldnes ANITA Mox system.
- Test and start any Kruger-supplied control equipment, including PLC programming and SCADA systems.

Hubgrade Performance Plant - ANITA Mox Start-up Kit

The start-up kit includes software implementation and expert assistance during the start-up period. Specifically, Veolia will:

- Provide the temporary use of one (1) Hach EZ Series nitrite analyzer
- Deliver the communication software package OPC Bridge (UA client to client) software along with all functional specifications for proper implementation with the PLC/SCADA, including Watchdog interaction for safe communication
- Work with the client’s systems integrator to complete implementation of the software package and verify communication to/from the Hubgrade Performance cloud server
- Implement, configure, tune and test of the Hubgrade Performance Plant features

- Provide remote expert review of system operation via the Hubgrade Performance Plant cloud platform throughout the start-up phase and completion of effluent performance tests

AnoxKaldnes ANITA™ Mox System Equipment

Mechanical Equipment Items	Qty	Description
AnoxKaldnes AnoxK™5 Media (ft^3)	5,790	Carrier elements are made of high density polyethylene. The total media quantity will include a volume of ~5% seeded media.
Cylindrical Screen Assemblies	4	Two (2) per reactor. 304L SS. 23"ø perforated plate pipes terminated in custom flanges for mounting directly to the tank wall.
Medium Bubble Aeration System	4	Two (2) air grids per reactor. 304L SS including header, lateral piping, and hardware (excluding concrete anchor bolts).
Specially Designed Mechanical Mixers	2	One (1) per ANITA Mox Reactor. Includes VFD.
Mechanical Equipment Items (NOT INCLUDED)*	**Qty**	**Description**
Positive Displacement Blowers	2 + 1	Two (2) duty plus one (1) standby. Each blower will be rated for 515 SCFM and 40 NPHP at 8 psig differential pressure. Includes VFD.
Centrate Feed Pump	2 + 1	Two (2) duty plus one (1) standby to feed centrate from equalization tank. Includes VFD.

Instrumentation and Controls Equipment Items	Qty	Description
PLC Control Panel	1	NEMA 12 Freestanding or Wall Mount Control Panel (For Indoor Use). ControlLogix PLC; Panelview HMI; 120V Feed.
High Level Float Switch	2	One (1) for each media zone.
DO Probe (LDO)	2	One (1) for each Aerobic zone. Aerobic Zone DO Monitoring.
pH meter	2	One (1) pH meter for each ANITA Mox reactor.
Thermal Mass Flowmeter	2	One (1) for each ANITA Mox reactor for air flow control.
Magnetic Flowmeter	2	One (1) magnetic flow meter per reactor to measure influent flow.

Notes Regarding System Design and Installation

- A note on concrete specifications: For any MBBR or IFAS systems, it is sound practice to require good, quality concrete work for the process reactors. The Consulting Engineer's standard concrete specification section is typically adequate to eliminate large holes, excessive form marks, large pockets, and excessively rough areas. It is particularly important to eliminate the potential for annular space around media retention screens.
- A note on construction sequencing: It is important, particularly for IFAS installations, to have level detection and level communication systems in place and operational prior to the filling of process tanks with water and media.

Scope of Supply BY INSTALLER/PURCHASER

The scope of supply by others for the AnoxKaldnes ANITA™ Mox system should include, but is not limited to, the following items:

- All civil/site and electrical work.
- A concrete foundation for the tanks.
- Reactors to house the MBBR treatment equipment.
- All provisions for interconnecting piping.
- Unloading, storage and installation of equipment.
- Install and test all level floats, level transmitters, level alarms, and alarm communication devices prior to filling a process tank with media and water
- Centrate equalization tanks
- Cover for reactor tanks (if necessary)
- Temporary provisions for screened primary or secondary effluent during startup.
- Temporary reactor heating during startup.
- Valves
- Blowers and VFDs
- Mixer support and walkways
- Mixer bridges and other structural modifications for the reactors.
- Video recording of any training activities.

Design Options

In addition to the proposed system as detailed herein, Kruger is able to further incorporate our process and controls expertise into wastewater treatment plants, allowing municipalities to meet stringent effluent requirements and future plant upgrades. Kruger is also able to offer our instrumentation and controls expertise to build upon the proposed system by providing a **customized plant-wide SCADA system** or designing a **Motor Control Center (MCC)**, providing clients a single source responsibility for plant controls. Please contact Kruger if the options above are of interest or to be included in the current proposed system or future upgrades. ***Please note that the design options listed above are not included in the pricing noted herein.*

Schedule

- Shop drawings will be submitted within 6-8 weeks of receipt of an executed contract by all parties.
- All equipment will be delivered within 18-20 weeks after receipt of written approval of the shop drawings.
- Installation manuals will be furnished upon delivery of equipment.
- Operation and Maintenance Manuals will be submitted within 90 days after receipt of approved shop drawings.

Pricing

The price for the AnoxKaldnes ANITA™ Mox system, as defined herein, including process and design engineering, field services, and equipment supply is: **$918,000.**

Pricing is DDP to the job site. This pricing does not include any sales or use taxes. In addition, pricing is valid for thirty (30) days from the date of issue. The proposed goods may be affected by the ongoing market fluctuations impacting material and shipping costs. Kruger reserves the right to re-evaluate the Proposal price prior to order acceptance.

Please note that the above pricing is expressly contingent upon the items in this proposal and are subject to Kruger's Standard Terms of Sale detailed herein.

Kruger Standard Terms of Payment

The terms of payment are as follows:

- 10% on receipt of fully executed contract
- 15% on submittal of shop drawings
- 75% on the delivery of equipment to the site

Payment shall not be contingent upon receipt of funds by the Contractor from the Owner. There shall be no retention in payments due to Kruger. All other terms per our Standard Terms of Sale are attached.

All payment terms are net 30 days from the date of invoice. Final payment not to exceed 120 days from delivery of equipment.

Kruger Standard Terms of Sale

1. Applicable Terms. These terms govern the purchase and sale of the equipment and related services, if any (collectively, "Equipment"), referred to in Seller's purchase order, quotation, proposal or acknowledgment, as the case may be ("Seller's Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms or documents.

2. Payment. Buyer shall pay Seller the full purchase price as set forth in Seller's Documentation. Unless Seller's Documentation provides otherwise, freight, storage, insurance and all taxes, duties or other governmental charges relating to the Equipment shall be paid by Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller. All payments are due within 30 days after receipt of invoice. Buyer shall be charged the lower of 1 ½% interest per month or the maximum legal rate on all amounts not received by the due date and shall pay all of Seller's reasonable costs (including attorneys' fees) of collecting amounts due but unpaid. All orders are subject to credit approval.

3. Delivery. Delivery of the Equipment shall be in material compliance with the schedule in Seller's Documentation. Unless Seller's Documentation provides otherwise, Delivery terms are DDP to jobsite.

4. Ownership of Materials. All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data and other documents or information disclosed by Seller or prepared solely by Seller or Buyer or jointly by Seller and Buyer in connection with this Agreement, and all intellectual property rights therein, shall be and remain the confidential and proprietary property of Seller, whether or not patented by Seller ("Work Product"). Buyer hereby irrevocably assigns all rights in any Work Product to Seller. Seller grants Buyer a non-exclusive, non-transferable (except to a successor-in interest to the ownership of the Equipment), paid-up license to use the Work Product solely in connection with Buyer's use, operation, repair and maintenance of the Equipment at the Jobsite defined in this Agreement. Buyer may not disclose, share, transfer, or sell any such Work Product to third parties without Seller's prior written consent and such consent may be arbitrarily withheld. Buyer agrees not to resell, transfer or give any of the biologically colonized media or bacteria from the system to any party other than Seller or any of Seller's affiliates without the prior written consent of Seller for a period of fifteen (15) years from the effective date of this Agreement. Buyer shall not cultivate bacteria or use biomass carriers retrieved from the ANITA Mox system for any research or non-research purposes without prior written consent of the Seller. Any new developments, discoveries or inventions resulting from the operation of the ANITA Mox system in which the ANITA Mox process is a component or is in any way incorporated in whole or in part shall be owned solely by the Seller.

5. Changes. Seller shall not implement any changes in the scope of work described in Seller's Documentation unless Buyer and Seller agree in writing to the details of the change and any resulting price, schedule or other contractual modifications. This includes any changes necessitated by a change in applicable law occurring after the effective date of any contract including these terms.

6. Warranty. Subject to the following sentence, Seller warrants to Buyer that the Equipment shall materially conform to the description in Seller's Documentation and shall be free from defects in material and workmanship. The foregoing warranty shall not apply to any Equipment that is specified or otherwise demanded by Buyer and is not manufactured or selected by Seller, as to which (i) Seller hereby assigns to Buyer, to the extent assignable, any warranties made to Seller and (ii) Seller shall have no other liability to Buyer under warranty, tort or any other legal theory. If Buyer gives Seller prompt written notice of breach of this warranty within 18 months from delivery or 1 year from beneficial use, whichever occurs first (the "Warranty Period"), Seller shall, at its sole option and as Buyer's sole remedy, repair or replace the subject parts or refund the purchase price therefore. If Seller determines that any claimed breach is not, in fact, covered by this warranty, Buyer shall pay Seller its then customary charges for any repair or replacement made by Seller. Seller's warranty is conditioned on Buyer's (a) operating and maintaining the Equipment in accordance with Seller's instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Seller. Seller's warranty does not cover damage caused by chemical action or abrasive material, misuse or improper installation (unless installed by Seller). THE WARRANTIES SET FORTH IN THIS SECTION ARE SELLER'S SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO SECTION 10 BELOW. SELLER MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

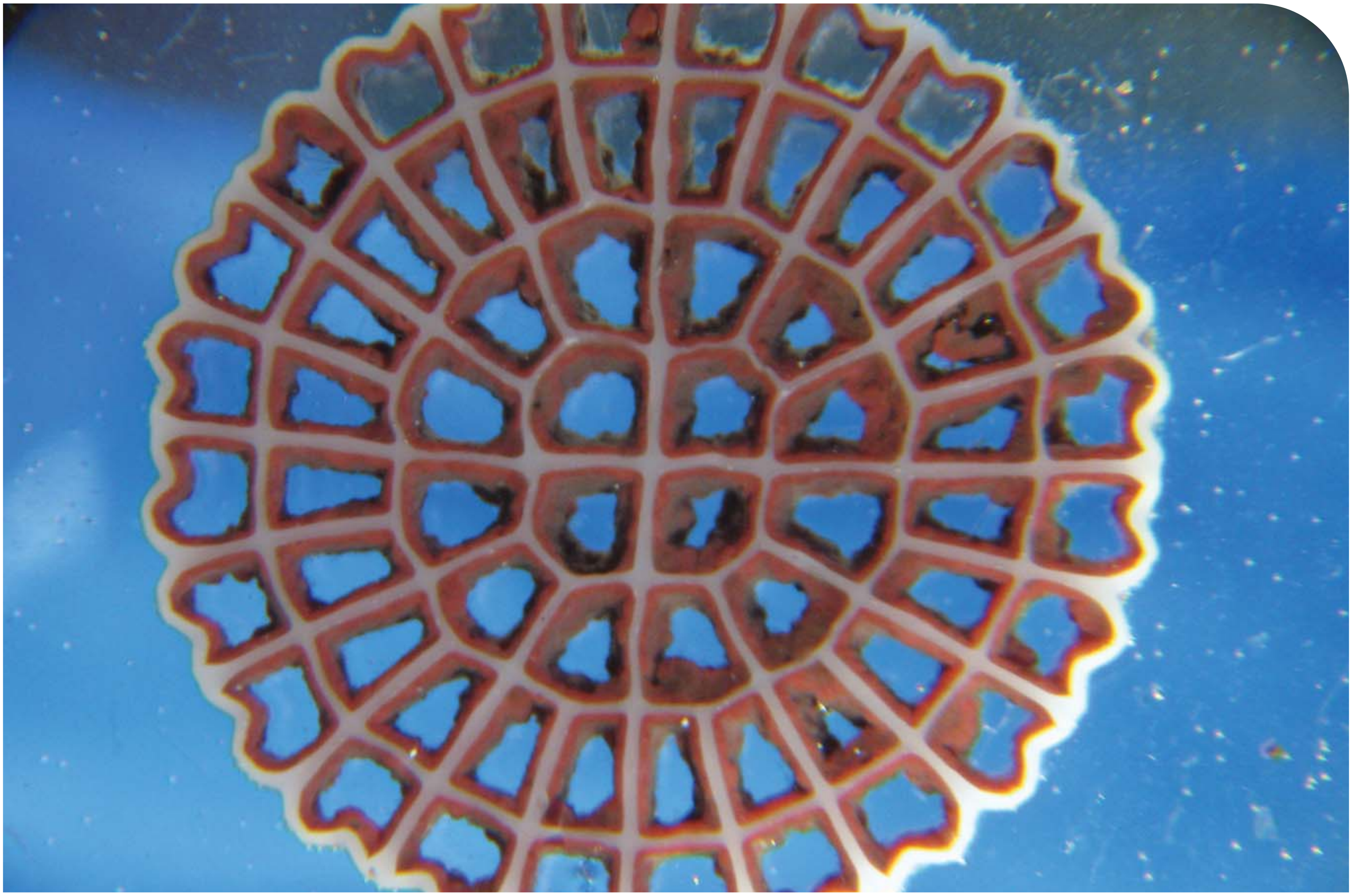
7. Indemnity. Seller shall indemnify, defend and hold Buyer harmless from any claim, cause of action or liability incurred by Buyer as a result of third party claims for personal injury, death or damage to tangible property, to the extent caused by Seller's negligence. Seller shall have the sole authority to direct the defense of and settle any indemnified claim. Seller's indemnification is conditioned on Buyer (a) promptly, within the Warranty Period, notifying Seller of any claim, and (b) providing reasonable cooperation in the defense of any claim.

8. Force Majeure. Neither Seller nor Buyer shall have any liability for any breach (except for breach of payment obligations) caused by extreme weather or other act of God, strike or other labor shortage or disturbance, fire, accident, war or civil disturbance, delay of carriers, failure of normal sources of supply, act of government or any other cause beyond such party's reasonable control.

9. Cancellation. If Buyer cancels or suspends its order for any reason other than Seller's breach, Buyer shall promptly pay Seller for work performed prior to cancellation or suspension and any other direct costs incurred by Seller as a result of such cancellation or suspension.

10. LIMITATION OF LIABILITY. NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SELLER'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE EQUIPMENT SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE EQUIPMENT. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

11. Miscellaneous. If these terms are issued in connection with a government contract, they shall be deemed to include those federal acquisition regulations that are required by law to be included. These terms, together with any quotation, purchase order or acknowledgement issued or signed by the Seller, comprise the complete and exclusive statement of the agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Seller. No part of the Agreement may be changed or cancelled except by a written document signed by Seller and Buyer. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. Buyer may not assign or permit any other transfer of the Agreement without Seller's prior written consent. The Agreement shall be governed by the laws of the State of North Carolina without regard to its conflict of laws provisions.



VEOLIA

ANITA™ Mox

Deammonification Process
Simple, Stable and Robust

WATER TECHNOLOGIES

ANITA™ Mox

Sidestream Deammonification

ANITA™ Mox is a robust, single-stage ammonia and total nitrogen removal biofilm process based on the Moving Bed Bioreactor (MBBR) or Integrated Fixed-film Activated Sludge (IFAS) platform. It utilizes the AnoxK™ 5 media to cultivate anaerobic ammonia oxidizing bacteria (anammox) and ammonia oxidizing bacteria (AOB) enriched biomass for both mainstream and sidestream deammonification applications. It is the simplest and most stable technology in the market in terms of operation and maintenance in treating centrate or filtrate from either conventional anaerobic digestion (AD) or AD following thermal hydrolysis process (THP).

Sidestream Benefits Compared to Conventional Nitrification/ Denitrification

- 3x lower in total cost per pound of nitrogen removed
- Much smaller footprint with high loading/removal rates
- 90% less sludge production
- 60% less in energy consumption
- No external carbon required; less carbon footprint

System Configuration

- **MBBR** - for centrate from conventional anaerobic digestion
- **IFAS** - for centrate from thermal hydrolysis process + anaerobic digestion
- **Phased IFAS** - for centrate from any anaerobic digestion

Unique Advantages

- The simplest and most stable technology in the market
- Robust and forgiving design/operating parameters
- 90% ammonia removal and 80% TIN Removal
- Can work with both shallow (< 10 ft) and high side water depth (> 26 ft)
- Media-based solution eliminates the risk of anammox washout without the need for anammox/MLSS separation equipment
- Small footprint and easliy expandable by adding media or converting MBBR to IFAS with higher loading rates.
- Zero maintenance needed for in-basin components such as SS media screens, SS medium bubble diffusers and media carriers.
- Seed media readily available from multiple large US-based bio-farms for quick startup
- No need for media replacement

Full scale performance data has demonstrated ANITA Mox's ability to withstand:

- High TSS and swings in TSS (between 1,500 and 17,000 mg/L) without the need of pretreatment unit process
- High polymer residual
- Wide DO concentration and PH ranges
- Variations in dewatering schedules and dewatering starts/stops
- Extended shutdowns due to dewatering equipment maintenance
- High NO2-N residual with less NOB suppression requirements
- Inhibitory effects of recalcitrant COD and complex nitrogen compounds generated by THP or other special processes

Mainstream Deammonification

Paving the Way for Energy Neutrality

ANITA Mox is now offered as a compact and robust media based process for ammonia and nitrogen removal in mainstream applications while unlocking the possibility for energy production through COD diversion to digestion.

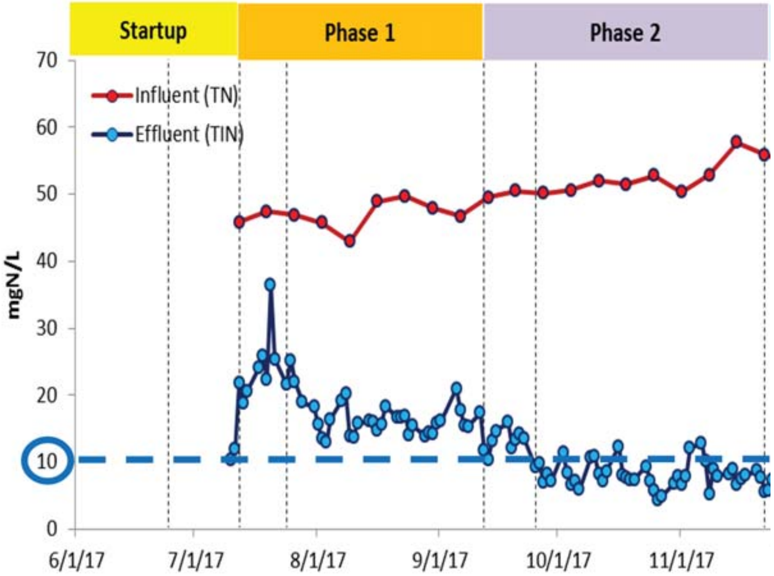
For mainstream deammonification, ANITA Mox provides an easy and purely mechanical solution to securely retain anammox biomass with the combination of biofilm carriers and retention screens. This simple and maintenance-free physical separation between anammox-rich biofilm carriers and nitrifier-rich suspended sludge allows for easy control of the sludge and therefore better AOB selection and control and better selective wash-out of NOB while retaining anammox.

Compared to conventional BNR treatment, Mainstream ANITA™ Mox reduces aeration demand by 60% and eliminates the need for carbon. Minimizing the operating cost of nitrogen removal and generating power through COD diversion, Mainstream ANITA™ Mox makes it possible for facilities to achieve energy neutrality.

Benefits of Mainstream ANITA™ Mox

- Eliminates carbon needs, enables power generation through COD diversion
- 60% less aeration required
- Targets 10-15 mg/L effluent TN concentration
- Works at low temperatures (15°C)
- Simple to control and operate
- Retains anammox easily
- Sidestream/Maintstream ANITA™ Mox ecosystem

Proven Results



Pilot Services

Veolia offers the following Pilot Services:

- On-site pilot testing trailors
- Startup and remote data collection
- Monitoring through Veolia's Aquavista™ smart water management system

ANITA™ Mox Mobile

"Plug and Play" Centrate Deammonification Solution

Complete Solution for Smaller Facilities

Do you have a plant that is 15 to 20 MGD or smaller? Do you need a complete centate solution that can be shipped to your facility on skids and ready to be connected and functional? If the answers to these questions are yes, the ANITA Mox Mobile will be exactly what you are looking for. It is a complete package plant ready to take and treat centrate and remove nitrogen as soon as it's connected.

Realizing the Advantages

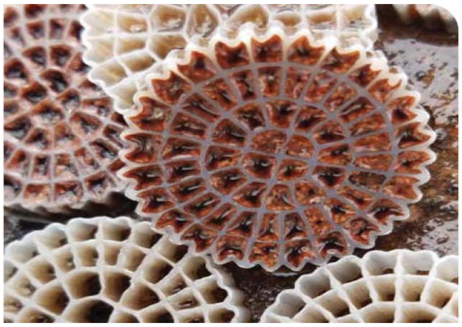
- Plug and play
- Minimizes onsite construction and plant interference
- Fast project delivery
- Lowest overall CAPEX & OPEX cost
- Zero external carbon requirement
- Lowest sludge production
- Proven simple, stable and robust technology
- Fully automated requiring minimal operator attention

System Components

The ANITA Mox Mobile MBBR package consists of a reactor, AnoxK™ 5 media, aeration diffusers, media retaining screens, mixers, blowers, air and/or liquid control valves, control panel, instrumentation and pipe connection ports. The IFAS package would also include a clarifier and RAS/WAS pumps. Other system options such as centrate feed pumps and access walkway can also be included per customer requirements.

Unit Design Capacity

The ANITA Mox Mobile package comes with different models and sizes. For regular centrate, the rated ammonia removal capacity for one MBBR unit ranges from 100 to 500 lbs NH_3-N/day; the rated ammonia removal capacity for the more robust IFAS unit ranges from 200 to 1,000 lbs NH_3-N/day. For THP centrate with high COD concentrations, the rated ammonia removal capacity for an IFAS unit can be up to 300 to 500 lbs NH_3-N/day depending on COD loading.



Contact Us for More Information

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ANITA™ Mox: Simple Start Up with High Influent TSS

Deammonification | Case Study

Little Patuxent Water Reclamation Plant

The Client

Little Patuxent Water Reclamation Plant (LPWRP) is located in Howard County, Maryland. This is a 29 MGD ENR (Enhanced Nutrient Removal) plant that discharges to the Little Patuxent River which goes to the Chesapeake Bay.

Design Criteria

- Design flow: 0.176 MGD
- Influent NH_4-N: 1,100 mg/L

Effluent criteria:

- 80-85% of NH_4-N Removal
- 70-75% TN Removal

The Client's Needs

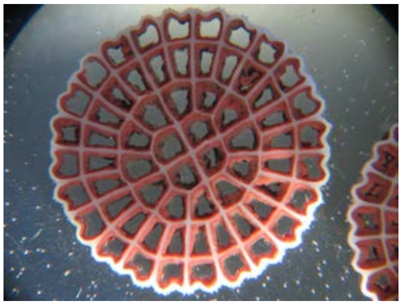
In 2013, Howard County began plans for an upgrade to its biosolids management facilities at LPWRP with high rate anaerobic digestion, rebuilt centrifuges for dewatering, a phosphorus recovery system and a sidestream deammonification system. The sidestream process is designed to reduce the impact of nitrogen load returned back to the mainstream treatment process and ensure that the plant meets the stringent discharge TN limit of 3 mg/L. LPWRP required the sidestream process to meet the following:

- Treat centrate with a high solids concentration (800 mg/L or higher) without requiring solids pretreatment.
- Proven, simple and robust treatment process that is supported by successful installations throughout the US.
- Easy to operate and requires minimal maintenance.
- Stable system that retains anammox bacteria easily and is not prone to washout, and more importantly,
- Fit into existing tankage.

The Solution

Howard County and the CMAR team chose Veolia's ANITA™ Mox MBBR sidestream deammonification process to meet the plant's requirements while offering project cost savings.

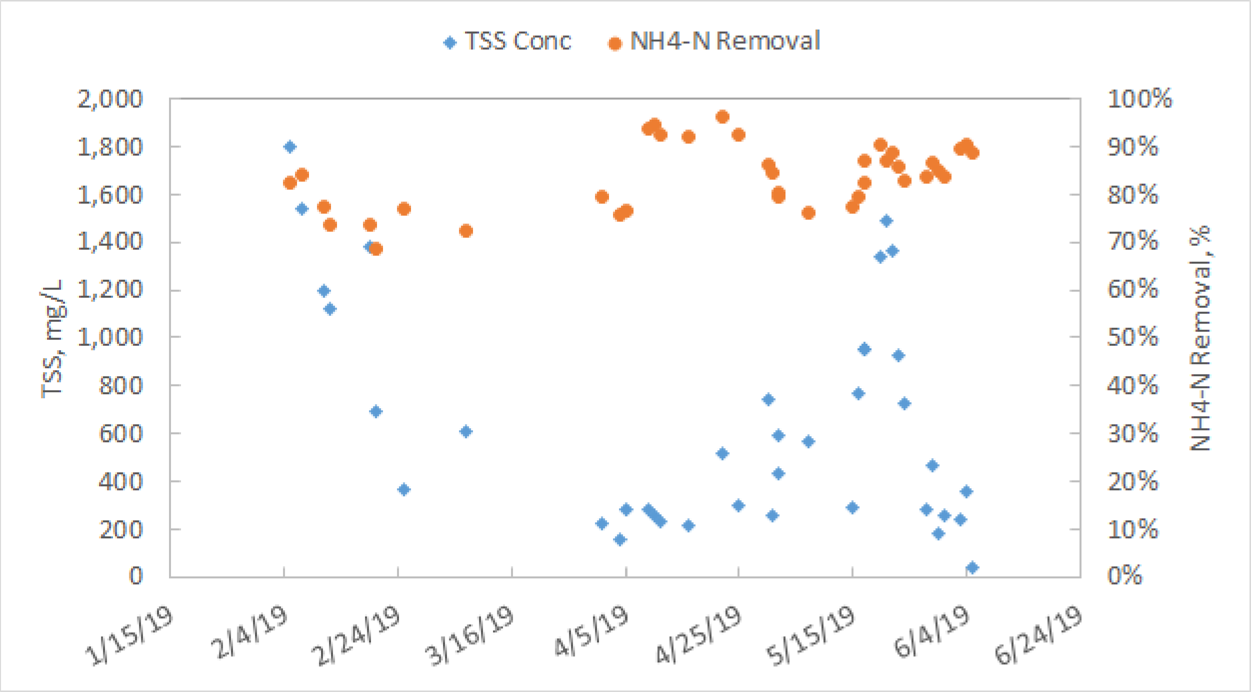
ANITA™ Mox utilizes K5 biofilm carriers and media retaining screens, eliminating anammox washout. Biomass (including anammox and AOBs) remains attached to the carriers as high TSS passes through the system.



ANITA™ Mox: Simple Start Up with High Influent TSS

Process Description

The ANITA™ Mox system was retrofitted into existing tanks with relatively shallow side water depth. The tanks were originally aeration tanks for an industrial waste pretreatment system that was mothballed before the Biosolids Project started. The system components such as the media, media retaining screens and medium bubble aeration diffusers are designed to be maintenance free for the lifetime of the system. The media fill volume of each of the two reactors leaves room for future expansion by simply adding more media if ammonia loading increases. Air for the ANITA™ Mox system is supplied via dedicated blowers as required by the plant. The small footprint of the system is able to save room for two small EQ tanks, designed to provide consistent loading to the reactors for enhanced performance. The patented ANITA™ Mox process controls strategy has the flexibility to be controlled by DO, pH, and/or ammonia for optimal energy savings.



Results

After adding seeded media from an existing BioFarm in the US, the reactors reached the design loading and removal rates despite high influent TSS concentrations. Reactor operation and performance is largely unaffected by high TSS concentrations. Since startup in early 2019, the ANITA™ Mox system continues to meet the design Nitrogen removal rates. The two small ANITA™ Mox reactors are able to remove approximately 15% of the total nitrogen load of the plant with low cost.

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www.veoliawatertech.com

Meeting Strict TN Limits: ANITA™ Mox

Biological Treatment | Case Study

South Durham Water Reclamation Facility

The Client

The City of Durham is located in the Research Triangle Region of North Carolina. The City operates two wastewater treatment plants – the North Durham Water Reclamation Facility and the South Durham Water Reclamation Facility, both permitted to treat 20 million gallons per day (MGD).

Design Flow: 0.08 MGD;
Peak Design Flow: 0.16 MGD
Effluent Criteria:
- ≥75% NH_4-N Removal
- ≥65% TN Removal

The Client's Needs

In 2011, the City of Durham completed a comprehensive wastewater master plan that evaluated different treatment techniques for meeting strict total nitrogen (TN) limits at the South Durham Water Reclamation Facility (SDWRF). The SDWRF will need to meet a TN limit of 3 mg/L at its design flow to comply with the total maximum daily load (TMDL) in the Jordan Lake Watershed, which serves as a source of drinking water in the region. The SDWRF uses anaerobic digesters to break down the plant's sludge. Downstream of the digesters, the plant uses belt filter presses for dewatering. The resulting liquid – the pressate from dewatering, or what is referred to as "sidestream" flow – historically accounted for about 20 percent of the nitrogen load in the plant's biological nutrient removal (BNR) process. While this sidestream nitrogen contribution sounds high, it is typical for many plants with anaerobic digestion.

The Solution

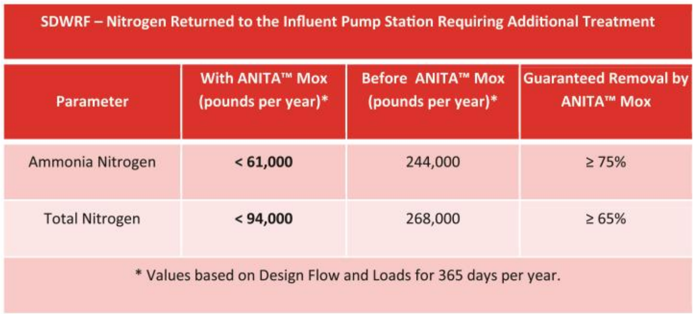
As a result of the evaluation, Durham selected Veolia's ANITA™ Mox sidestream deammonification system for ammonia and total nitrogen removal. The City studied mainstream and sidestream treatment alternatives to meet its TN limits. In its cost comparisons, ANITA™ Mox was calculated to be three times lower in cost per pound of nitrogen removed when capital and operating costs were considered. ANITA™ Mox was estimated to cost $0.93 per pound of nitrogen removed ($/lb N), while the most cost-effective mainstream BNR solution was estimated at $2.66/lb N. The City thus selected ANITA™ Mox as the most cost-effective nitrogen removal alternative.

Process Description

ANITA™ Mox is Veolia’s sidestream deammonification technology for short-cut nitrogen removal. When compared to conventional mainstream nitrification/denitrification, ANITA™ Mox uses about 60% less oxygen, requires no external carbon source, and produces less sludge.

ANITA™ Mox is offered in both Moving Bed Biofilm Reactor (MBBR) and Integrated Fixed Film Activated Sludge (IFAS) configurations, depending on site conditions. As such, the system consists of engineered polyethylene carriers – in this case AnoxKaldnes™ K5 media – to provide ample protected surface area for biofilm to thrive. The K5 media (approximately the diameter of a quarter) host two types of bacteria in the same reactor. The outer layer consists primarily of ammonia oxidizing bacteria (AOBs) which convert about half of the ammonia to nitrite. The inner layer consists mainly of anammox (anaerobic autotrophic ammonia oxidizer) bacteria. These bacteria utilize the resulting nitrite and much of the remaining residual ammonia and convert them to nitrogen gas, which is released harmlessly to the atmosphere.

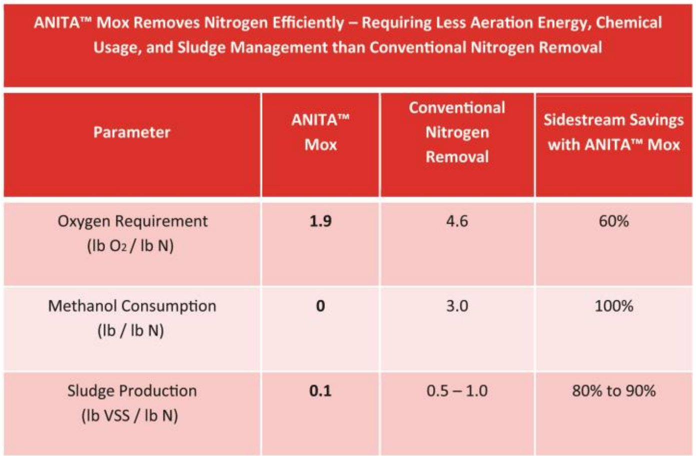
Since ANITA™ Mox has a high removal rate and treats the smaller sidestream flow at a wastewater plant, it has a compact treatment footprint. At many plants, the system can fit into a spare or abandoned tank on site. At the SDWRF, for example, the MBBR system was constructed in an abandoned aerobic digester.



SDWRF – Nitrogen Returned to the Influent Pump Station Requiring Additional Treatment

Parameter	With ANITA™ Mox (pounds per year)*	Before ANITA™ Mox (pounds per year)*	Guaranteed Removal by ANITA™ Mox
Ammonia Nitrogen	**< 61,000**	244,000	≥ 75%
Total Nitrogen	**< 94,000**	268,000	≥ 65%

* Values based on Design Flow and Loads for 365 days per year.



ANITA™ Mox Removes Nitrogen Efficiently – Requiring Less Aeration Energy, Chemical Usage, and Sludge Management than Conventional Nitrogen Removal

Parameter	ANITA™ Mox	Conventional Nitrogen Removal	Sidestream Savings with ANITA™ Mox
Oxygen Requirement (lb O_2 / lb N)	**1.9**	4.6	60%
Methanol Consumption (lb / lb N)	**0**	3.0	100%
Sludge Production (lb VSS / lb N)	**0.1**	0.5 – 1.0	80% to 90%

Results

At the SDWRF, the ANITA™ Mox MBBR system was started up in 12 weeks – an efficient time given the slow growth of anammox bacteria. Now operating full-scale, the system is achieving greater than 80% ammonia removal and 70% total inorganic nitrogen (TIN) removal – both exceeding guaranteed values. The ANITA™ Mox system is thus helping the SDWRF meet its strict effluent nitrogen limits using the most cost-effective solution.

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www.veoliawatertech.com

What are clients saying about ANITA™ Mox?

JOHNSON COUNTY KANSAS
Wastewater

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

METRO WASTEWATER RECLAMATION DISTRICT

DENVER, CO

CITY OF DURHAM

SANITATION DISTRICTS OF LOS ANGELES COUNTY

Converting Waste Into Resources

CITY OF SAN LUIS OBISPO

HRSD
Cleaning wastewater every day for a better Bay.

ANITA™ Mox Testimonial

- Evaluated sidestream Technologies:
  - Chicago piloted granular deammonification process
  - Denver piloted ANITA™ Mox (fixed film)
- Shared results through the LIFT Group:

LIFT ©

WATER ENVIRONMENT & REUSE FOUNDATION WE&RF

- Both Facilities Chose ANITA™ Mox:
  - Fit within existing reactors
  - More robust system = more forgiving
  - No risk of anammox washout due to upset conditions
  - Operational flexibility
  - Ease of Operation

Egan WRP (Chicago, IL)

Piloted Granular

Installed ANITA Mox

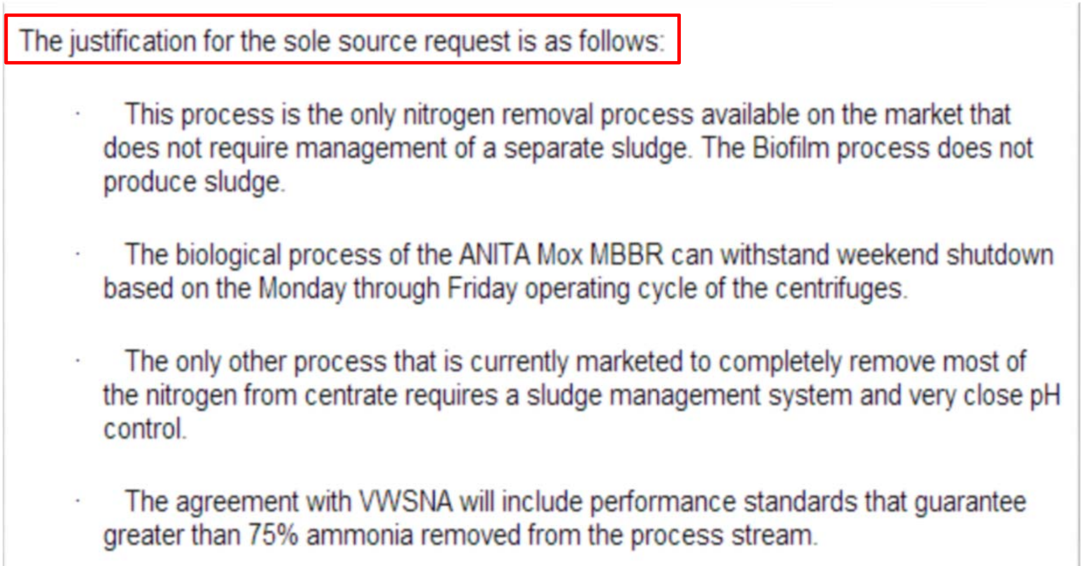
MWRD (Denver, CO)

Piloted ANITA Mox

Installed ANITA Mox

ANITA™ Mox Testimonial - MWRDGC (Chicago, IL)

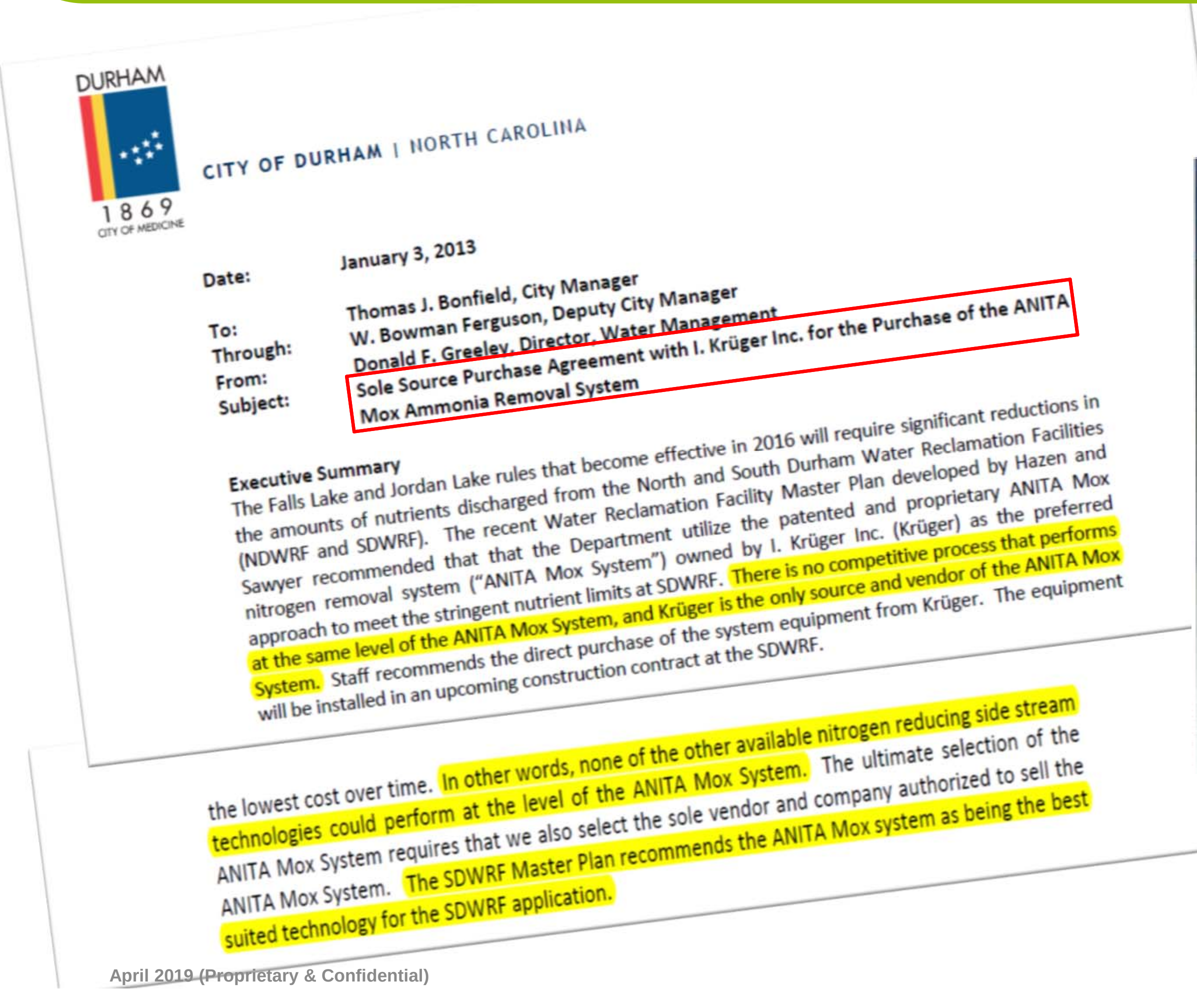
Chicago's published reasons for selecting ANITA Mox:



The justification for the sole source request is as follows:

- This process is the only nitrogen removal process available on the market that does not require management of a separate sludge. The Biofilm process does not produce sludge.
- The biological process of the ANITA Mox MBBR can withstand weekend shutdown based on the Monday through Friday operating cycle of the centrifuges.
- The only other process that is currently marketed to completely remove most of the nitrogen from centrate requires a sludge management system and very close pH control.
- The agreement with VWSNA will include performance standards that guarantee greater than 75% ammonia removed from the process stream.

ANITA™ Mox Testimonial - SDWRF (Durham, NC)



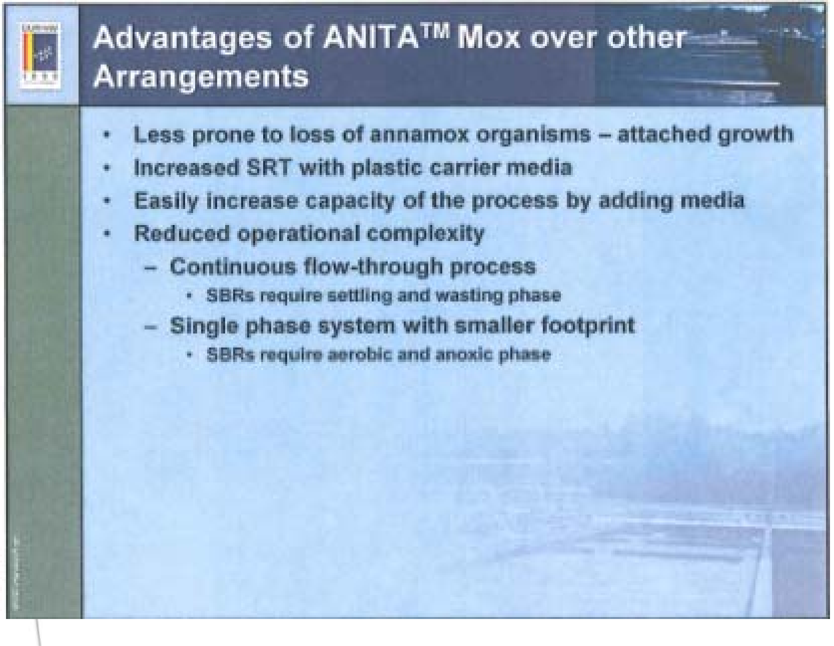
DURHAM
1869
CITY OF MEDICINE

CITY OF DURHAM | NORTH CAROLINA

Date: January 3, 2013
To: Thomas J. Bonfield, City Manager
Through: W. Bowman Ferguson, Deputy City Manager
From: Donald F. Greeley, Director, Water Management
Subject: Sole Source Purchase Agreement with I. Krüger Inc. for the Purchase of the ANITA Mox Ammonia Removal System

Executive Summary
The Falls Lake and Jordan Lake rules that become effective in 2016 will require significant reductions in the amounts of nutrients discharged from the North and South Durham Water Reclamation Facilities (NDWRF and SDWRF). The recent Water Reclamation Facility Master Plan developed by Hazen and Sawyer recommended that that the Department utilize the patented and proprietary ANITA Mox nitrogen removal system ("ANITA Mox System") owned by I. Krüger Inc. (Krüger) as the preferred approach to meet the stringent nutrient limits at SDWRF. There is no competitive process that performs at the same level of the ANITA Mox System, and Krüger is the only source and vendor of the ANITA Mox System. Staff recommends the direct purchase of the system equipment from Krüger. The equipment will be installed in an upcoming construction contract at the SDWRF.

the lowest cost over time. In other words, none of the other available nitrogen reducing side stream technologies could perform at the level of the ANITA Mox System. The ultimate selection of the ANITA Mox System requires that we also select the sole vendor and company authorized to sell the ANITA Mox System. The SDWRF Master Plan recommends the ANITA Mox system as being the best suited technology for the SDWRF application.



Advantages of ANITA^{TM} Mox over other Arrangements

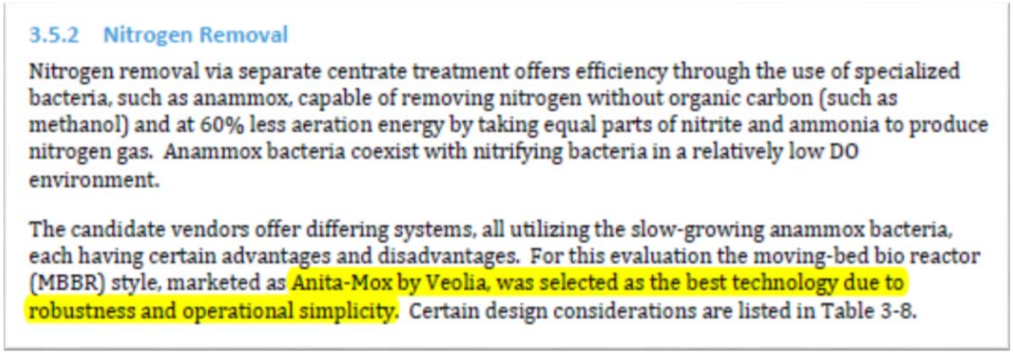
- Less prone to loss of annamox organisms – attached growth
- Increased SRT with plastic carrier media
- Easily increase capacity of the process by adding media
- Reduced operational complexity
  - Continuous flow-through process
    - SBRs require settling and wasting phase
  - Single phase system with smaller footprint
    - SBRs require aerobic and anoxic phase

ANITA™ Mox Testimonial - Tomahawk WWTF (Johnson County, KS)

JOHNSON COUNTY
KANSAS
Wastewater

Tomahawk Creek WWTF Section objectives:

- Provide the most cost-effective, long-term solutions for customers.
- Improve water quality using the latest, proven technologies.
- Preserve the high quality of life enjoyed by Jonson County residents.



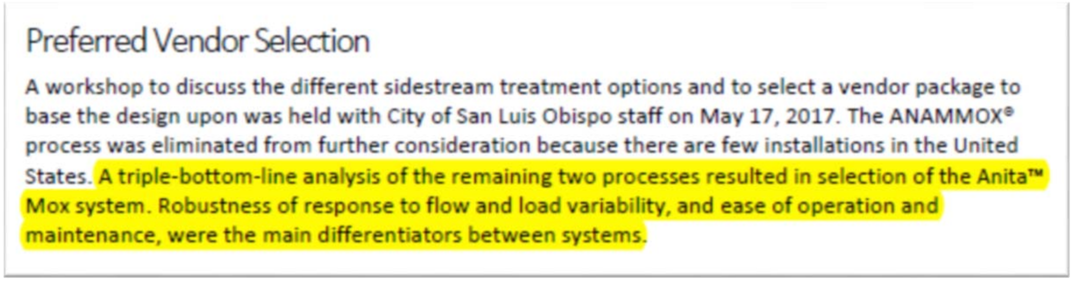
3.5.2 Nitrogen Removal

Nitrogen removal via separate centrate treatment offers efficiency through the use of specialized bacteria, such as anammox, capable of removing nitrogen without organic carbon (such as methanol) and at 60% less aeration energy by taking equal parts of nitrite and ammonia to produce nitrogen gas. Anammox bacteria coexist with nitrifying bacteria in a relatively low DO environment.

The candidate vendors offer differing systems, all utilizing the slow-growing anammox bacteria, each having certain advantages and disadvantages. For this evaluation the moving-bed bio reactor (MBBR) style, marketed as Anita-Mox by Veolia, was selected as the best technology due to robustness and operational simplicity. Certain design considerations are listed in Table 3-8.

Technical Memorandum – Tomahawk Wastewater Treatment Facility expansion - June 2016

ANITA™ Mox Testimonial - SLO WRRF (San Luis Obispo, CA)



Preferred Vendor Selection

A workshop to discuss the different sidestream treatment options and to select a vendor package to base the design upon was held with City of San Luis Obispo staff on May 17, 2017. The ANAMMOX® process was eliminated from further consideration because there are few installations in the United States. A triple-bottom-line analysis of the remaining two processes resulted in selection of the Anita™ Mox system. Robustness of response to flow and load variability, and ease of operation and maintenance, were the main differentiators between systems.

Final Predesign Report – San Luis Obispo Water Resource Recovery Facility – October 2017

ANITA™ Mox Testimonial - LA County Sanitation District

SANITATION DISTRICTS OF LOS ANGELES COUNTY

Converting Waste Into Resources

"We tested both the MBBR version and the IFAS version of the ANITA Mox process. I was very impressed by the performance of the system. It was **easy to control, robust, and did what we expected it to do**. We're currently pilot testing the MBBR version at another plant (Valencia, 15 MGD). When we started a couple of weeks ago, there was a problem with the pipe feeding the pilot system. The pipe was clogged over the weekend, but the compressor continued to operate. Consequently the system got over-aerated (DO>9 mg/L) and the pH was down to ~5.5 when we came back on Monday. Once we fixed the problem, **the system quickly responded and started removing N** (I guess it was an unplanned robustness test). After one week of operation, we've observed **very high volumetric and surface N removal rates.** "

– Chi-Chung Tang, LACWSD

ANITA™ Mox Testimonial - MWRD (Denver, CO)

- “The pilot-scale evaluation of the ANITA Mox MBBR technology at the RWHTF supported the conclusion that performance of the continuous flow deammonification process was **compact, consistent, and reliable.**”

- “The **aeration control strategy** used for operating the pilot system **was straightforward and simple to operate**.”

- “The pilot system **was able to recover in about two days after an extended interruption to aeration and feed**.”

- – from *Evaluation of the Anita-Mox Moving Bed Biofilm Reactor Process for Sidestream Deammonification at the Robert W. Hite Treatment Facility, Denver Colorado* by Hollowed, Meg, et al.

METRO WASTEWATER RECLAMATION DISTRICT

Corporate Description

Company Overview

Veolia Water Technologies, Inc. (dba Kruger) is a water and wastewater solutions provider specializing in advanced and differentiating technologies. Kruger provides complete processes and systems ranging from biological nutrient removal to mobile surface water treatment. The AnoxKaldness Hybas and MBBR processes, ANITA Mox Deammonification Process, BioCon Dryer, BIOSTYR Biological Aerated Filter (BAF), NEOSEP MBR and HYDROTECH Discfilters are just a few of the innovative technologies offered by Kruger. Kruger is a subsidiary of Veolia Water Technologies, a world leader in engineering and technological solutions in water treatment for industrial companies and municipal authorities.

Veolia, present throughout the world, develops a global approach responding to specific needs of customers at each of their production facilities. This has allowed Veolia to become the world leader in design, project management and execution of projects for water and wastewater treatment plants. The company also creates dedicated technology solutions to meet its customer's needs. Its unique portfolio of differentiating technologies, developed by the group's R&D centers, ensures unsurpassed innovation and control of each treatment line for public organizations and industries. Furthermore, a whole range of associated services is offered on each site to guarantee the technical efficiency and life expectancy of the installed solutions. Veolia continually extends and enriches its offer, to guarantee expertise and competence at every step of the projects it undertakes.

Kruger prides itself for being a customer-focused organization that provides solutions to challenges faced by municipalities and not just another equipment supplier. To achieve this, Kruger has gathered a force of process experts, trained sales staff, and project managers that share our vision and priorities. Please see the attached information describing the experience and expertise of Our People. We are proud of our staff and know that they are the most qualified team in the market to provide your project the right solution to meet the plant's needs and future goals.

Location and Addresses of Corporate and Regional Offices

Kruger's corporate office is located in the Raleigh, NC area.

Kruger	Customer Support Center
4001 Weston Parkway	1500 Garner Road, Suite C
Cary, NC 27513	Raleigh, NC 27610

In addition, Veolia hosts multiple regional offices across North America in support of our clients, including the Customer Support Center (i.e. aftermarket services and equipment spare parts), within 20 minutes from Veolia’s corporate office. See the Summary of Support Services section below for more details.

Date and State of Incorporation

Veolia celebrates 160 years of service to cities, regions and local communities. Established in 1853, Veolia’s long history proves our stability and financial strength. Veolia Water Technologies, Inc. (dba Kruger) was incorporated on May 27, 2004 and is incorporated in Delaware. Kruger further builds on Veolia’s expertise, offering more than 30 years of experience servicing the US municipal market.

Bonding Qualifications

Veolia Water Technologies, Inc. (dba Kruger) has sufficient financial stability and backing to provide the performance bond as required by the specifications. Kruger can provide a pre-qualification letter for proof of ability to provide such a bond as requested within the specifications upon request.

Corporate and Financial Stability

The Veolia companies in North America, including Veolia Water Technologies, Inc. dba Kruger (Kruger), are part of Veolia Environnement, S.A. (Veolia). Veolia traces its history to the establishment of Compagnie Générale des Eaux (CGE) on December 14, 1853. Since that time and over 160 years, Veolia has continued to focus on new frontiers of environmental business and its traditional markets, in emerging and developed countries. In support of this progress and in line with our commitments, Veolia has strengthened its operating and financial performance.

Veolia is the global leader in optimized resource management. With nearly 171,000 employees worldwide, Veolia designs and provides water, waste and energy management solutions that contribute to the sustainable development of communities and industries. Through its three complementary business activities, Veolia helps to develop access to resources, preserve available resources and replenish them.

In 2018, the Veolia group supplied 95 million people with drinking water and 63 million people with wastewater service, produced nearly 56 million megawatt hours of energy and converted 49 million metric tons of waste into new materials and energy. Veolia Environnement, operating in five continents, realized $30.1 billion (€25.91 billion) in revenue for 2018.

VEOLIA

2018

Registration document

Annual financial report

Kruger, as part of the Veolia family of companies, provides financial strength and stability to our customers. Veolia offers the support structure desired by municipal authorities, assuring project stakeholders of Kruger's commitment to meeting performance guarantees, extended project schedules and ongoing warranties. Veolia has been in business for over 160 years, providing the comfort to our customers that Kruger will remain supportive for the life of the project and beyond.

Veolia's 2018 financial statement is available online. Please see the following website for more information.

https://www.veolia.com/en/veolia-group/finance

Corporate Sustainability

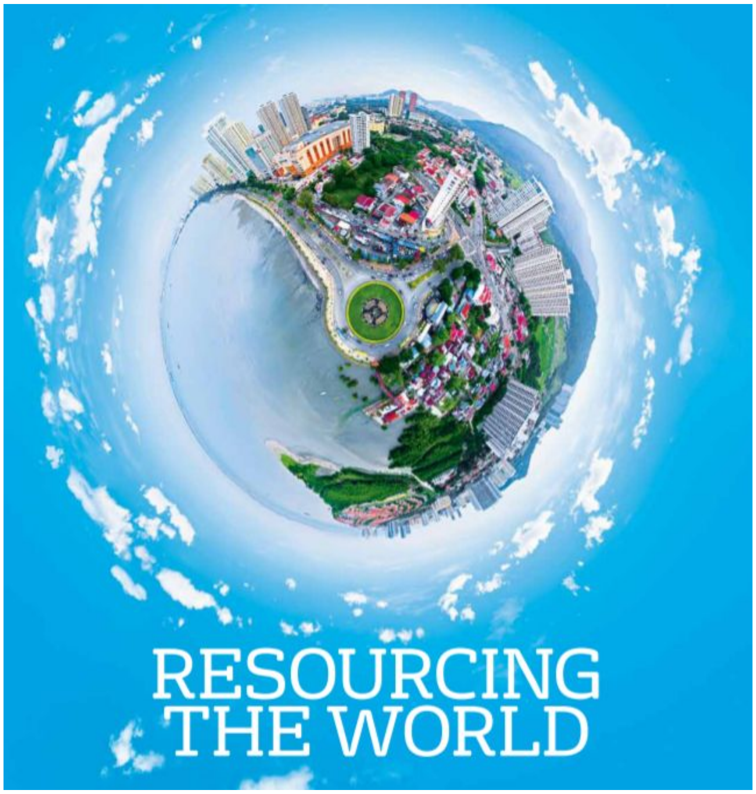
Veolia's 'Resourcing the world' mission is based on a vision of our environment that is shared by our employees, including those at Kruger: the world as it should be. In this world, fewer resources are wasted and they are shared fairly; waste has a value and uses are found for wastewater; and energy is efficiently managed and reused. In this world, companies as well as government bodies play a central role in anticipating and supporting major global transitions. In this world, companies voluntarily ask themselves what is their purpose and their use. This vision both drives and commits us. Our goal is not only to be the world leader but also the standard setter for environmental businesses: *the company that resolves, prepares the ground and invents, inspires and shows the way.*

Resourcing the World

The world has to rethink its relationship with resources and come up with new social and economic growth models that are more efficient, better balanced and more sustainable.

With 160 years of expertise in the areas of water, energy and waste, Veolia applies its capacity for innovation to pursue human progress and wellbeing, and improving the performance of businesses and regions.

To make the switch from a resource consumption rationale to a use-and-recover approach in today's circular economy, Veolia designs and implements solutions aimed at improving access to resources while at the same time protecting and renewing those same resources.



This is how Veolia and its employees contribute each and every day to resourcing the world.

https://www.livingcircular.veolia.com/en

Resourcing the world

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PRELIMINARY PROPOSAL FOR PEARL® NUTRIENT RECOVERY SYSTEM

IDAHO FALLS WWTF

IDAHO FALLS, ID

STANTEC

Version:	0
Date:	June 2023
Prepared By:	Bryce Vandenboom

Questions relative to this preliminary proposal should be directed to:

Bill Reilly
William H. Reilly & Co.
910 SW 18th Ave
Portland, OR 97225
Office: 503-223-6197
Cell: 503-314-8386
Email: bill@whreilly.com

Table of Contents

1 Introduction

The Pearl® and WASSTRIP® systems provide the most comprehensive and cost-effective nutrient recovery solution proven on the market. Instead of discharging phosphorus into waterways, the Pearl system recovers phosphorus as a high-quality fertilizer, called Crystal Green®, reducing phosphorus discharge to the environment. The Pearl system offers significant savings on chemical demand, maintenance, and operations combined with the production of high value fertilizer ensuring a shortened payback period on the upfront investment of the system.

Traditional wastewater treatment processes allow for two "exits" for incoming phosphorus, one being the plant effluent, and the other being wasted biosolids. Production of struvite-based Crystal Green® fertilizer provides a third, beneficial, exit for the incoming phosphorus load to the plant. Many parts of the world are looking to limit the phosphorus content in their effluent as well as the phosphorus content in their biosolids. The combination of WASSTRIP and Pearl provides a cost-effective means of recovering phosphorus to lower its content in the effluent and biosolids generated by the plant. The phosphate rich Crystal Green® fertilizer, is a slow-release fertilizer and does not contribute to agricultural nutrient run-off.

The Pearl and WASSTRIP systems can be easily integrated into the plant's solids handling stream as shown **Figure 1** below.

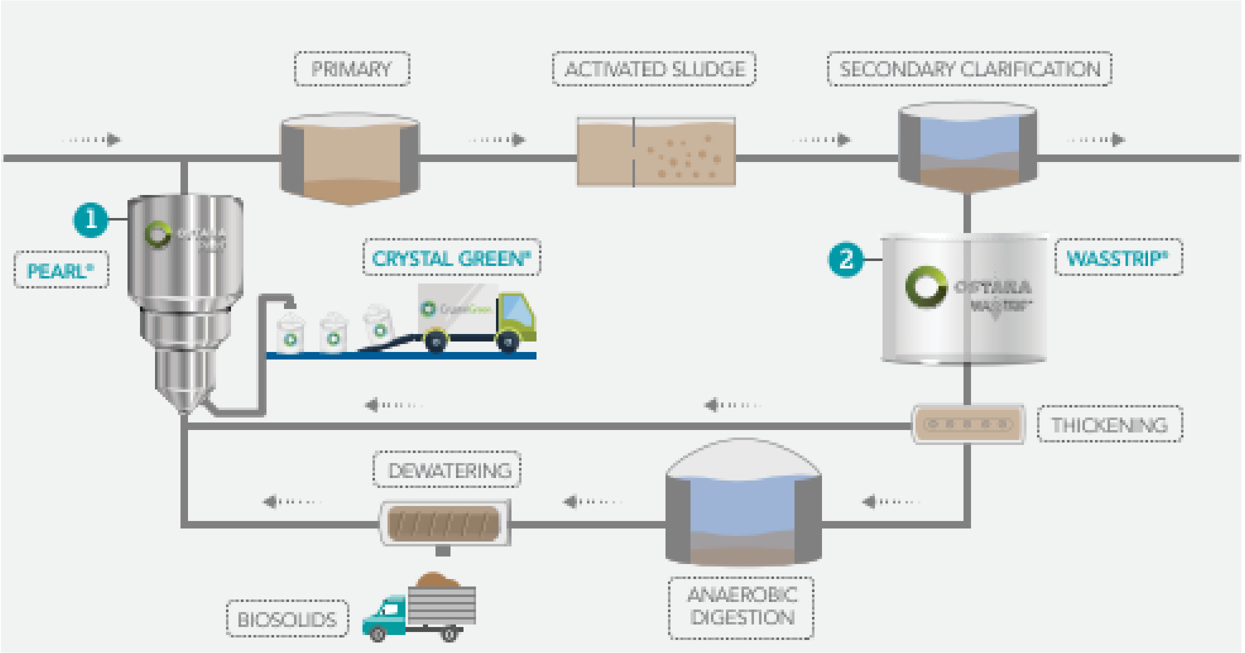


Figure 1: Location of Pearl and WASSTRIP Processes

The value of nutrient recovery extends beyond generating revenue from the reclaimed nutrients in the Crystal Green® fertilizer. Many wastewater treatment plants suffer from struvite precipitation in pipes, tanks, and other equipment. The precipitated struvite can affect reliability of these systems and increase annual maintenance costs. Plants generally dose metal salts (such as ferric chloride) into plant recycle streams to manage unwanted struvite precipitation. However, this creates significant volumes of chemical sludge, and adds ongoing operating costs for dewatering and disposal of this additional sludge. Circulating chemical in the plant also inhibits enhanced biological phosphorus removal (EBPR) in the balance of the plant and destroys the commercial value of phosphorus as a nutrient. Phosphorus is a finite natural resource we rely on to produce food globally and binding it chemically with metal salts is an unsustainable means of struvite management. Chemical phosphorus removal imposes significant ongoing treatment costs including:

1. Purchase costs for chemicals
2. Dosing system O&M costs
3. Disposal costs for the chemical sludge produced
4. Impacts of chemical sludge "dead weight" on biological treatment process performance (e.g. reduced digestion efficiency due to inter material load)
5. Consumption of side stream alkalinity

2 About the Pearl® System

The Pearl system recovers phosphorus from the dewatering and thickening centrate streams before they accumulate as nuisance struvite in pipes and on other equipment. Nutrient rich primary sludge and waste activated sludge is treated through the anaerobic digestion process. In this anaerobic process, the breakdown of organic matter causes phosphorus to be released into solution. When the digested sludge is dewatered, the dissolved phosphorus will be concentrated in the post-digestion dewatering centrate. This phosphorus rich stream is then feed to the Pearl system.

Using a tightly controlled chemical precipitation process, the Pearl system takes this centrate stream and facilitates the growth of struvite "seeds". Like an oyster-cultivated pearl, the seeds grow in diameter until they reach a desired size suitable for sale to established fertilizer markets. They are then dried and collected on site in a fully automated process. The end-product is greater than 99.6% pure and ready for sale to a global network of professionals in turf, horticulture, and agriculture applications.

The revenue generated by the Crystal Green fertilizer differentiates the Pearl nutrient recovery system from other removal processes such as chemical phosphate removal using metal salts. The Pearl system uses a multi-barrier approach to ensure the fertilizer product is consistently pathogen free in accordance with all known regulatory requirements including Part 503 of the US EPA standard for the use or disposal of sewage sludge. This process has been demonstrated to consistently render Crystal Green product, free of pathogen indicators, over more than ten years of commercial operating experience at all our operating sites.

Figure 2: Crystal Green fertilizer product.

3 About the WASSTRIP® System

The WASSTRIP system can be combined with the Pearl reactor to maximize phosphorus recovery. Waste activated sludge (WAS) is rich in stored phosphorus, magnesium, and potassium. This is particularly true at plants using enhanced biological phosphorus removal (EBPR). In traditionally designed systems these nutrients release under anaerobic conditions in the digester and combine with ammonia to form uncontrolled struvite. This struvite can accumulate in digesters and result in several negative impacts such as: reduced digestion volume (and performance), scale formation on digester and dewatering equipment, and scale formation in transfer pipes. Further, any digester struvite formation that is not attached as scale will remain entrained in biosolids and increase both the volume of biosolids produced by the plant and phosphorus concentration of these biosolids.

Wastewater treatment plants operating a combination of EBPR and anaerobic digestion typically have 5 to 10% (dry weight) of their biosolids as struvite. This unwanted struvite results in increased sludge processing costs for the plant and may limit the amount of biosolids that can be spread on land due to the imbalance in phosphorus and nitrogen nutrient levels. The release of phosphorus, magnesium, and potassium and other ions in the digester has also been shown to provide an ionic balance that results in poor sludge dewaterability (high ratio of monovalent to divalent ions).

The WASSTRIP system tackles these challenges by releasing the phosphorus, magnesium, and potassium ahead of the digester and bypassing these nutrients around the digester and dewatering systems where they cause problems. Following the WASSTRIP tank where the phosphorus, magnesium and potassium are released (becoming soluble), they are then separated from the solids by pre-digestion thickening. The WAS thickening centrate is then bypassed around the digester and sent directly to the Pearl reactor, where the soluble phosphorus and magnesium are transformed into Crystal Green fertilizer.

The WASSTRIP system offers many benefits including:

BENEFITS	**SIDE STREAM CHEMICAL ADDITION**	**STRUVITE PRECIPITATION IN SLUDGE**	**PEARL & WASSTRIP SOLUTION**
Reduced Phosphorus in Recycle	✓	✓	✓
Reduced Struvite Maintenance	✓	✓	✓
Mitigate Digester Struvite Buildup	✘	✘	✓
Improve Dewaterability	✘	✓	✓
Reduce Polymer	✘	✓	✓
Reduce Sludge Generation	✘	✘	✓
Reduce Biosolids Phosphorus Content	✘	✘	✓
Revenue Generation	✘	✘	✓

4 Design Basis

Table 1 & 2 below outline the design basis for the centrate streams used for sizing of the proposed Pearl nutrient recovery system.

Table 1: Design basis for Pearl system: Current Loading

ITEM	Pearl			UNIT
	WASSTRIP Centrate	Post-Digestion Centrate	COMBINED FEED	
Flow				
Feed Liquor Flow	98,000	60,400	158,400	gpd
Reactor Feed				
PO4-P Concentration	160	305	215	mg/L
PO4-P Mass Loading	131	154	284	lb/day
NH3-N Concentration	30	1,070	427	mg/L
NH3-N Mass Loading	25	539	564	lb/day
Mg Concentration	40	10	29	mg/L
Mg Mass Loading	33	5	38	lb/day
pH	6.50	7.20	6.8	SU
TSS	1,000	1,000	1,000	mg/L
Alkalinity	500	2,800	1,377	mg/L
Conductivity	2,000	7,000	3,907	µS/cm

Table 2: Design basis for Pearl system: Future Loading

ITEM	Pearl			UNIT
	WASSTRIP Centrate	Post-Digestion Centrate	COMBINED FEED	
Flow				
Feed Liquor Flow	159,000	83,800	242,800	gpd
Reactor Feed				
PO4-P Concentration	160	305	210	mg/L
PO4-P Mass Loading	212	213	425	lb/day
NH3-N Concentration	30	1,070	389	mg/L
NH3-N Mass Loading	40	748	788	lb/day
Mg Concentration	40	10	30	mg/L
Mg Mass Loading	53	7	60	lb/day
pH	6.50	7.20	6.7	SU
TSS	1,000	1,000	1,000	mg/L
Alkalinity	500	2,800	1,294	mg/L
Conductivity	2,000	7,000	3,726	µS/cm

5 Pearl Performance

Treated effluent is discharged from the top of the Pearl reactor and returned to the plant. Typically, the reactor is fed continuously while product harvesting occurs periodically. **Tables 3 & 4** below outline the effluent performance of the proposed Pearl nutrient recovery system.

Table 3: Pearl system effluent performance: Current Loading

Rector Effluent				
PO4-P Concentration		40		mg/L
PO4-P Mass Loading		53		lb/day
NH3-N Concentration		347		mg/L
NH3-N Mass Loading		458		lb/day
pH	7.4	-	7.7	SU
Pearl Performance				
PO4-P Removal		81		%
		232		lb/day
NH3-N Removal		19		%
		105		lb/day
Crystal Green Production	235	-	268	tons/yr

Table 4: Pearl system effluent performance: Future Loading

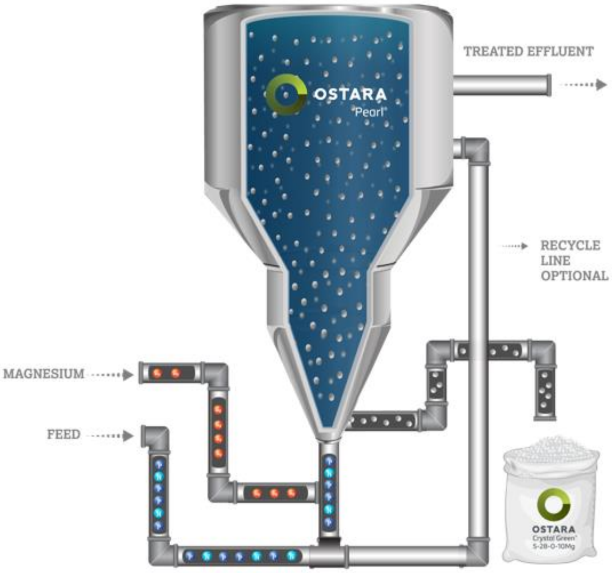
Rector Effluent				
PO4-P Concentration		40		mg/L
PO4-P Mass Loading		81		lb/day
NH3-N Concentration		311		mg/L
NH3-N Mass Loading		631		lb/day
pH	7.5	-	7.8	SU
Pearl Performance				
PO4-P Removal		81		%
		345		lb/day
NH3-N Removal		20		%
		156		lb/day
Crystal Green Production	349	-	399	tons/yr

5.1 Pearl System Design

The Pearl system, depicted below, is an up-flow fluidized bed reactor engineered for controlled struvite precipitation. Two principles are fundamental in the process: maximizing efficient nutrient removal and consistently producing high quality fertilizer.

Struvite is a crystal containing one mole each of magnesium, ammonium and phosphate, together with six waters of hydration ($NH_4MgPO_4{\cdot}6H_2O$). Struvite crystallization occurs when the three ions (magnesium, ammonium, and phosphate) are present in a solution above the saturation point. This condition – termed “super saturation” – causes the ions to come out of solution and form a struvite crystal. The saturation point is influenced by several factors, but pH has the greatest influence.

For certain Pearl reactor models a portion of treated effluent from the top of the reactor is returned to the bottom of the reactor in a recycle loop. This allows for control of upflow velocity, feed concentrations (recycle water acts as dilution), as well as adaption of the system to variable feed flow rates. Recycle rates are automatically controlled by the Pearl control system, and do not impact overall phosphorus removal efficiency.



Note 1: Recycle line not included for Pearl Fx models.

The inventory of fertilizer in the reactor is managed using differential pressure measurement in combination with an automated harvest system. When a target fertilizer inventory in the reactor is reached, the reactor will automatically batch harvest the fertilizer by sending it to the product handling system. During harvest, the reactor will continue operation without interruption or loss of efficiency.

Table 5 below outlines the design details of the proposed Pearl system.

Table 5: Pearl nutrient recovery system design conditions and specifications.

PEARL NUTRIENT RECOVERY SYSTEM SPECIFICATIONS

Reactor Model	Pearl Fx-12'
Quantity of Reactors	1
Total Reactor Capacity	360,000 gpd

Item	Value	Unit
Reactor Feed Total Suspended Solids (TSS) Concentration	< 1,000	mg/L
Reactor Feed PO4-P Concentration Range	50 - 400	mg PO4-P/L
Reactor Feed Flow Range	180,000 - 360,000	gpd
Reactor Phosphorus Loading Range	75 - 1,200	lb PO4-P/day
Typical % of Plant Influent TP Treated with Pearl® Only	15 - 25	%
Typical % of Plant Influent TP Treated with Pearl® and WASSTRIP®	25 - 40	%
Average Daily Crystal Green Production Capacity Range	385 - 6,153	lb CG/day

PEARL NUTRIENT RECOVERY SYSTEM SPECIFICATIONS				
Average Annual Crystal Green Production Capacity Range	70	-	1,125	tons CG/yr
Reactor Design Operating Temperature	Ambient			
Reactor Design Operating Pressure	Atmospheric			
Approximate Reactor Footprint	12' (D) x 42' (H) each unit			
Approximate Pearl Nutrient Recovery System Footprint	2,000 ft2			
Life Expectancy of Pearl Nutrient Recovery System	> 20 years			
Non-Potable Water Demand @ 40-60 psi	TBC			
Indoor/Outdoor Installation	Indoor			

Non-potable water is required on a continuous basis to provide reactor effluent dilution (scale prevention) and for harvest operations. A higher instantaneous demand is required for up to 15 minutes to restart the reactor in the event of a power failure or uncontrolled shutdown. If this flow or pressure is not available, Evoqua can deliver design alternatives.

5.2 WASSTRIP System Design

Table 6 below outlines the design basis for the WASSTRIP system. WAS is delivered to the WASSTRIP tank and allowed to ferment and release phosphorus and magnesium. If appropriate tankage exists on site, Evoqua can assist in the evaluation of this tank. The WAS exiting the WASSTRIP tank will then be thickened, producing a centrate stream that is rich in phosphorus and magnesium which bypasses the anaerobic digesters and goes directly to the Pearl reactor.

Table 6: WASSTRIP system design.

WASSTRIP® DESIGN		
ITEM	**VALUE**	**UNIT**
Waste Activated Sludge (WAS)		
WAS Flow Rate	194,000	gpd
WAS % Solids	1.5	%
WASSTRIP® Design Basis		
WASSTRIP P Release Portion	30-40	%
WASSTRIP Tank Retention Time	24-36	hr
WASSTRIP® Filtrate		
WASSTRIP Filtrate Flow Rate	98,000 - 159,000	gpd
WASSTRIP PO4-P Concentration	160	mg/L

When WASSTRIP (pre-digestion phosphorus release) is employed, phosphate that would otherwise be consumed by nuisance precipitation (e.g. struvite) and surface adsorption in the digester is liberated, making more of the influent total phosphorus available for recovery. As a result of WASSTRIP PO_4-P release upstream of the digester, the PO_4-P loads in the centrate were reduced in our models. This is an estimate that is based on experience at existing WASSTRIP sites. The exact design numbers are dependent on influent plant characteristics, local water hardness, digestion design, WAS thickening and digested sludge dewatering design, and the import of sludges or other organic material into the plant.

As the project progresses, it is recommended that bench-top testing be completed using representative WAS and primary sludge streams from the site to characterize the release rates of phosphate and counter ions and assist in sizing and process control design for the WASSTRIP release tank. For planning purposes, however, it is recommended that a WASSTRIP release tank with approximately 36 hours of hydraulic residence time (HRT) is allowed for in the instance of endogenous release or 12 hours of HRT in the instance of fermented primary sludge addition.

6 Operation and Maintenance

6.1 Energy, Consumables and Chemical Consumption

Tables 7 & 8 below summarize the estimated O&M costs for the proposed system. Utility and maintenance estimates are based on existing projects. Evoqua has assumed natural gas as the heat source for drying the Crystal Green product. Requirements for other heat sources such as electricity are also provided in the table below.

Table 7: Estimated O&M costs: Current Loading

ITEM	UNIT	UNIT COST	AMOUNT	ANNUAL COST
Maintenance and Labor				
Operating and Maintenance Labor	FTE	60,000/ FTE	0.25 FTE/year	$15,000
Utilities				
Power - Pearl Process	kWh	$ 0.08/kWh	63 kWh/day	$1,800
As Electricity	kWh	-	260 kWh/day	-
As Natural Gas	therm	$ 0.50/therm	9	$1,600
As Hot Water @190°F	gal	-	2,943	-
Chemicals				
Magnesium Chloride (32%)	dry ton	$ 600.00/dry ton	0.43	$94,000
Sodium Hydroxide (50%)	dry ton	$ 600.00/dry ton	0.32	$69,200
Citric Acid (50%)	gal	$ 1.00/gal	0.17	$60
Consumables				
Lab analysis (Hach)	sample	$ 2.00/sample	51 sample/week	$5,300
Pallets/Bags	ton	$ 25.00/ton	268 ton/y	$6,700
TOTAL				**$193,560**

Table 8: Estimated O&M costs: Future Loading

ITEM	UNIT	UNIT COST	AMOUNT	ANNUAL COST
Maintenance and Labor				
Operating and Maintenance Labor	FTE	60,000/ FTE	0.25 FTE/year	$15,000
Utilities				
Power - Pearl Process	kWh	$ 0.08/kWh	85 kWh/day	$2,500
As Electricity	kWh	-	540 kWh/day	-
As Natural Gas	therm	$ 0.50/therm	19	$3,500
As Hot Water @190°F	gal	-	5,148	-
Chemicals				
Magnesium Chloride (32%)	dry ton	$ 600.00/dry ton	0.63	$139,100
Sodium Hydroxide (50%)	dry ton	$ 600.00/dry ton	0.49	$106,300
Citric Acid (50%)	gal	$ 1.00/gal	0.17	$60
Consumables				
Lab analysis (Hach)	sample	$ 2.00/sample	51 sample/week	$5,300
Pallets/Bags	ton	$ 25.00/ton	399 ton/y	$10,000
TOTAL				**$281,760**

With regard to the above O&M estimates, please note the following:

- The power estimate does not include the feed pump required to deliver dewatering centrate and WASSTRIP filtrate to the Pearl reactor, WAS transfer pumps or WASSTRIP tank mixers. Feed liquors should enter the reactor at approximately 30 psi.
- Heat required for drying Crystal Green can be provided as electricity, biogas, natural gas, steam or hot water.
- Acid is used for periodic (1-2x per year) descaling of the Pearl reactor through clean in-place control loops. This improves the operational reliability of the Pearl reactor and eliminates the need to mechanically clean feed lines.

7 Economic Benefits

In addition to turning struvite into revenue generating Crystal Green fertilizer, incorporating the Pearl system into the overall treatment process provides several economic benefits. **Tables 9 & 10** present an analysis of the financial benefits achieved by removing phosphorus with Pearl system. We compared this removal to phosphorus removal using ferric chloride.

Furthermore, by removing phosphorus upstream of the digester, precipitation of struvite and other phosphate compounds elsewhere in the treatment process can be mitigated. This can result in substantial maintenance savings, in addition to improved reliability.

Table 9: Pearl revenue and financial benefits: Current Loading

ITEM	VALUE	UNITS	NOTES/SOURCE
Ferric Chloride avoidance			
P removal	42	tons/yr	P removed by Pearl
FeCl3 (40%) required	332	dry ton/y	1.5:1 Fe:P Ratio
Purchase price of FeCl3 (40%)	$600	$/dry ton	
FeCl3 (40%) purchase cost avoidance	$199,500	$/yr	
Alkalinity Consumption	0	dry ton NaOH	Consumed by excess Fe dose
Purchase price of NaOH	$0	$/dry ton	
Total Alkalinity Benefit	$0	$/yr	
Fe sludge produced	279	dry ton/y	6.6 lb sludge/lb P removed
Cost of sludge processing	$30	$/dry ton	Cost of polymer
Cost of sludge disposal	$125	$/dry ton	
Fe sludge cost avoidance	$43,300	$/yr	
Total Value of Ferric Chloride avoidance	**$242,800**	***$/yr***	
Biosolids Cost Avoidance			
Biosolids production	2,646	dry ton/y	
WASSTRIP struvite sludge avoidance	60	dry ton/y	Mg diversion around digester
Dry sludge production avoidance	$9,200	$/yr	Cost of polymer + disposal
Cake solids	20	% TS	
WASSTRIP cake solids improvement	1.5	%	
Wet ton production avoidance	902	wet ton/y	
Wet ton avoidance value	$22,600	$/yr	
WASSTRIP polymer reduction	10.0	%	
WASSTRIP polymer avoidance	5,172	lb/y	
Dewatering improvement value	$7,800	$/yr	Cost of polymer + disposal
Total dewatering improvement value	$30,400	$/yr	
Total Biosolids Cost avoidance	**$39,600**	***$/yr***	
Ammonia			
Cost of ammonia removal	$1.76	$/lb	Aeration savings
Quantity of ammonia removed	38,228	lb/y	
Value of ammonia removal	**$67,300**	***$/yr***	
Crystal Green® Revenue			
CG Production	268	ton/y	
Purchase price of CG	$150	$/ton	
CG revenue	**$40,200**	***$/yr***	
Total Value of Financial Benefits	**$389,900**	**$/yr**	
Less Operating Cost	$193,660	$/yr	
Total Value of Financial Benefits	**$196,240**	**$/yr**	

Table 10: Pearl revenue and financial benefits: Future Loading

ITEM	VALUE	UNITS	NOTES/SOURCE
Ferric Chloride avoidance			
P removal	63	tons/yr	P removed by Pearl
FeCl3 (40%) required	494	dry ton/y	1.5:1 Fe:P Ratio
Purchase price of FeCl3 (40%)	$600	$/dry ton	
FeCl3 (40%) purchase cost avoidance	$296,600	$/yr	
Alkalinity Consumption	0	dry ton NaOH	Consumed by excess Fe dose
Purchase price of NaOH	$0	$/dry ton	
Total Alkalinity Benefit	$0	$/yr	
Fe sludge produced	415	dry ton/y	6.6 lb sludge/lb P removed
Cost of sludge processing	$30	$/dry ton	Cost of polymer
Cost of sludge disposal	$125	$/dry ton	
Fe sludge cost avoidance	$64,300	$/yr	
Total Value of Ferric Chloride avoidance	**$360,900**	***$/yr***	
Biosolids Cost Avoidance			
Biosolids production	3,670	dry ton/y	
WASSTRIP struvite sludge avoidance	97	dry ton/y	Mg diversion around digester
Dry sludge production avoidance	$15,000	$/yr	Cost of polymer + disposal
Cake solids	20	% TS	
WASSTRIP cake solids improvement	1.5	%	
Wet ton production avoidance	1,247	wet ton/y	
Wet ton avoidance value	$31,200	$/yr	
WASSTRIP polymer reduction	10.0	%	
WASSTRIP polymer avoidance	7,147	lb/y	
Dewatering improvement value	$10,700	$/yr	Cost of polymer + disposal
Total dewatering improvement value	$41,900	$/yr	
Total Biosolids Cost avoidance	**$56,900**	***$/yr***	
Ammonia			
Cost of ammonia removal	$1.76	$/lb	Aeration savings
Quantity of ammonia removed	56,843	lb/y	
Value of ammonia removal	**$100,000**	***$/yr***	
Crystal Green® Revenue			
CG Production	399	ton/y	
Purchase price of CG	$150	$/ton	
CG revenue	**$59,800**	***$/yr***	
Total Value of Financial Benefits	**$577,600**	**$/yr**	
Less Operating Cost	$281,760	$/yr	
Total Value of Financial Benefits	**$295,840**	**$/yr**	

8 Scope of Supply

Each Fx system ships as two (2) separate skids including the main equipment skid, and the Pearl reactor skid. The following table outlines the scope of supply for the proposed Pearl system.

ITEM	EVOQUA	OTHERS
Pearl Fx Reactor skid including: • Reactor with cover • Reactor frame • Injection quills • Instruments	X	
Main equipment skid including: • One (1) dewatering screen • One (1) dryer including screw feeder and baghouse system • One (1) dryer discharge conveyor • Two (2) bulk bag fillers • $MgCl_2$ dosing pump • NaOH dosing pump • Instruments • Control panel and MCC for Evoqua equipment	X	
Centrate feed flow meters	X	
Piping and wiring located on the main equipment skid	X	
Centrate feed pumps		X
Interconnecting piping and wiring to/from Pearl system skids		X
Manual valves		X
Chemical storage tanks.		X
Power supply to Pearl system skids		X
Design and supply of building, slab materials, chemical containment, and concrete equipment pads		X
Access stairway for Pearl reactor		X
Start-up, commissioning, and training	X	
Engineering submittals and O&M	X	

9 Excluded Items

- WASSTRIP infrastructure: tank, mixers, tank feed pump, tank effluent pump
- WASSTRIP filtrate and dewatering centrate feed pumps
- Anchor bolts
- Bonding
- Permitting
- Any construction or installation of the Evoqua-supplied equipment including:
    - Earthworks
    - Concrete work, including the building slab and chemical containment walls

- Building HVAC, lighting, drainage and utilities not associated with the Pearl process
- System tie-ins to the building footprint, including potable water, non-potable water, power, side stream feed, effluent and plant drains, and all utility connection fees
- A new building, or modification of an existing building to house Pearl
- Safety showers and eyewash stations
- Standby pumps or equipment
- Spare parts

10 Budget Pricing

The budgetary price for the proposed Pearl system, as defined herein, including engineering, field services, and equipment supply is **$3,600,000 (USD).**

This price makes no provision for taxes, tariffs, duties, permitting fees and other fees and charges that are not made explicit above.

All pricing is quoted at FCA, Factory (full freight allowed). No taxes, regulatory fees or other costs related to the procurement and installation of the system are included.

The scope of supply and pricing are based on Evoqua standard equipment selection, standard terms of sale and warranty terms. Any variations from these standards may affect this budgetary quotation. Additionally, please note this budgetary quotation is for review and informational purposes only and does not constitute an offer for acceptance.

Should you have any questions regarding this quotation, or would like to request a firm proposal and order form, please contact the following Evoqua Regional Representative:

Bill Reilly
William H. Reilly & Co.
910 SW 18th Ave
Portland, OR 97225
Office: 503-223-6197
Cell: 503-314-8386
Email: bill@whreilly.com

EVOQUA
WATER TECHNOLOGIES

Ostara's Pearl® FX System by Evoqua

NUTRIENT RECOVERY SOLUTIONS

Ostara's nutrient recovery solution, offered by Evoqua Water Technologies, helps transform wastewater treatment plants into true resource recovery facilities, helping create a circular economy.

The solution, Ostara's Pearl system, is an innovative and sustainable approach to wastewater management by removing nutrients from where they shouldn't be—in our waterways—and transforming them into high-performing fertilizers, proven to increase yields while reducing runoff and non-point source pollution.

Complementing the Pearl system is the WASSTRIP® system, providing a benefit to facilities using anaerobic digestion by releasing phosphorus and magnesium upstream before reaching anaerobic digester systems The WASSTRIP system helps protect digesters and equipment form struvite scale formation, improves dewaterability, and reduces biosolids volume.

A MODULAR PHOSPHORUS RECOVERY SOLUTION

Ostara's Pearl FX system from Evoqua is a cost-effective modular nutrient recovery solution ideal for treatment plants that are from 5–30 million gallons per day (MGD) in size. The Pearl FX system is pre-engineered and pre-assembled package plant solution allowing for simpler and faster installation requiring less physical space and site preparation resulting lower installation cost and maintenance. The Pearl FX system is ideally suited for treatment plants looking for a phosphorus recovery solution that will also allow for the mitigation of unwanted struvite formation with the added benefit of producing an environmentally friendly high performing fertilizer.

FEATURES AND BENEFITS

- Cost-effective package solution with minimal civil requirements
- Overall project CAPEX savings greater than 30%
- Fast turnaround—Installation and commissioning
- Operator-friendly controls
- Reduced product handling
- Final product is processed offsite by Ostara

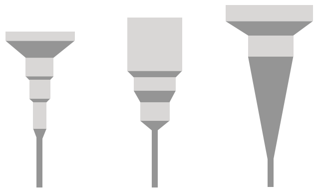
Nutrient Recovery Benefits

Ostara's Nutrient Recovery solution helps transform wastewater treatment plants into true resource recovery facilities.

- Up to 85% of P and 40% of N removed
- Helps meet P limits
- Pure, eco-friendly fertilizer
- Reduces chemical dependency
- Revenue-generating offtake offsets operating costs

Ostara's Pearl® FX System Specifications

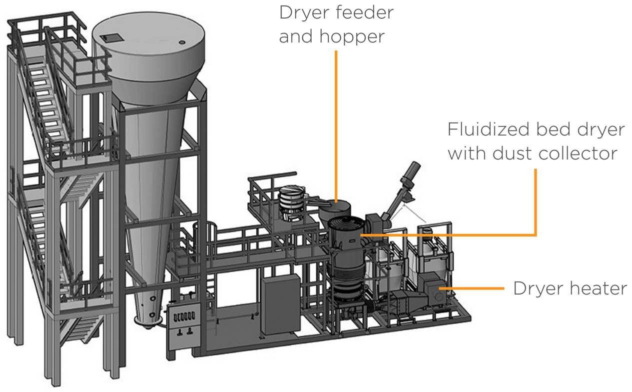
OSTARA'S PEARL® FX SYSTEM IS AVAILABE IN THREE REACTOR SIZES DEPENDING ON PHOSPHORUS CONCENTRATION LEVELS IN THE WASTEWATER STREAM

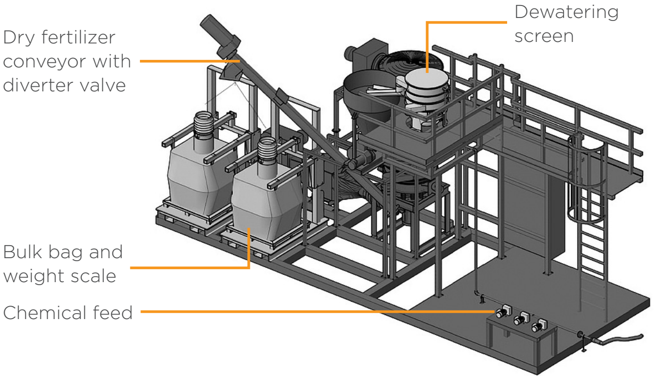


P Concentration (mg/l PO_4-P)	50–400
Current Fx Reactor Sizes (@ 200 mg/l PO_4-P)	6'Ø = 70 lb/d 9'Ø = 300 lb/d 12'Ø = 525 lb/d
Hydraulic Capacity (gpm)	18–250
Average Production Capacity (CG tons/year)	65–475

FEATURES

- Simplified Design
  - No recycle single pass reactor
  - Simplified instrumentation and controls
  - Simplified product handling (unclassified product is processed offsite by Ostara)
- Modular Delivery
  - Pre-engineered and pre-assembled skid mounted design reducing installation costs and maintenance





PEARL FX SYSTEM EQUIPMENT

- Main equipment skid including piping and wiring
- Pearl FX System Reactor skid with motor control center
- Optional Dryer skid
- Pearl FX System Reactor skid
- Pearl FX System controls including:
  - NEMA 4X main control panel with PLC, HMI, I/O, and Ethernet switch for Evoqua supplied equipment
  - Remote I/O cabinet as required

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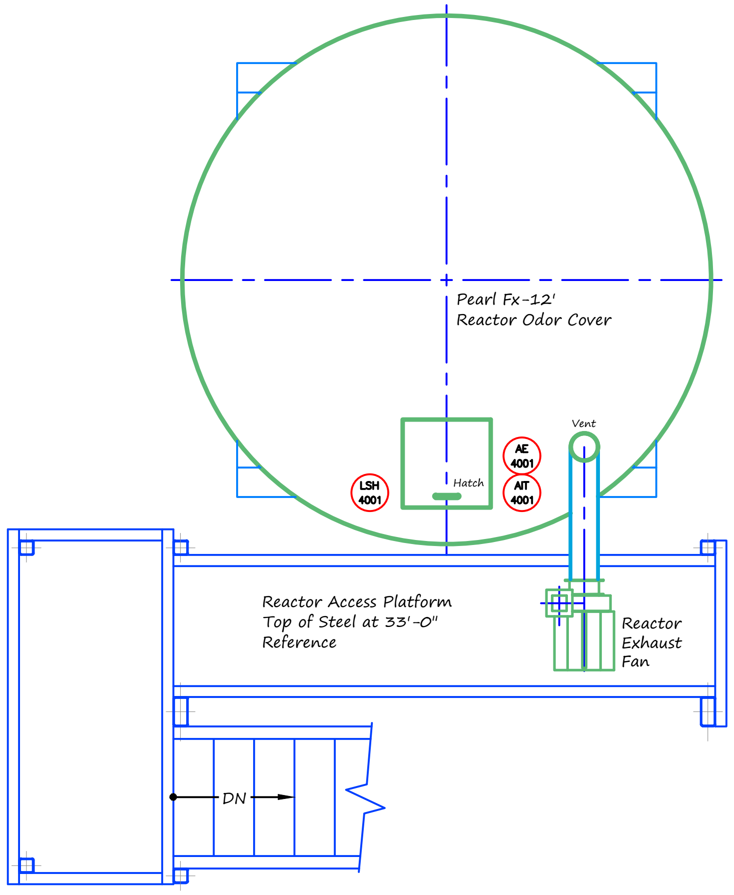
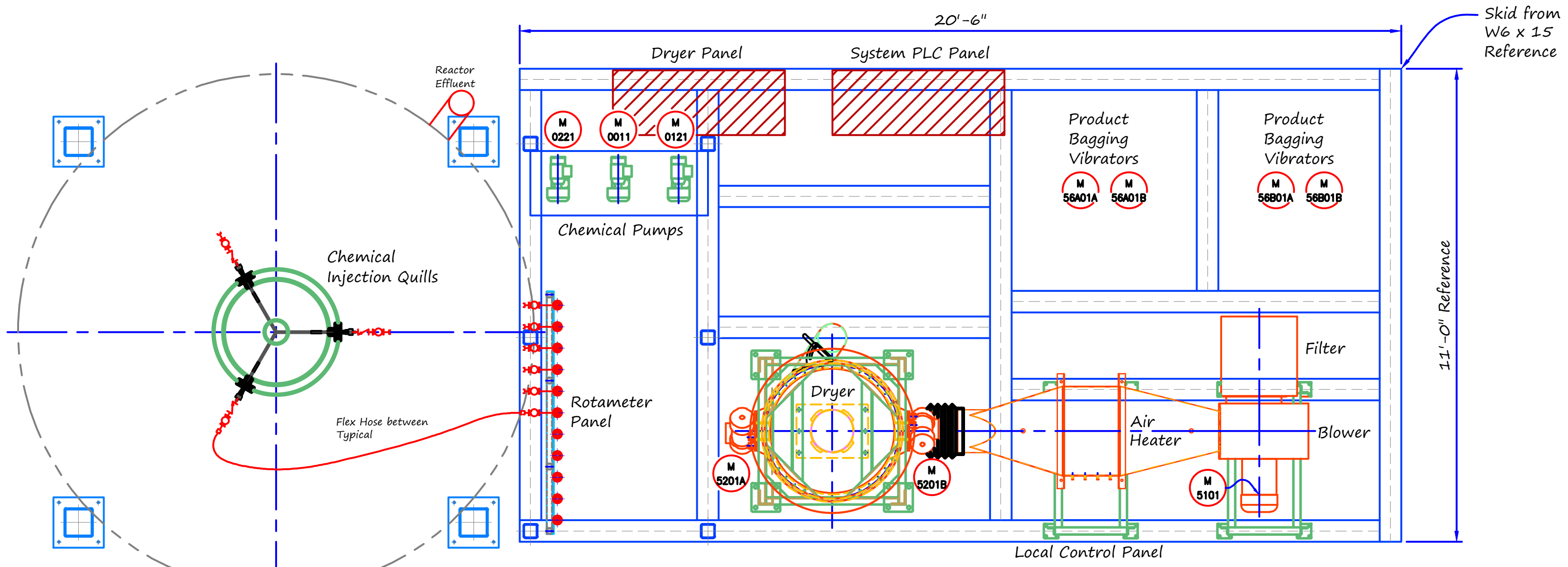
+1 (866) 926-8420 (toll-free) **+1 (978) 614-7233 (toll)** **evoqua.com**



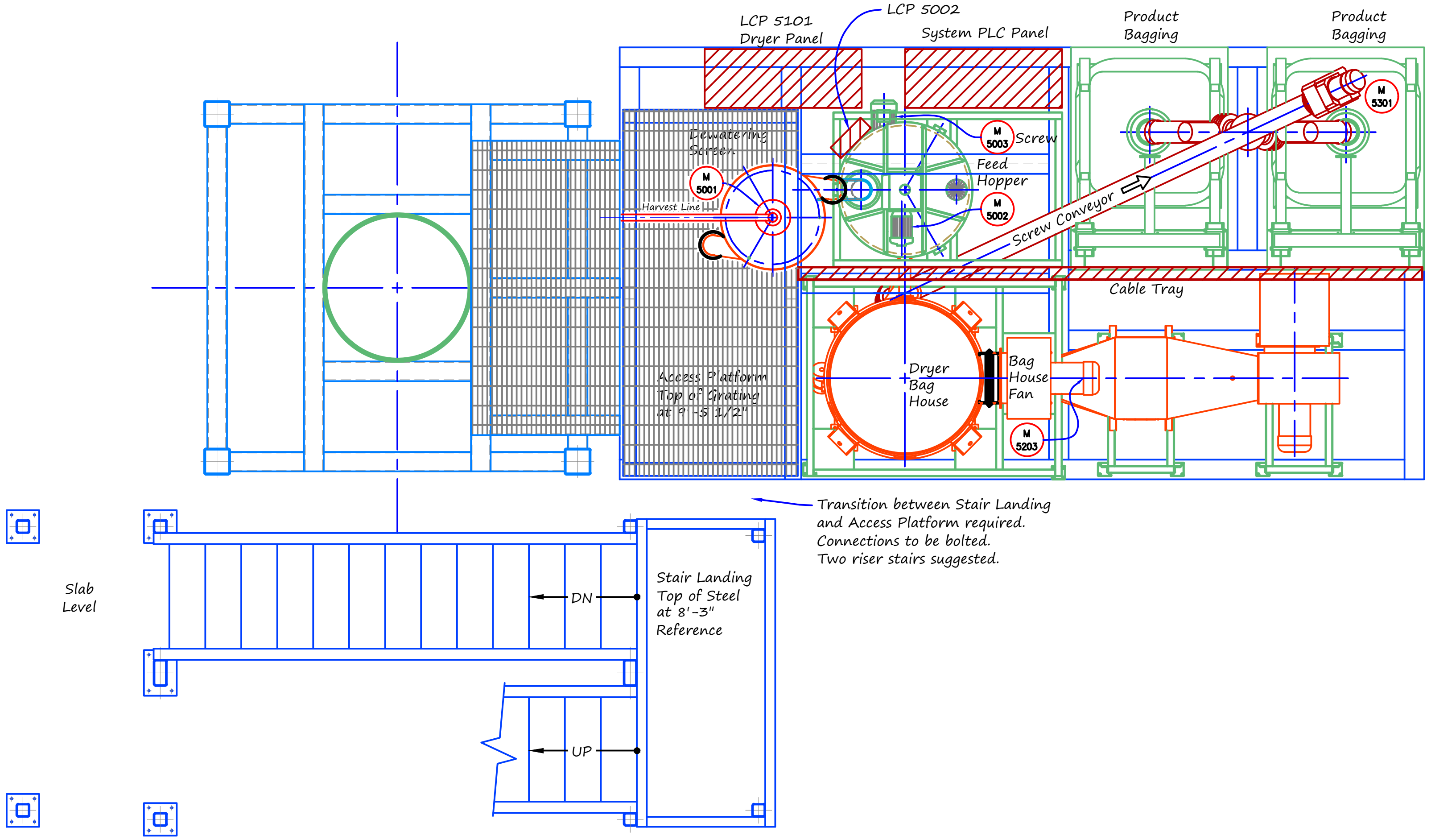
LAYOUT AT TOP OF REACTOR

1/2"=1'-0"



LAYOUT AT SKID LEVEL

1/2"=1'-0"



LAYOUT AT ACCESS PLATFORM LEVEL

1/2"=1'-0"

0 1' 2'

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
ALL WEIGHTS ARE POUNDS AND EACH
DRAWN PER ASME Y14.5M

STANDARD TOLERANCE	MACHINED SURFACES
.XX ± .06 XXX ± .005 X/X ± 1/16 ANG ± 0.50°	250

PRELIMINARY
NOT TO BE USED FOR
CONSTRUCTION
PURPOSES

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN

DWN BY: ---- DATE ----
CKD BY: ---- DATE ----
APPD BY: ---- DATE ----
MGD BY: ---- SCALE 1/2" = 1'-0"

TITLE PEARL FX-12
EXAMPLE GA

CLIENT ----

EVOQUA WATER TECHNOLOGIES
WAUKESHA WI USA
262-547-0141

PART NUMBER	PROJ/PROD NUMBER	CODE	FILE/DRAWING NUMBER	SHEET	REV
----	----	----	----	1 OF 1	A

STD:24x36_D v4.0

BAR = 1" AT PLOT SCALE

APPENDIX E: CAPITAL IMPROVEMENT PLAN

2011 MSA Collection System CIP

TM CP Attachment A

TM CP Attachment B

TM CP Attachment C

TM CP Attachment D

TM CP Attachment E

TM CP Attachment F

Project ID	Improvement Timeline	Project Type	Existing Surface Condition	Pipe Type**	Existing Diameter (in)	Build-out Diameter (in)	Length* (ft)	Minimum Depth* (ft)	Maximum Depth* (ft)	Minimum Slope*	Maximum Slope*	Total Project Cost
S-30	Build-out	New	Paved	Gravity	0	18	2,526	15	19	0.0015	0.0078	$2,074,000
S-31	Build-out	Upgrade	Paved	Force main	12	24	32	5	5	-	-	$11,000
S-32	Build-out	Upgrade	Unpaved	Force main	12	30	3,663	5	5	-	-	$1,166,000
S-33	Build-out	Upgrade	Unpaved	Gravity	36	42	20	9	9	0.0980	0.0980	$22,000
S-34	Build-out	Upgrade	Unpaved	Gravity	24	42	101	11	11	0.0015	0.0015	$78,000
S-35	Build-out	Upgrade	Mixed	Gravity	36	42	4,762	8	13	0.0005	0.0005	$3,205,000
S-36	Build-out	New, Parallel	Paved	Gravity	0	24	266	10	10	0.0014	0.0014	$99,000
S-37	Build-out	Upgrade	Unpaved	Gravity	36	42	2,124	10	13	0.0004	0.0005	$1,554,000
S-38	Build-out	New, Parallel	Unpaved	Gravity	0	48	182	13	13	0.0006	0.0006	$173,000
S-39	Build-out	New	Paved	Gravity	0	8	8,697	9	11	0.0009	0.0031	$1,943,000
S-40	Build-out	New	Paved	Gravity	0	10	2,292	13	14	0.0007	0.0011	$1,134,000
SI-1	Build-out	New	Paved	Gravity	0	10	1,736	8	8	0.0023	0.0023	$365,000
SI-2	Build-out	New	Paved	Gravity	0	15	6,610	8	13	0.0006	0.0088	$2,275,000
SI-3	Build-out	Upgrade	Paved	Gravity	8	15	248	14	14	0.0038	0.0038	$90,000
SI-4	Build-out	Upgrade	Paved	Gravity	12	15	2,274	9	14	0.0005	0.0047	$704,000
SI-5	Build-out	Upgrade	Paved	Gravity	15	18	871	14	14	0.0011	0.0017	$355,000
SI-6	Build-out	Upgrade	Paved	Gravity	12	18	237	14	14	0.0018	0.0018	$93,000
SI-7	Build-out	Upgrade	Unpaved	Gravity	15	18	647	12	13	0.0012	0.0018	$209,000
SI-8	Build-out	Upgrade	Paved	Gravity	15	18	2,144	15	20	0.0012	0.0028	$1,307,000
ST-1	Build-out	New	Paved	Gravity	0	8	1,569	16	16	0.0037	0.0037	$1,128,000
ST-2	Build-out	New	Paved	Gravity	0	15	5,059	13	16	0.0007	0.0009	$3,222,000
ST-3	Build-out	New	Paved	Gravity	0	15	5,378	16	17	0.0026	0.0078	$4,432,000
ST-4	Build-out	New	Paved	Gravity	0	18	2,383	17	17	0.0095	0.0095	$2,153,000
ST-5	Build-out	New	Paved	Gravity	0	24	2,747	13	13	0.0007	0.0007	$1,685,000
ST-6	Build-out	New	Paved	Gravity	0	30	4,093	10	11	0.0005	0.0022	$1,767,000
ST-7	Build-out	New	Paved	Gravity	0	15	6,091	11	15	0.0043	0.0080	$3,122,000
ST-8	Build-out	New	Paved	Gravity	0	24	2,284	9	9	0.0010	0.0010	$708,000
ST-9	Build-out	New	Paved	Gravity, Crossing	0	30	490	11	11	0.0010	0.0010	$321,000
ST-10	Build-out	New	Paved	Gravity	0	30	8,148	8	12	0.0005	0.0019	$3,881,000
ST-11	Build-out	Upgrade	Unpaved	Gravity, Crossing	8	15	2,844	3	14	0.0031	0.0092	$660,000
ST-12	Build-out	Upgrade	Unpaved	Gravity, Crossing	12	15	399	11	11	0.0021	0.0021	$123,000
ST-13	Build-out	Upgrade	Unpaved	Gravity, Crossing	12	36	466	8	9	0.0031	0.0088	$242,000
ST-14	Build-out	Upgrade	Mixed	Gravity, Crossing	15	30	5,002	9	16	0.0010	0.0051	$2,569,000
ST-15	Build-out	Upgrade	Unpaved	Gravity	18	30	1,196	10	10	0.0013	0.0017	$544,000
ST-16	Build-out	Upgrade	Mixed	Gravity	15	24	1,177	12	14	0.0013	0.0022	$512,000
ST-17	Build-out	Upgrade	Mixed	Gravity	24	36	475	10	10	0.0008	0.0008	$276,000
ST-18	Build-out	Upgrade	Paved	Gravity	30	36	564	7	10	0.0006	0.0024	$303,000

Project ID	Improvement Timeline	Project Type	Existing Surface Condition	Pipe Type**	Existing Diameter (in)	Build-out Diameter (in)	Length* (ft)	Minimum Depth* (ft)	Maximum Depth* (ft)	Minimum Slope*	Maximum Slope*	Total Project Cost
ST-19	Build-out	Upgrade	River***	Gravity, Crossing	18	36	500	9	9	0.0088	0.0088	$2,000,000
ST-20	Build-out	Upgrade	Paved	Gravity	12	15	1,142	5	5	0.0022	0.0027	$247,000
ST-21	Build-out	Upgrade	Unpaved	Gravity	15	18	1,280	6	10	0.0011	0.0013	$335,000
WS-1	Build-out	New	Paved	Gravity	0	15	5,247	10	11	0.0032	0.0042	$1,970,000
WS-2	Build-out	New	Paved	Gravity	0	18	2,617	9	9	0.0031	0.0031	$679,000
WS-3	Build-out	New	Paved	Gravity	0	24	3,561	10	16	0.0008	0.0017	$1,882,000
WS-4	Build-out	New	Paved	Gravity	0	8	3,116	15	15	0.0096	0.0096	$1,747,000
WS-5	Build-out	New	Paved	Force main	0	16	3,572	5	5	-	-	$786,000
WS-6	Build-out	New	Paved	Gravity	0	24	8,867	14	20	0.0038	0.0109	$8,588,000
WS-7	Build-out	New	Paved	Gravity	0	8	2,035	8	9	0.0014	0.0030	$420,000
WS-8	Build-out	New	Paved	Gravity	0	10	1,351	8	13	0.0023	0.0037	$493,000
WS-9	Build-out	New	Paved	Gravity	0	15	946	16	16	0.0011	0.0011	$768,000
WS-10	Build-out	New	Paved	Gravity	0	18	563	10	10	0.0091	0.0091	$201,000
WS-11	Build-out	New	Paved	Gravity	0	24	2,285	7	7	0.0144	0.0144	$694,000
WS-12	Build-out	New	Paved	Gravity	0	30	2,201	9	9	0.0009	0.0009	$863,000
WS-13	Build-out	New	Paved	Gravity	0	8	3,154	8	8	0.0015	0.0065	$616,000
WS-14	Build-out	New	Paved	Gravity	0	15	865	10	10	0.0023	0.0023	$214,000
WS-15	Build-out	New	Paved	Gravity	0	30	5,683	12	20	0.0008	0.0010	$5,982,000
WS-16	Build-out	New	Paved	Gravity	0	8	2,511	15	15	0.0071	0.0071	$1,415,000
WS-17	Build-out	New	Paved	Gravity	0	30	8,206	10	21	0.0008	0.0040	$9,040,000
WS-18	Build-out	New	Paved	Gravity	0	10	1,313	7	9	0.0013	0.0028	$288,000
WS-19	Build-out	New	Paved	Gravity	0	15	7,586	9	18	0.0010	0.0128	$3,678,000
WS-20	Build-out	New	Paved	Gravity	0	18	7,442	12	20	0.0015	0.0076	$5,624,000
WS-21	Build-out	New	Paved	Gravity	0	24	1,726	21	24	0.0008	0.0018	$2,732,000
WS-22	Build-out	New	Paved	Gravity	0	18	429	16	16	0.0023	0.0023	$365,000
WS-23	Build-out	New	Paved	Gravity	0	8	868	10	10	0.0081	0.0081	$184,000
WS-24	Build-out	New	Paved	Gravity	0	18	3,154	14	18	0.0038	0.0050	$2,852,000
WS-25	Build-out	New	Paved	Gravity	0	18	1,893	17	19	0.0019	0.0081	$1,855,000
WS-26	Build-out	New	Unpaved	Gravity	0	10	2,666	14	14	0.0015	0.0015	$1,240,000
WS-27	Build-out	New	Paved	Force main	0	36	8,667	5	5	-	-	$3,564,000
WS-28	Build-out	New	Mixed	Gravity	0	8	2,033	6	12	0.0014	0.0108	$475,000
WS-29	Build-out	New	Unpaved	Gravity	0	18	531	13	13	0.0009	0.0009	$249,000
WS-30	Build-out	New	Unpaved	Gravity	0	18	2,627	13	16	0.0010	0.0016	$1,678,000
WS-31	Build-out	New	Unpaved	Gravity	0	24	1,008	14	15	0.0010	0.0010	$661,000
WS-32	Build-out	New	Unpaved	Gravity	0	30	461	13	13	0.0011	0.0011	$300,000
WS-33	Build-out	New	Mixed	Gravity	8	36	922	11	12	0.0004	0.0011	$585,000
WS-34	Build-out	New	Paved	Gravity	0	15	1,083	6	8	0.0008	0.0020	$252,000

Table 7.6
Summary of Required Pipeline Improvements

Project ID	Improvement Timeline	Project Type	Existing Surface Condition	Pipe Type**	Existing Diameter (in)	Build-out Diameter (in)	Length* (ft)	Minimum Depth* (ft)	Maximum Depth* (ft)	Minimum Slope*	Maximum Slope*	Total Project Cost
C-1	Existing	Upgrade	Paved	Gravity	10	18	1,814	6	8	0.0015	0.0043	$474,000
C-2	Existing	Upgrade	Paved	Gravity	12	18	2,327	9	19	0.0013	0.0154	$790,000
C-3	Existing	Upgrade	Paved	Gravity	18	24	1,555	10	15	0.0014	0.0032	$693,000
C-4	Existing	Upgrade	Paved	Gravity	15	24	648	10	10	0.0014	0.0022	$224,000
C-5	Existing	Upgrade, Parallel	Paved	Gravity	15	30	1,242	9	10	0.0008	0.0040	$575,000
C-6	Existing	Upgrade	Paved	Gravity	18	30	1,305	9	14	0.0018	0.0202	$659,000
C-7	Existing	Upgrade	Mixed	Gravity, Crossing	24	30	5,516	6	14	0.0012	0.0156	$2,722,000
C-8	Existing	Upgrade	Paved	Gravity	15	18	329	8	8	0.0031	0.0031	$90,000
C-9	Existing	Upgrade	Paved	Gravity	24	30	347	9	10	0.0068	0.0410	$169,000
C-10	Build-out	Upgrade	Mixed	Gravity	30	36	796	15	18	0.0085	0.0200	$593,000
C-11	Build-out	New, Parallel	Unpaved	Gravity	0	48	8,794	6	17	0.0002	0.0015	$6,258,000
RI-1	Build-out	New	Paved	Gravity	0	10	2,552	9	9	0.0025	0.0029	$564,000
RI-2	Build-out	New	Paved	Gravity	0	15	6,666	9	12	0.0029	0.0037	$2,438,000
RI-3	Build-out	New	Paved	Gravity	0	18	3,937	14	14	0.0027	0.0027	$2,415,000
RI-4	Build-out	New	Paved	Gravity	0	24	4,977	14	15	0.0009	0.0015	$3,842,000
RI-5	Build-out	New	Paved	Gravity	0	30	1,349	17	17	0.0014	0.0014	$1,527,000
RI-6	Build-out	New	Paved	Gravity	0	10	2,078	15	16	0.0017	0.0022	$1,502,000
RI-7	Build-out	New	Paved	Gravity	0	15	3,808	9	14	0.0008	0.0037	$1,639,000
RI-8	Build-out	New	Paved	Gravity	0	18	1,255	9	9	0.0044	0.0044	$332,000
RI-9	Build-out	New	Paved	Gravity	0	24	8,001	10	16	0.0004	0.0044	$5,946,000
RI-10	Build-out	New	Paved	Gravity	0	30	5,867	16	17	0.0006	0.0019	$6,461,000
RI-11	Build-out	Upgrade	Mixed	Gravity	15	30	8,849	12	22	0.0002	0.0065	$7,211,000
RI-12	Build-out	Upgrade	Unpaved	Gravity	15	36	320	17	17	0.0036	0.0036	$251,000
RI-13	Build-out	Upgrade	Unpaved	Gravity	15	42	59	18	18	0.0508	0.0508	$83,000
RI-14	Existing	Upgrade	Unpaved	Force main	6	36	41	5	5	-	-	$26,000
RI-15	Build-out	Upgrade	Mixed	Gravity, Crossing	24	30	3,261	5	12	0.0007	0.0122	$1,672,000
RI-16	Build-out	Upgrade	Paved	Gravity	30	42	1,836	9	13	0.0005	0.0008	$1,396,000
RI-17	Build-out	New	Paved	Siphon	0	36	29	7	7	-	-	$22,000
RI-18	Build-out	Upgrade	Paved	Gravity	30	42	597	10	13	0.0006	0.0006	$476,000
RI-19	Build-out	New	Paved	Gravity	0	15	6,841	15	18	0.0011	0.0033	$5,318,000
RI-20	Build-out	New	Paved	Gravity	0	18	6,433	15	18	0.0009	0.0022	$4,863,000
RI-21	Build-out	Upgrade	Paved	Gravity, Crossing	12	18	1,578	17	18	0.0016	0.0025	$857,000
RI-22	Build-out	New	Paved	Gravity	0	8	3,582	8	14	0.0015	0.0053	$879,000
RI-23	Build-out	New	Paved	Gravity	0	10	279	17	17	0.0077	0.0077	$214,000
RI-24	Build-out	Upgrade	Paved	Gravity	12	18	3,423	12	19	0.0005	0.0030	$1,575,000

Project ID	Improvement Timeline	Project Type	Existing Surface Condition	Pipe Type**	Existing Diameter (in)	Build-out Diameter (in)	Length* (ft)	Minimum Depth* (ft)	Maximum Depth* (ft)	Minimum Slope*	Maximum Slope*	Total Project Cost
RI-25	Build-out	Upgrade	Paved	Gravity	15	18	1,057	11	13	0.0015	0.0040	$401,000
RI-26	Build-out	Upgrade	Mixed	Gravity, Crossing	15	24	5,538	9	17	0.0014	0.0199	$2,341,000
RI-27	Build-out	Upgrade	Mixed	Gravity	21	24	1,960	10	13	0.0004	0.0015	$810,000
RI-28	Build-out	Upgrade, Parallel	Paved	Gravity	21	30	273	13	13	0.0016	0.1051	$172,000
RI-29	Build-out	Upgrade, Parallel	Paved	Gravity	21	36	247	14	14	0.0011	0.0011	$179,000
RI-30	Build-out	Upgrade	Paved	Gravity	24	36	924	14	15	0.0011	0.0033	$699,000
RI-31	Build-out	Upgrade	Paved	Gravity	30	36	3,259	10	17	0.0006	0.0030	$2,373,000
RI-32	Existing	Upgrade	Paved	Force main	4	8	34	5	5	-	-	$8,000
S-1	Build-out	New	Unpaved	Gravity	0	15	2,626	11	12	0.0005	0.0012	$999,000
S-2	Build-out	New	Paved	Gravity	0	18	5,205	10	12	0.0007	0.0014	$2,046,000
S-3	Build-out	New	Paved	Gravity	0	8	763	9	9	0.0013	0.0013	$160,000
S-4	Build-out	New	Paved	Gravity	0	10	1,016	9	9	0.0010	0.0010	$223,000
S-5	Build-out	New	Paved	Gravity	0	15	893	9	9	0.0007	0.0007	$212,000
S-6	Build-out	New	Unpaved	Gravity	0	18	3,936	10	10	0.0018	0.0018	$924,000
S-7	Build-out	New	Unpaved	Gravity	0	24	1,481	10	10	0.0011	0.0011	$412,000
S-8	Build-out	New	Unpaved	Gravity	0	10	1,355	14	14	0.0012	0.0012	$642,000
S-9	Build-out	New	Unpaved	Gravity	0	15	1,397	11	11	0.0009	0.0009	$466,000
S-10	Build-out	New	Mixed	Gravity	0	24	5,334	12	15	0.0009	0.0015	$3,317,000
S-11	Build-out	New	Paved	Gravity	0	8	1,653	15	15	0.0027	0.0027	$938,000
S-12	Build-out	New	Paved	Gravity	0	10	1,270	14	14	0.0026	0.0026	$684,000
S-13	Build-out	New	Paved	Gravity	0	18	682	15	15	0.0008	0.0008	$471,000
S-14	Build-out	New	Paved	Gravity	0	24	2,243	14	14	0.0018	0.0018	$1,534,000
S-15	Build-out	New	Paved	Gravity	0	30	2,964	14	16	0.0009	0.0014	$2,646,000
S-16	Build-out	New	Paved	Gravity	0	8	2,503	11	11	0.0012	0.0012	$892,000
S-17	Build-out	New	Paved	Gravity	0	15	592	16	16	0.0084	0.0084	$468,000
S-18	Build-out	New	Paved	Gravity	0	30	4,656	16	17	0.0015	0.0027	$5,111,000
S-19	Build-out	New	Paved	Gravity	0	10	1,989	12	12	0.0013	0.0013	$847,000
S-20	Build-out	New	Paved	Gravity	0	24	592	17	17	0.0039	0.0039	$583,000
S-21	Build-out	New	Paved	Force main	0	24	10,192	5	5	-	-	$2,908,000
S-22	Build-out	New	Paved	Force main	0	8	4,732	5	5	-	-	$758,000
S-23	Build-out	New	Mixed	Gravity	0	30	4,265	14	21	0.0018	0.0055	$4,306,000
S-24	Build-out	New	Paved	Gravity	0	10	4,924	11	13	0.0018	0.0024	$2,030,000
S-25	Build-out	New	Paved	Gravity	0	15	1,527	12	12	0.0019	0.0019	$709,000
S-26	Build-out	New	Paved	Gravity	0	18	6,066	13	15	0.0004	0.0016	$3,709,000
S-27	Build-out	New	Paved	Gravity	0	8	3,196	12	13	0.0012	0.0012	$1,398,000
S-28	Build-out	New	Paved	Gravity	0	10	3,450	12	12	0.0024	0.0029	$1,468,000
S-29	Build-out	New	Paved	Gravity	0	15	1,148	13	13	0.0032	0.0032	$593,000

Project ID	Improvement Timeline	Project Type	Existing Surface Condition	Pipe Type**	Existing Diameter (in)	Build-out Diameter (in)	Length* (ft)	Minimum Depth* (ft)	Maximum Depth* (ft)	Minimum Slope*	Maximum Slope*	Total Project Cost
WS-35	Build-out	New	Paved	Gravity	0	42	519	12	12	0.0006	0.0006	$429,000
WS-36	Build-out	Upgrade	Mixed	Gravity, Crossing	30	42	4,852	7	18	0.0006	0.0011	$4,322,000
WS-37	Build-out	Upgrade	Paved	Gravity	24	30	403	13	13	0.0008	0.0008	$246,000
WS-38	Build-out	Upgrade	Paved	Gravity	24	36	405	11	11	0.0008	0.0008	$263,000
WS-39	Build-out	New, Parallel	Unpaved	Gravity	0	24	1,805	4	9	0.0004	0.0006	$435,000
WS-40	Build-out	Upgrade	Unpaved	Gravity, Crossing	24	36	907	7	12	0.0006	0.0030	$726,000
WS-41	Build-out	New	Paved	Gravity	0	10	317	9	9	0.0143	0.0143	$70,000

**Values are based on planning level information provided by the City. Survey of actual field conditions is recommended prior to design.*

*** Crossing specifies areas where pipe crosses highways, railroad or water.*

*** Elevated river crossing, estimated assuming constructed in conjunction with a pedestrian bridge at $3,500/lf plus pipe material (steel @ $500/lf) cost.

Table 7.7
Summary of Required Lift Station Improvements

Project ID	Project Type	Lift Station Type	Existing Firm Capacity (gpm)	Existing Total Capacity (gpm)	Build-out Firm Capacity (gpm)	Build-out Total Capacity (gpm)	Total Project Cost
LS-1	Upgrade of Park Place Lift Station	Wet well	900	2,700	6,000	9,300	$2,569,000
LS-2	Upgrade of Presto Lift Station	Wet well	800	1,600	4,900	7,200	$1,681,000
LS-3	New	Wet well	-	-	2,200	2,800	$1,166,000
LS-4	New	Wet well	-	-	6,600	9,000	$1,897,000
LS-5	New	Wet well	-	-	3,300	5,200	$1,331,000
LS-6	New	Submersible	-	-	120	250	$500,000

ATTACHMENT A

Master Capital Improvement Plan (CIP) - (Escalated)

Project Description	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	FY2041	FY2042	FY2043	Total Cost
Remove Stormwater Connections	$ -	$ 265,225	$ 273,182	$ 281,377	$ 289,819	$ 298,513	$ 307,468	$ 633,385	$ 652,387	$ 671,958	$ 692,117	$ 712,880	$ 734,267	$ 756,295	$ 778,984	$ 802,353	$ 826,424	$ 851,217	$ 876,753	$ 903,056	$ 11,607,659
Upgrade 3 Lift Stations Per Year And Backup Generation	$ -	$ 813,357	$ 837,757	$ 862,890	$ 888,777	$ 915,440	$ 942,903	$ 1,456,786	$ 1,500,489	$ 1,545,504	$ 1,591,869	$ 1,639,625	$ 1,688,814	$ 1,739,478	$ 1,791,663	$ 1,845,412	$ 1,900,775	$ 1,957,798	$ 2,016,532	$ 2,077,028	$ 28,012,896
Upgrade at least 1% of Collection System	$ -	$ 1,060,900	$ 1,092,727	$ 1,125,509	$ 1,159,274	$ 1,194,052	$ 1,229,874	$ 1,900,155	$ 1,957,160	$ 2,015,875	$ 3,460,585	$ 3,564,402	$ 3,671,334	$ 3,781,474	$ 3,894,919	$ 4,011,766	$ 4,132,119	$ 4,256,083	$ 4,383,765	$ 4,515,278	$ 52,407,251
Procure Biosolids Handling Trucks 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Procure Additional Biosolids Handling Truck	$ -	$ 265,225	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 265,225
Facility Plan Update	$ -	$ -	$ -	$ -	$ 579,637	$ -	$ -	$ -	$ -	$ 671,958	$ -	$ -	$ -	$ -	$ 778,984	$ -	$ -	$ -	$ -	$ 903,056	$ 2,933,635
Collection System Master Plan & Model Update	$ -	$ 424,360	$ -	$ -	$ -	$ -	$ 491,950	$ -	$ -	$ -	$ -	$ 570,304	$ -	$ -	$ -	$ -	$ 661,139	$ -	$ -	$ -	$ 2,147,753
Secondary System Evaluation	$ -	$ 206,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 206,000
Clean B System	$ -	$ 445,671	$ 3,394,447	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,840,118
Liquid Chlorine Disenfection	$ -	$ -	$ 65,564	$ 495,224	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 560,787
Screening / Washer Compactor Improvements	$ -	$ -	$ -	$ -	$ -	$ 604,668	$ 4,567,260	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,171,928
Membrane Bioreactor (MBBR)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 657,606	$ 4,967,115	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,624,721
Makeup Air Unit and Corrosion Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 36,012	$ 272,009	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 308,020
Headworks Improvements	$ -	$ -	$ -	$ -	$ -	$ 230,691	$ 1,742,485	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,973,176
Primary Scum Pit Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 68,437	$ 516,924	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 585,360
Chlorine Contact Chamber Gate Replacement	$ -	$ -	$ 41,961	$ 316,943	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 358,904
Additional GAC Adsorption Unit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 119,832	$ 905,134	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,024,966
Plant Wide Arc Flash Study and SCADA Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 168,805	$ 1,275,041	$ -	$ -	$ -	$ -	$ -	$ 1,443,846
Digester & Biogas Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 722,118	$ 5,454,397	$ -	$ -	$ -	$ 6,176,515
New Digester	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,875,955	$ 21,723,046	$ -	$ -	$ 24,599,001
New Headworks Building	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,208,415	$ 31,787,558	$ 35,995,972
Facility Asset Management	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,921,727	$ 4,503,112	$ 4,220,125	$ 4,177,845	$ 4,894,355	$ -	$ -	$ 1,928,857	$ -	$ 24,646,020
602.72.00 - Buildings	$ 25,750	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,750
602.73.00 - Imps Other Than Build 1	$ 171,592	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 171,592
602.73.00 - Imps Other Than Build 2	$ 206,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 206,000
602.73.00 - Imps Other Than Build 3	$ 414,575	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 414,575
602.73.00 - Imps Other Than Build 4	$ 515,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 515,000
602.73.15 - Participation With Devel	$ 669,500	$ 159,135	$ 163,909	$ 168,826	$ 173,891	$ 179,108	$ 184,481	$ 190,016	$ 195,716	$ 201,587	$ 207,635	$ 213,864	$ 220,280	$ 226,888	$ 233,695	$ 240,706	$ 247,927	$ 255,365	$ 263,026	$ 270,917	$ 4,666,473
602.73.20 - Sewer Line Replacement	$ 2,060,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,060,000
602.73.35 - Storm Drain Projects	$ 515,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 515,000
602.74.00 - Office Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
602.74.01 - Software Programs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
602.75.01 - MERF Auto Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
602.75.01 - MERF Auto Equipment 1	$ 447,640	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 447,640
602.76.09 - Treat Plt-Expension-Upgra	$ 10,300,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,300,000
Total Modeled CIP	**$ 15,325,057**	**$ 3,639,872**	**$ 5,869,547**	**$ 3,250,770**	**$ 3,091,398**	**$ 3,422,472**	**$ 9,466,421**	**$ 4,180,341**	**$ 4,999,369**	**$ 10,346,006**	**$ 5,952,206**	**$ 11,691,239**	**$ 11,454,563**	**$ 11,798,200**	**$ 12,931,130**	**$ 12,516,710**	**$ 16,098,736**	**$ 29,043,508**	**$ 13,677,347**	**$ 40,456,892**	**$ 229,211,783**

Underlying Assumptions																				
Cumulative Projected Cost Escalation	3.00%	6.09%	9.27%	12.55%	15.93%	19.41%	22.99%	26.68%	30.48%	34.39%	38.42%	42.58%	46.85%	51.26%	55.80%	60.47%	65.28%	70.24%	75.35%	80.61%
Annual CIP Execution Percentage Assumption	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

ATTACHMENT B

Projection of Cash Inflows

1	Revenue Line Items	Department Name	Department Number	FY2024
2	332.01.00 - Any State Grant	Wastewater	332.01.00	$ -
3	348.01.00 - Sewer Connection Fees	Wastewater	348.01.00	$ 500,000
4	361.00.00 - Interest Income	Wastewater	361.00.00	$ -
5	361.05.00 - Market Adjustment	Wastewater	361.05.00	$ 200,000
6	361.06.00 - MERF Interest Income	Wastewater	361.06.00	$ 30,000
7	361.07.00 - Investment Interest	Wastewater	361.07.00	$ 300,000
8	361.08.00 - MERF Market Adjustment	Wastewater	361.08.00	$ 30,000
9	362.11.00 - Farm Land	Wastewater	362.11.00	$ 8,000
10	365.02.00 - Sale of Property	Wastewater	365.02.00	$ -
11	365.02.01 - MERF Sale of Property	Wastewater	365.02.01	$ -
12	365.06.00 - Miscellaneous Revenues	Wastewater	365.06.00	$ -
13	365.11.00 - Gain/Loss Sale of Assets	Wastewater	365.11.00	$ -
14	365.16.00 - Sewer Maint Other Entity	Wastewater	365.16.00	$ 50,000
15	381.01.02 - MERF Depreciation	Wastewater	381.01.02	$ -
16	381.02.05 - Contributed Capital	Wastewater	381.02.05	$ -
17	422.01.00 - Sewer fees	Wastewater	422.01.00	$ -
18	Sewer Fees - Res	Wastewater	422.01.01	$ 6,497,503
19	Sewer Fees - NonRes	Wastewater	422.01.02	$ 2,034,539
20	Sewer Fees - Ind	Wastewater	422.01.03	$ 1,988,686
21	Sewer Fees - Ucon	Wastewater	422.01.04	$ 163,352
22	Sewer Fees - IBSD	Wastewater	422.01.05	$ 1,703,618
23	Sewer Fees - Ammon Lincoln	Wastewater	422.01.06	$ 12,301
24	422.03.00 - Septic Haulers	Wastewater	422.03.00	$ 200,000
25	422.04.00 - Construction Fees	Wastewater	422.04.00	$ -
26	422.05.00 - City Accounts	Wastewater	422.05.00	$ 20,000
27	458.07.00 - Late Fees	Wastewater	458.07.00	$ 5,000
28	498.98.98 - MERF Cash	Wastewater	498.98.98	$ -
29	499.01.00 - Paperless Billing Credit	Wastewater	499.01.00	$ -
30	**Total Revenue Line Items**			**$ 13,742,999**
31	**Primary Revenue Growth Assumptions**			**FY2024**
32	**Industrial Rates**			
33	% Change in Units			0.00%
34	Revenue Weighted % Change in Units			0.00%
35	**Residential Rates**			
36	% Change in Units			0.00%
37	Revenue Weighted % Change in Units			0.00%
38	**Non-Residential Rates**			
39	% Change in Units			0.00%
40	Revenue Weighted % Change in Units			0.00%

41	**Wholesale Rates**			
42	% Change in Units			0.00%
43	Revenue Weighted % Change in Units			0.00%
44	**Assumed Primary Revenue Increases**			
45	Assumed Industrial Rates Increase			0.00%
46	Assumed Residential Rates Increase			0.00%
47	Assumed Non-Residential Rates Increase			0.00%
48	Assumed Wholesale Rates Increase			0.00%
49	**Industrial Rates Revenue**			
50	Revenue Forecast			$ 1,988,686
51	**Total Industrial Rates Revenue**			**$ 1,988,686**
52	**Residential Rates Revenue**			
53	Revenue Forecast			$ 6,497,503
54	**Total Residential Rates Revenue**			**$ 6,497,503**
55	**Non-Residential Rates Revenue**			
56	Revenue Forecast			$ 2,034,539
57	**Total Non-Residential Rates Revenue**			**$ 2,034,539**
58	**Wholesale Rates Revenue**			
59	Revenue Forecast			$ 1,879,271
60	**Total Wholesale Rates Revenue**			**$ 1,879,271**
61	**Operating Revenue**			
62	Other Income (Operating)			$ 225,000
63	**Total Operating Revenue**			**$ 225,000**
64	**Other Income (Non-Operating)**			
65	Other Income (Non-Operating)			$ 288,000
66	**Total Other Income (Non-Operating)**			**$ 288,000**
67	**Transfers In to Operating Fund**			**$ -**
68	**Interest Income**			
69	Unrestricted			$ 233,852
70	**Total Interest Income**			**$ 233,852**
71	**Total Revenue Cash In**			**$ 13,146,851**
72	**Fee Revenue (non-revenue fund)**			
73	Connection Fees			$ 500,000
74	**Total Fee Revenue**			**$ 500,000**
75	**Total Cash Inflows**			**$ 13,646,851**

Projection of Cash Outflows

	Expense Line Item	Department Name	Dept No	Account	Escalation Factor	FY2024
1	**Operating Expenses**					
2	601.11.00 - Regular Salary and Wage	8401 - Sewer-Sewer Administration	8401	601.11.00	O&M	$ 793,578
3	601.15.00 - Seasonal Employees	8401 - Sewer-Sewer Administration	8401	601.15.00	O&M	$ 40,000
4	601.16.00 - Overtime	8401 - Sewer-Sewer Administration	8401	601.16.00	O&M	$ 68,000
5	601.21.00 - Employee Benefits	8401 - Sewer-Sewer Administration	8401	601.21.00	O&M	$ 381,953
6	601.25.01 - Provision for Wage Adjust	8401 - Sewer-Sewer Administration	8401	601.25.01		$ -
7	601.25.08 - Pension Expense	8401 - Sewer-Sewer Administration	8401	601.25.08		$ -
8	601.27.00 - Clothing	8401 - Sewer-Sewer Administration	8401	601.27.00	O&M	$ 1,000
9	601.31.00 - Office Supplies	8401 - Sewer-Sewer Administration	8401	601.31.00	O&M	$ 1,100
10	601.32.00 - Special Dept Supplies	8401 - Sewer-Sewer Administration	8401	601.32.00	O&M	$ 2,300
11	601.32.00 - Special Dept Supplies	8408 - Sewer-Storm Drainage O & Mtnce	8408	601.32.00		$ -
12	601.32.12 - Safety Items	8401 - Sewer-Sewer Administration	8401	601.32.12	O&M	$ 500
13	601.32.80 - Emergency Supplies	8401 - Sewer-Sewer Administration	8401	601.32.80		$ -
14	601.34.00 - Minor Equipment	8401 - Sewer-Sewer Administration	8401	601.34.00	O&M	$ 4,500
15	601.42.00 - Professional Services	8401 - Sewer-Sewer Administration	8401	601.42.00	O&M	$ 150,000
16	601.42.05 - Drug Testing Services	8401 - Sewer-Sewer Administration	8401	601.42.05	O&M	$ 3,300
17	601.42.10 - Accounting & Auditing	8401 - Sewer-Sewer Administration	8401	601.42.10	O&M	$ 4,500
18	601.42.17 - Public Wk-Admin Transfer	8401 - Sewer-Sewer Administration	8401	601.42.17	O&M	$ 186,736
19	601.42.19 - Public Wk-GIS Transfer	8401 - Sewer-Sewer Administration	8401	601.42.19	O&M	$ 75,459
20	601.42.20 - Billing/Collect-Transfer	8401 - Sewer-Sewer Administration	8401	601.42.20		$ -
21	601.42.21 - City Gen & Admin Transfer	8401 - Sewer-Sewer Administration	8401	601.42.21	Trans to GF	$ 779,400
22	601.42.28 - Engineering Services	8401 - Sewer-Sewer Administration	8401	601.42.28	O&M	$ 109,523
23	601.44.00 - Advertising	8401 - Sewer-Sewer Administration	8401	601.44.00	O&M	$ 1,600
24	601.45.00 - Printing & Binding	8401 - Sewer-Sewer Administration	8401	601.45.00	O&M	$ 2,000
25	601.46.00 - Insurance	8401 - Sewer-Sewer Administration	8401	601.46.00	O&M	$ 68,300
26	601.47.00 - Travel & Meeting Costs	8401 - Sewer-Sewer Administration	8401	601.47.00	O&M	$ 4,000
27	601.48.00 - Dues & Subscriptions	8401 - Sewer-Sewer Administration	8401	601.48.00	O&M	$ 600
28	601.49.00 - Personnel Training	8401 - Sewer-Sewer Administration	8401	601.49.00	O&M	$ 1,400
29	601.50.00 - Custodial Cleaning	8401 - Sewer-Sewer Administration	8401	601.50.00		$ -
30	601.51.00 - Technology	8401 - Sewer-Sewer Administration	8401	601.51.00	O&M	$ 10,900
31	601.52.00 - Heat, Lights & Utilities	8401 - Sewer-Sewer Administration	8401	601.52.00	O&M	$ 22,000
32	601.52.02 - County Landfill Fees	8401 - Sewer-Sewer Administration	8401	601.52.02	O&M	$ 1,000
33	601.58.00 - Rep & Mtnce Office Equip	8401 - Sewer-Sewer Administration	8401	601.58.00	O&M	$ 4,000
34	601.58.01 - Software Expense	8401 - Sewer-Sewer Administration	8401	601.58.01	O&M	$ 25,000
35	601.60.00 - Repair & Mtnce Buildings	8401 - Sewer-Sewer Administration	8401	601.60.00	O&M	$ 11,000
36	601.61.00 - Repair & Mtnce Auto Equip	8401 - Sewer-Sewer Administration	8401	601.61.00	O&M	$ 4,000
37	601.62.00 - Repair & Mtnce-Other Equip	8401 - Sewer-Sewer Administration	8401	601.62.00	O&M	$ 100
38	601.64.00 - Maint Work Order Transfer	8401 - Sewer-Sewer Administration	8401	601.64.00	O&M	$ 150,000
39	601.66.00 - Laundry	8401 - Sewer-Sewer Administration	8401	601.66.00	O&M	$ 4,000
40	601.69.00 - Miscellaneous	8401 - Sewer-Sewer Administration	8401	601.69.00	O&M	$ 300
41	601.69.15 - City Employee Events	8401 - Sewer-Sewer Administration	8401	601.69.15	O&M	$ 540
42	601.69.34 - Project Help Costs	8401 - Sewer-Sewer Administration	8401	601.69.34	O&M	$ 1,000
43	601.69.36 - Idaho Connection Fees	8401 - Sewer-Sewer Administration	8401	601.69.36	O&M	$ 72,100
44	601.69.97 - Payment In-Lieu of Taxes	8401 - Sewer-Sewer Administration	8401	601.69.97	O&M	$ 692,700
45	601.79.00 - MERF Depreciation	8401 - Sewer-Sewer Administration	8401	601.79.00		$ -
46	601.98.00 - Interfund Transfers	8401 - Sewer-Sewer Administration	8401	601.98.00		$ -
47	602.11.00 - Regular Salary and Wage	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.11.00	O&M	$ 1,361,361
48	602.15.00 - Seasonal Employees	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.15.00	O&M	$ 71,680
49	602.16.00 - Overtime	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.16.00	O&M	$ 80,000
50	602.21.00 - Employee Benefits	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.21.00	O&M	$ 777,794
51	602.25.02 - Unemployment Insur Adjust	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.25.02		$ -
52	602.27.00 - Clothing	8402 - Sewer-Collection Sys O & Mtnce	8402	602.27.00	O&M	$ 6,300
53	602.27.00 - Clothing	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.27.00	O&M	$ 11,500
54	602.28.00 - Meals	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.28.00	O&M	$ 400
55	602.28.00 - Meals	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.28.00	O&M	$ 300
56	602.28.00 - Meals	8402 - Sewer-Collection Sys O & Mtnce	8402	602.28.00	O&M	$ 200
57	602.31.00 - Office Supplies	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.31.00	O&M	$ 5,000
58	602.31.00 - Office Supplies	8402 - Sewer-Collection Sys O & Mtnce	8402	602.31.00	O&M	$ 4,500
59	602.32.00 - Special Dept Supplies	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.32.00	O&M	$ 2,700
60	602.32.00 - Special Dept Supplies	8402 - Sewer-Collection Sys O & Mtnce	8402	602.32.00	O&M	$ 31,800
61	602.32.00 - Special Dept Supplies	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.32.00	O&M	$ 40,000
62	602.32.12 - Safety Items	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.32.12	O&M	$ 12,350
63	602.32.12 - Safety Items	8402 - Sewer-Collection Sys O & Mtnce	8402	602.32.12	O&M	$ 7,200
64	602.32.55 - Chlorine & Dechlorination	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.32.55	O&M	$ 370,000
65	602.32.56 - Laboratory Supplies	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.32.56	O&M	$ 78,000
66	602.32.65 - Sludge Thickening Chem	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.32.65	O&M	$ 61,000
67	602.34.00 - Minor Equipment	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.34.00	O&M	$ 500
68	602.34.00 - Minor Equipment	8402 - Sewer-Collection Sys O & Mtnce	8402	602.34.00	O&M	$ 87,300
69	602.34.00 - Minor Equipment	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.34.00	O&M	$ 58,317
70	602.34.00 - Minor Equipment	8406 - Sewer-New Construction	8406	602.34.00		$ -
71	602.42.00 - Professional Services	8402 - Sewer-Collection Sys O & Mtnce	8402	602.42.00	O&M	$ 30,000
72	602.42.00 - Professional Services	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.42.00	O&M	$ 10,000

73	602.42.00 - Professional Services	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.42.00	O&M	$ 500,000
74	602.42.26 - Laboratory Analysis	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.42.26	O&M	$ 120,000
75	602.42.29 - WR Pretreatment	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.42.29	O&M	$ 3,000
76	602.42.47 - Sludge Removal	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.42.47	O&M	$ 350,000
77	602.45.00 - Printing & Binding	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.45.00	O&M	$ 1,300
78	602.46.00 - Insurance	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.46.00	O&M	$ 18,555
79	602.47.00 - Travel & Training	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.47.00	O&M	$ 11,700
80	602.47.00 - Travel & Training	8402 - Sewer-Collection Sys O & Mtnce	8402	602.47.00	O&M	$ 4,000
81	602.48.00 - Dues & Subscriptions	8402 - Sewer-Collection Sys O & Mtnce	8402	602.48.00	O&M	$ 3,700
82	602.48.00 - Dues & Subscriptions	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.48.00	O&M	$ 6,500
83	602.49.00 - Personnel Training	8402 - Sewer-Collection Sys O & Mtnce	8402	602.49.00	O&M	$ 3,000
84	602.49.00 - Personnel Training	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.49.00	O&M	$ 5,000
85	602.50.00 - Custodial Cleaning	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.50.00		$ -
86	602.51.00 - Technology	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.51.00	O&M	$ 1,224
87	602.51.00 - Technology	8402 - Sewer-Collection Sys O & Mtnce	8402	602.51.00		$ -
88	602.52.00 - Heat, Lights & Utilities	8402 - Sewer-Collection Sys O & Mtnce	8402	602.52.00	O&M	$ 70,000
89	602.52.00 - Heat, Lights & Utilities	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.52.00	O&M	$ 68,500
90	602.52.00 - Heat, Lights & Utilities	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.52.00	O&M	$ 350,000
91	602.52.02 - County Landfill Fees	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.52.02	O&M	$ 13,200
92	602.56.00 - Rental Auto Equipment	8402 - Sewer-Collection Sys O & Mtnce	8402	602.56.00	O&M	$ 1,200
93	602.56.00 - Rental Auto Equipment	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.56.00	O&M	$ 3,000
94	602.58.00 - Rep & Mtnce Office Equip	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.58.00	O&M	$ 1,000
95	602.58.01 - Software Expense	8402 - Sewer-Collection Sys O & Mtnce	8402	602.58.01	O&M	$ 29,000
96	602.58.01 - Software Expense	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.58.01	O&M	$ 10,000
97	602.59.00 - Repair & Mtnce Grounds	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.59.00	O&M	$ 200
98	602.60.00 - Repair & Mtnce Buildings	8402 - Sewer-Collection Sys O & Mtnce	8402	602.60.00	O&M	$ 45,000
99	602.60.00 - Repair & Mtnce Buildings	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.60.00	O&M	$ 5,000
100	602.60.00 - Repair & Mtnce Buildings	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.60.00	O&M	$ 45,000
101	602.60.03 - Easement Repairs	8402 - Sewer-Collection Sys O & Mtnce	8402	602.60.03	O&M	$ 500
102	602.60.11 - Sanitary Sewer	8402 - Sewer-Collection Sys O & Mtnce	8402	602.60.11	O&M	$ 5,000
103	602.60.12 - Lift Stations	8402 - Sewer-Collection Sys O & Mtnce	8402	602.60.12	O&M	$ 500
104	602.60.13 - Bldgs & Lift Stat	8402 - Sewer-Collection Sys O & Mtnce	8402	602.60.13	O&M	$ 5,000
105	602.60.14 - Lift Stations (2)	8402 - Sewer-Collection Sys O & Mtnce	8402	602.60.14	O&M	$ 500
106	602.60.15 - Waste Water Treat Plant	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.60.15	O&M	$ 3,500
107	602.60.21 - Maintence of Sewer Lines	8402 - Sewer-Collection Sys O & Mtnce	8402	602.60.21	O&M	$ 154,000
108	602.61.00 - Repair & Mtnce Auto Equip	8406 - Sewer-New Construction	8406	602.61.00	O&M	$ 1,200
109	602.61.00 - Repair & Mtnce Auto Equip	8402 - Sewer-Collection Sys O & Mtnce	8402	602.61.00	O&M	$ 132,000
110	602.61.00 - Repair & Mtnce Auto Equip	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.61.00	O&M	$ 150,000
111	602.61.00 - Repair & Mtnce Auto Equip	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.61.00	O&M	$ 15,600
112	602.62.00 - Repair & Mtnce-Other Equip	8406 - Sewer-New Construction	8406	602.62.00	O&M	$ 100
113	602.62.00 - Repair & Mtnce-Other Equip	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.62.00	O&M	$ 350,000
114	602.62.00 - Repair & Mtnce-Other Equip	8402 - Sewer-Collection Sys O & Mtnce	8402	602.62.00	O&M	$ 138,000
115	602.62.00 - Repair & Mtnce-Other Equip	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.62.00	O&M	$ 8,000
116	602.62.26 - Small Equipment	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.62.26	O&M	$ 10,000
117	602.63.57 - Manhole Repair	8402 - Sewer-Collection Sys O & Mtnce	8402	602.63.57	O&M	$ 150,000
118	602.63.57 - Manhole Repair	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.63.57	O&M	$ 15,000
119	602.64.00 - Maint Work Order Transfer	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.64.00		$ -
120	602.64.00 - Maint Work Order Transfer	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.64.00	O&M	$ 50,000
121	602.64.00 - Maint Work Order Transfer	8402 - Sewer-Collection Sys O & Mtnce	8402	602.64.00	O&M	$ 10,000
122	602.64.00 - Maint Work Order Transfer	8406 - Sewer-New Construction	8406	602.64.00		$ -
123	602.66.00 - Laundry	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.66.00	O&M	$ 3,500
124	602.69.00 - Miscellaneous	8402 - Sewer-Collection Sys O & Mtnce	8402	602.69.00	O&M	$ 100
125	602.69.00 - Miscellaneous	8409 - Sewer-Treatment Plnt O & Mtnce	8409	602.69.00	O&M	$ 2,000
126	602.69.37 - Storm Water Pumping	8408 - Sewer-Storm Drainage O & Mtnce	8408	602.69.37	O&M	$ 25,000
127	**Total Operating Expenses**					**$ 9,685,170**
128	**Total Expenses by Category**					
129	Personnel Services					$ 3,594,066
130	Fixed Operating Expenses					$ 5,307,104
131	Variable Operating Expenses					$ 784,000
132	**Total Expenses**					**$ 9,685,170**
133	**Transfers Out of Operating Fund**					**$ -**
134	**Debt Service**					
135	Capital Debt					$ 1,100,000
136	New Senior Debt Debt Service (Model Calcu					$ -
137	New Subordinate Debt Debt Service (Model					$ -
138	New Debt Service (Model Calculated)					$ -
139	**Total Debt Service**					**$ 1,100,000**
140	**Cash-Funded Capital**					
141	Projects Designated To Be Funded With Ca					$ -
142	Excess Fund Balance Used for Cash Fundir					$ 15,134,057
143	**Total Cash-Funded Capital**					**$ 15,134,057**
144	**Total Cash Outflows**					**$ 25,919,227**

ATTACHMENT C

Assumptions

	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	FY2041	FY2042	FY2043
Annual Growth																				
Industrial Rates																				
Rate Increase Adoption Date	10/1/2023	10/1/2024	10/1/2025	10/1/2026	10/1/2027	10/1/2028	10/1/2029	10/1/2030	10/1/2031	10/1/2032	10/1/2033	10/1/2034	10/1/2035	10/1/2036	10/1/2037	10/1/2038	10/1/2039	10/1/2040	10/1/2041	10/1/2042
Ending # of Units	1000	1023	1047	1071	1096	1122	1148	1175	1202	1230	1259	1288	1318	1349	1381	1413	1446	1480	1515	1550
Units Growth	0	23	24	24	25	26	26	27	27	28	29	29	30	31	32	32	33	34	35	35
% Change in Units	0.00%	2.30%	2.35%	2.29%	2.33%	2.37%	2.32%	2.35%	2.30%	2.33%	2.36%	2.30%	2.33%	2.35%	2.37%	2.32%	2.34%	2.35%	2.36%	2.31%
Monthly Usage Per Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage Per Units	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Usage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Residential Rates																				
Rate Increase Adoption Date	10/1/2023	10/1/2024	10/1/2025	10/1/2026	10/1/2027	10/1/2028	10/1/2029	10/1/2030	10/1/2031	10/1/2032	10/1/2033	10/1/2034	10/1/2035	10/1/2036	10/1/2037	10/1/2038	10/1/2039	10/1/2040	10/1/2041	10/1/2042
Ending # of Units	1000	1027	1054	1082	1111	1141	1171	1202	1234	1267	1301	1336	1372	1409	1447	1486	1526	1567	1609	1652
Units Growth	0	27	27	28	29	30	30	31	32	33	34	35	36	37	38	39	40	41	42	43
% Change in Units	0.00%	2.70%	2.63%	2.66%	2.68%	2.70%	2.63%	2.65%	2.66%	2.67%	2.68%	2.69%	2.69%	2.70%	2.70%	2.70%	2.69%	2.69%	2.68%	2.67%
Monthly Usage Per Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage Per Units	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Usage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-Residential Rates																				
Rate Increase Adoption Date	10/1/2023	10/1/2024	10/1/2025	10/1/2026	10/1/2027	10/1/2028	10/1/2029	10/1/2030	10/1/2031	10/1/2032	10/1/2033	10/1/2034	10/1/2035	10/1/2036	10/1/2037	10/1/2038	10/1/2039	10/1/2040	10/1/2041	10/1/2042
Ending # of Units	1000	1027	1054	1082	1111	1141	1171	1202	1234	1267	1301	1336	1372	1409	1447	1486	1526	1567	1609	1652
Units Growth	0	27	27	28	29	30	30	31	32	33	34	35	36	37	38	39	40	41	42	43
% Change in Units	0.00%	2.70%	2.63%	2.66%	2.68%	2.70%	2.63%	2.65%	2.66%	2.67%	2.68%	2.69%	2.69%	2.70%	2.70%	2.70%	2.69%	2.69%	2.68%	2.67%
Monthly Usage Per Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage Per Units	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Usage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wholesale Rates																				
Rate Increase Adoption Date	10/1/2023	10/1/2024	10/1/2025	10/1/2026	10/1/2027	10/1/2028	10/1/2029	10/1/2030	10/1/2031	10/1/2032	10/1/2033	10/1/2034	10/1/2035	10/1/2036	10/1/2037	10/1/2038	10/1/2039	10/1/2040	10/1/2041	10/1/2042
Ending # of Units	1000	1020	1040	1060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Units Growth	0	20	20	20	-1060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Units	0.00%	2.00%	1.96%	1.92%	-100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Monthly Usage Per Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage Per Units	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Usage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Change in Usage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Capital Spending																				
Original CIP	$ 15,325,057	$ 3,639,872	$ 5,869,547	$ 3,250,770	$ 3,091,398	$ 3,422,472	$ 9,466,421	$ 4,180,341	$ 4,999,369	$ 10,346,006	$ 5,952,206	$ 11,691,239	$ 11,454,563	$ 11,798,200	$ 12,931,130	$ 12,516,710	$ 16,098,736	$ 29,043,508	$ 13,677,347	$ 40,456,892
Annual Percent Executed	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Annual CIP Redistribution	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Modeled CIP	$ 15,325,057	$ 3,639,872	$ 5,869,547	$ 3,250,770	$ 3,091,398	$ 3,422,472	$ 9,466,421	$ 4,180,341	$ 4,999,369	$ 10,346,006	$ 5,952,206	$ 11,691,239	$ 11,454,563	$ 11,798,200	$ 12,931,130	$ 12,516,710	$ 16,098,736	$ 29,043,508	$ 13,677,347	$ 40,456,892
System Development Fees																				
Connection Fees	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
Average Annual Interest Earnings Rate																				
Rate of Return on Fund Balances	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%
Operating Budget Reserve																				
Target (Number of Months O&M Expenses)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Operating Budget Execution Percentage																				
Personnel Services	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Fixed Operations and Maintenance	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Variable Operations and Maintenance	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

ATTACHMENT D

CIP-Input Color

		Remove Stormwater Connections					50%	50%	50%	50%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Upgrade 3 Lift Stations Per Year And Backup Generation				Assuming 15 yr life	67%	67%	67%	67%	67%	67%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Adjustments	Upgrade at least 1% of Collection System					40%	40%	40%	40%	40%	40%	60%	60%	60%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
						0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Priority Number #	**Project Name**	**Start Year**	**Total Cost**		**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**	**FY31**	**FY32**	**FY33**	**FY34**	**FY35**	**FY36**	**FY37**	**FY38**	**FY39**	**FY40**	**FY41**	**FY42**	**FY43**
Annual or pre-determined	1	Remove Stormwater Connections		$150,000	Annually	$0	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000
	2	Upgrade 3 Lift Stations Per Year And Backup Generation		$1,150,000	Annually	$0	$766,667	$766,667	$766,667	$766,667	$766,667	$766,667	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000	$1,150,000
	3	Upgrade at least 1% of Collection System		$2,500,000	Annually	$0	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,500,000	$1,500,000	$1,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000
	4	Procure Biosolids Handling Trucks 2		$500,000	2024	$0																			
	5	Procure Additional Biosolids Handling Truck		$250,000	2025		$250,000																		
	6	Facility Plan Update		$500,000	every 5 years, Start in 2028					$500,000					$500,000					$500,000					$500,000
	8	Collection System Master Plan & Model Update		$400,000	every 5 years, start 2025		$400,000					$400,000					$400,000					$400,000			
To Be Allocated	9	**Secondary System Evaluation**	FY25	$200,000	0-5 years	$0	$200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	10	**Clean B System**	FY25	$3,530,000	0-5 years	$0	$423,000	$3,106,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	11	**Liquid Chlorine Disenfection**	FY26	$500,000	0-5 years	$0	$0	$60,000	$440,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	12	**Screening / Washer Compactor Improvements**	FY29	$4,220,000	0-5 years	$0	$0	$0	$0	$0	$506,400	$3,713,600	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	13	**Moving Bed Bioreactor (MBBR)**	FY32	$4,200,000	0-5 years	$0	$0	$0	$0	$0	$0	$0	$0	$504,000	$3,696,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	14	**Makeup Air Unit and Corrosion Improvements**	FY32	$230,000	0-5 years	$0	$0	$0	$0	$0	$0	$0	$0	$27,600	$202,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	15	**Headworks Improvements**	FY29	$1,610,000	0-5 years	$0	$0	$0	$0	$0	$193,200	$1,416,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	16	**Primary Scum Pit Upgrade**	FY35	$400,000	0-5 years	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$48,000	$352,000	$0	$0	$0	$0	$0	$0	$0
	17	**Chlorine Contact Chamber Gate Replacement**	FY26	$320,000	0-5 years	$0	$0	$38,400	$281,600	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	18	**Additional GAC Adsorption Unit**	FY36	$680,000	5-10 years	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$81,600	$598,400	$0	$0	$0	$0	$0	$0
	19	**Plant Wide Arc Flash Study and SCADA Improvements**	FY37	$930,000	5-10 years	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$111,600	$818,400	$0	$0	$0	$0	$0
	20	**Digester & Biogas Improvements**	FY39	$3,750,000	5-10 years	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,000	$3,300,000	$0	$0	$0
	21	**New Digester**	FY40	$14,500,000	5-10 years	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,740,000	$12,760,000	$0	$0
	22	**New Headworks Building**	FY42	$20,000,000	20+ years	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,400,000	$17,600,000
	23	Facility Asset Management	FY35	$3,500,000	Annually	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,452,000	$3,066,400	$2,790,000	$2,681,600	$3,050,000	$0	$0	$1,100,000	$0
	24	602.72.00 - Buildings	FY24	$25,000	FY24 Budget	$25,000																			
	25	602.73.00 - Imps Other Than Build	FY24	$166,594	FY24 Budget	$166,594																			
	26	602.73.00 - Imps Other Than Build	FY24	$500,000	FY24 Budget	$200,000																			
	27	602.73.00 - Imps Other Than Build	FY24	$402,500	FY24 Budget	$402,500																			
	28	602.73.00 - Imps Other Than Build	FY24	$500,000	FY24 Budget	$500,000																			
	29	602.73.15 - Participation With Devel	FY24	$650,000	FY24 Budget	$650,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
	30	602.73.20 - Sewer Line Replacement	FY24	$2,000,000	FY24 Budget	$2,000,000																			
	31	602.73.35 - Storm Drain Projects	FY24	$500,000	FY24 Budget	$500,000																			
	32	602.74.00 - Office Equipment	FY24		FY24 Budget	$0																			
	33	602.74.01 - Software Programs	FY24		FY24 Budget	$0																			
	34	602.75.01 - MERF Auto Equipment	FY24		FY24 Budget	$0																			
	35	602.75.01 - MERF Auto Equipment	FY24	$434,602	FY24 Budget	$434,602																			
2024 Budge	36	602.76.09 - Treat Plt-Expension-Upgra	FY24	$10,000,000	FY24 Budget	$10,000,000																			
		Total				$14,878,696	$3,439,667	$5,371,467	$2,888,267	$2,666,667	$2,866,267	$7,697,067	$3,300,000	$3,831,600	$7,698,400	$4,300,000	$8,200,000	$7,800,000	$7,800,000	$8,300,000	$7,800,000	$9,740,000	$17,060,000	$7,800,000	$22,400,000
					Budgeted																				

Planning/Design:	0.12
Construction/Implementation:	0.88

ATTACHMENT E

Master Capital Improvement Plan (CIP)

Project Description	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	FY2041	FY2042	FY2043	Total Cost
Remove Stormwater Connections	$ -	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 8,000,000
Upgrade 3 Lift Stations Per Year And Backup Generation	$ -	$ 766,667	$ 766,667	$ 766,667	$ 766,667	$ 766,667	$ 766,667	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 1,150,000	$ 19,550,000
Upgrade at least 1% of Collection System	$ -	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 35,500,000
Procure Biosolids Handling Trucks 2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Procure Additional Biosolids Handling Truck	$ -	$ 250,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 250,000
Facility Plan Update	$ -	$ -	$ -	$ -	$ 500,000	$ -	$ -	$ -	$ -	$ 500,000	$ -	$ -	$ -	$ -	$ 500,000	$ -	$ -	$ -	$ -	$ 500,000	$ 2,000,000
Collection System Master Plan & Model Update	$ -	$ 400,000	$ -	$ -	$ -	$ -	$ 400,000	$ -	$ -	$ -	$ -	$ 400,000	$ -	$ -	$ -	$ -	$ 400,000	$ -	$ -	$ -	$ 1,600,000
Secondary System Evaluation	$ -	$ 200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 200,000
Clean B System	$ -	$ 423,000	$ 3,106,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,529,400
Liquid Chlorine Disenfection	$ -	$ -	$ 60,000	$ 440,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000
Screening / Washer Compactor Improvements	$ -	$ -	$ -	$ -	$ -	$ 506,400	$ 3,713,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,220,000
Membrane Bioreactor (MBBR)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 504,000	$ 3,696,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,200,000
Makeup Air Unit and Corrosion Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 27,600	$ 202,400	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 230,000
Headworks Improvements	$ -	$ -	$ -	$ -	$ -	$ 193,200	$ 1,416,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,610,000
Primary Scum Pit Upgrade	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 48,000	$ 352,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 400,000
Chlorine Contact Chamber Gate Replacement	$ -	$ -	$ 38,400	$ 281,600	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 320,000
Additional GAC Adsorption Unit	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 81,600	$ 598,400	$ -	$ -	$ -	$ -	$ -	$ -	$ 680,000
Plant Wide Arc Flash Study and SCADA Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 111,600	$ 818,400	$ -	$ -	$ -	$ -	$ -	$ 930,000
Digester & Biogas Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 450,000	$ 3,300,000	$ -	$ -	$ -	$ 3,750,000
New Digester	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,740,000	$ 12,760,000	$ -	$ -	$ 14,500,000
New Headworks Building	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,400,000	$ 17,600,000	$ 20,000,000
Facility Asset Management	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,452,000	$ 3,066,400	$ 2,790,000	$ 2,681,600	$ 3,050,000	$ -	$ -	$ 1,100,000	$ -	$ 16,140,000
602.72.00 - Buildings	$ 25,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000
602.73.00 - Imps Other Than Build 1	$ 166,594	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 166,594
602.73.00 - Imps Other Than Build 2	$ 200,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 200,000
602.73.00 - Imps Other Than Build 3	$ 402,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 402,500
602.73.00 - Imps Other Than Build 4	$ 500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000
602.73.15 - Participation With Devel	$ 650,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 3,500,000
602.73.20 - Sewer Line Replacement	$ 2,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000,000
602.73.35 - Storm Drain Projects	$ 500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000
602.74.00 - Office Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
602.74.01 - Software Programs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
602.75.01 - MERF Auto Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
602.75.01 - MERF Auto Equipment 1	$ 434,602	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 434,602
602.76.09 - Treat Plt-Expension-Upgra	$ 10,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,000,000
Total Modeled CIP	**$ 14,878,696**	**$ 3,439,667**	**$ 5,371,467**	**$ 2,888,267**	**$ 2,666,667**	**$ 2,866,267**	**$ 7,697,067**	**$ 3,300,000**	**$ 3,831,600**	**$ 7,698,400**	**$ 4,300,000**	**$ 8,200,000**	**$ 7,800,000**	**$ 7,800,000**	**$ 8,300,000**	**$ 7,800,000**	**$ 9,740,000**	**$ 17,060,000**	**$ 7,800,000**	**$ 22,400,000**	**$ 155,838,096**

Underlying Assumptions

Cumulative Projected Cost Escalation	3.00%	6.09%	9.27%	12.55%	15.93%	19.41%	22.99%	26.68%	30.48%	34.39%	38.42%	42.58%	46.85%	51.26%	55.80%	60.47%	65.28%	70.24%	75.35%	80.61%
Annual CIP Execution Percentage Assumption	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

ATTACHMENT F

Pro Forma

			FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
	Operating Revenue											
1	Primary Revenue		$ 12,399,999	$ 12,399,999	$ 13,349,374	$ 14,364,879	$ 15,458,437	$ 14,171,221	$ 15,272,452	$ 16,448,378	$ 17,718,519	$ 19,087,159
2	Change in Revenue From Growth		$ -	$ 313,690	$ 331,463	$ 357,443	$ (1,962,036)	$ 373,971	$ 392,670	$ 426,402	$ 459,728	$ 498,258
3	Subtotal		$ 12,399,999	$ 12,713,689	$ 13,680,837	$ 14,722,321	$ 13,496,401	$ 14,545,192	$ 15,665,122	$ 16,874,780	$ 18,178,247	$ 19,585,417
4	*Weighted Average Increase in Primary Revenue*		*0.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*
5	Additional Primary Revenue from Increase		$ -	$ 635,684	$ 684,042	$ 736,116	$ 674,820	$ 727,260	$ 783,256	$ 843,739	$ 908,912	$ 979,271
6	Total Primary Revenue		$ 12,399,999	$ 13,349,374	$ 14,364,879	$ 15,458,437	$ 14,171,221	$ 15,272,452	$ 16,448,378	$ 17,718,519	$ 19,087,159	$ 20,564,688
7	Plus: Other Operating Revenue		**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**
8	**Equals: Total Operating Revenue**		**$ 12,624,999**	**$ 13,574,374**	**$ 14,589,879**	**$ 15,683,437**	**$ 14,396,221**	**$ 15,497,452**	**$ 16,673,378**	**$ 17,943,519**	**$ 19,312,159**	**$ 20,789,688**
9	**Less: Operating Expenses**											
10	Operating Expenses		$ (9,685,170)	$ (10,076,473)	$ (10,390,984)	$ (10,715,475)	$ (10,952,016)	$ (11,194,293)	$ (11,442,461)	$ (11,696,683)	$ (11,957,129)	$ (12,223,980)
11	**Equals: Net Operating Income**		**$ 2,939,829**	**$ 3,497,901**	**$ 4,198,895**	**$ 4,967,962**	**$ 3,444,205**	**$ 4,303,159**	**$ 5,230,917**	**$ 6,246,836**	**$ 7,355,030**	**$ 8,565,708**
12	**Plus: Non-Operating Income/(Expense)**											
13	Non-Operating Revenue		$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000
14	Interest Income		$ 233,852	$ 144,299	$ 131,335	$ 129,116	$ 141,130	$ 147,416	$ 121,320	$ 103,215	$ 131,445	$ 132,953
15	System Development Fees		$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
16	Transfers In		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	**Equals: Net Income**		**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**
18	**Less: Revenues Excluded From Coverage Test**											
19	Excluded Debt Service Revenue		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	Transfers In		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
21	**Equals: Net Income Available For Debt Service**		**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**
22	**Total Senior Debt Service Coverage Test**											
23	Net Income Available for Debt Service		**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**
24	Existing Bond Debt Service		$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000
25	New Bond Debt Service (Model Calculated)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
26	Existing Other Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
27	New Other Debt Service (Model Calculated)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
28	**Total Annual Debt Service**	**Targ.**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**
29	*Calculated Senior Debt Service Coverage*	**1.75**	**3.60**	**4.03**	**4.65**	**5.35**	**3.98**	**4.76**	**5.58**	**6.49**	**7.52**	**8.62**
30	Additional Fee Revenue		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
31	**Total Income for Debt Service Including Fees**	**Targ.**	**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**
32	*Calculated Senior Debt Service Coverage including Fees*	**1.75**	**3.60**	**4.03**	**4.65**	**5.35**	**3.98**	**4.76**	**5.58**	**6.49**	**7.52**	**8.62**
33	**Total Subordinate Debt Service Coverage Test**											
34	Net Income Available for Debt Service		**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**
35	Existing Loan Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
36	New Loan Debt Service (Model Calculated)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
37	**Total Annual Debt Service**	**Targ.**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
38	*Calculated Subordinate Debt Service Coverage*	**1.75**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

		FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033
39	**Total All-In Debt Service Coverage Test**										
40	Net Income Available for Debt Service	**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**

41	Total Bond Debt Service		$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000
42	Total Loan Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
43	Total Other Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
44	**Total Annual Debt Service**	**Targ.**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**
45	*Calculated All-In Debt Service Coverage*	**1.75**	**3.60**	**4.03**	**4.65**	**5.35**	**3.98**	**4.76**	**5.58**	**6.49**	**7.52**	**8.62**
46	Additional Fee Revenue		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
47	**Total Income for Debt Service Including Fees**	**Targ.**	**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**
48	*Calculated All-In Debt Service Coverage with Fees*	**1.75**	**3.60**	**4.03**	**4.65**	**5.35**	**3.98**	**4.76**	**5.58**	**6.49**	**7.52**	**8.62**
49	**Cash Flow Test**											
50	Net Income Available For Debt Service		**$ 3,961,681**	**$ 4,430,200**	**$ 5,118,230**	**$ 5,885,079**	**$ 4,373,335**	**$ 5,238,575**	**$ 6,140,237**	**$ 7,138,051**	**$ 8,274,474**	**$ 9,486,661**
51	Less: Non-Operating Expenditures											
52	Net Interfund Transfers (In - Out)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
53	Debt Service Payment (Net of Development Fee Contributions)		$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)
54	Non-Revenue Fund System Development Fees		$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)
55	Projects Designated To Be Paid With Cash		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
56	Projects Paid With Reserve Funds		$ (15,134,057)	$ (2,830,872)	$ (5,369,547)	$ (2,750,770)	$ (2,591,398)	$ (2,922,472)	$ (8,966,421)	$ (3,680,341)	$ (4,499,369)	$ (9,846,006)
57	Capital Outlay		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
58	Other Below The Line Expenses		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
59	Plus: Revenues Excluded From Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
60	**Net Cash Flow**		**$ (12,772,376)**	**$ (672)**	**$ (1,851,317)**	**$ 1,534,309**	**$ 181,937**	**$ 716,103**	**$ (4,426,185)**	**$ 1,857,710**	**$ 2,175,106**	**$ (1,959,345)**
61	**Unrestricted Reserve Fund Test**											
62	Balance At Beginning Of Fiscal Year		$ 23,100,000	$ 10,307,437	$ 10,306,758	$ 8,455,435	$ 9,989,738	$ 10,171,668	$ 10,887,764	$ 6,443,643	$ 8,301,347	$ 10,476,446
63	Net Cash Flow		$ (12,772,376)	$ (672)	$ (1,851,317)	$ 1,534,309	$ 181,937	$ 716,103	$ (4,426,185)	$ 1,857,710	$ 2,175,106	$ (1,959,345)
64	**Balance At End Of Fiscal Year**		**$ 10,327,624**	**$ 10,306,765**	**$ 8,455,441**	**$ 9,989,744**	**$ 10,171,675**	**$ 10,887,771**	**$ 6,461,579**	**$ 8,301,352**	**$ 10,476,453**	**$ 8,517,101**
65	Minimum Working Capital Reserve Target		$ 2,696,292	$ 2,794,118	$ 2,872,746	$ 2,953,869	$ 3,013,004	$ 3,073,573	$ 3,135,615	$ 3,199,171	$ 3,264,282	$ 3,330,995
	Excess/(Deficiency) Of Working Capital To Target		**$ 7,631,332**	**$ 7,512,647**	**$ 5,582,695**	**$ 7,035,875**	**$ 7,158,671**	**$ 7,814,198**	**$ 3,325,964**	**$ 5,102,181**	**$ 7,212,171**	**$ 5,186,106**

Pro Forma (Cont'd)

		FY2034	FY2035	FY2036	FY2037	FY2038	FY2039	FY2040	FY2041	FY2042	FY2043
Operating Revenue											
1	Primary Revenue	$ 20,564,688	$ 22,159,389	$ 23,876,741	$ 25,729,323	$ 27,727,310	$ 29,881,603	$ 32,199,745	$ 34,697,962	$ 36,677,432	$ 38,768,806
2	Change in Revenue From Growth	$ 539,492	$ 580,364	$ 627,377	$ 677,639	$ 731,359	$ 784,820	$ 845,933	$ 911,195	$ 962,186	$ 1,010,810
3	Subtotal	$ 21,104,180	$ 22,739,753	$ 24,504,117	$ 26,406,962	$ 28,458,670	$ 30,666,424	$ 33,045,678	$ 35,609,157	$ 37,639,617	$ 39,779,616
4	*Weighted Average Increase in Primary Revenue*	*5.00%*	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	3.00%	3.00%	3.00%
5	Additional Primary Revenue from Increase	$ 1,055,209	$ 1,136,988	$ 1,225,206	$ 1,320,348	$ 1,422,933	$ 1,533,321	$ 1,652,284	$ 1,068,275	$ 1,129,189	$ 1,193,388
6	Total Primary Revenue	$ 22,159,389	$ 23,876,741	$ 25,729,323	$ 27,727,310	$ 29,881,603	$ 32,199,745	$ 34,697,962	$ 36,677,432	$ 38,768,806	$ 40,973,004
7	Plus: Other Operating Revenue	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**
8	**Equals: Total Operating Revenue**	**$ 22,384,389**	**$ 24,101,741**	**$ 25,954,323**	**$ 27,952,310**	**$ 30,106,603**	**$ 32,424,745**	**$ 34,922,962**	**$ 36,902,432**	**$ 38,993,806**	**$ 41,198,004**
9	**Less: Operating Expenses**										
10	Operating Expenses	$ (12,497,417)	$ (12,777,628)	$ (13,064,800)	$ (13,359,141)	$ (13,660,856)	$ (13,970,160)	$ (14,287,275)	$ (14,612,429)	$ (14,945,860)	$ (15,287,813)

11	**Equals: Net Operating Income**		**$ 9,886,972**	**$ 11,324,113**	**$ 12,889,523**	**$ 14,593,169**	**$ 16,445,747**	**$ 18,454,585**	**$ 20,635,687**	**$ 22,290,003**	**$ 24,047,946**	**$ 25,910,191**
12	**Plus: Non-Operating Income/(Expense)**											
13	Non-Operating Revenue		$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000	$ 288,000
14	Interest Income		$ 145,614	$ 168,415	$ 173,916	$ 201,787	$ 244,712	$ 310,397	$ 384,210	$ 369,596	$ 395,902	$ 367,109
15	System Development Fees		$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
16	Transfers In		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
17	**Equals: Net Income**		**$ 10,820,585**	**$ 12,280,528**	**$ 13,851,439**	**$ 15,582,956**	**$ 17,478,459**	**$ 19,552,981**	**$ 21,807,897**	**$ 23,447,598**	**$ 25,231,848**	**$ 27,065,300**
18	**Less: Revenues Excluded From Coverage Test**											
19	Excluded Debt Service Revenue		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
20	Transfers In		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
21	**Equals: Net Income Available For Debt Service**		**$ 10,820,585**	**$ 12,280,528**	**$ 13,851,439**	**$ 15,582,956**	**$ 17,478,459**	**$ 19,552,981**	**$ 21,807,897**	**$ 23,447,598**	**$ 25,231,848**	**$ 27,065,300**
22	**Total Senior Debt Service Coverage Test**											
23	Net Income Available for Debt Service		**$ 10,820,585**	$ 12,280,528	$ 13,851,439	$ 15,582,956	$ 17,478,459	$ 19,552,981	$ 21,807,897	$ 23,447,598	$ 25,231,848	$ 27,065,300
24	Existing Bond Debt Service		$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000
25	New Bond Debt Service (Model Calculated)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
26	Existing Other Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
27	New Other Debt Service (Model Calculated)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
28	**Total Annual Debt Service**	**Targ.**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**
29	*Calculated Senior Debt Service Coverage*	**1.75**	**9.84**	**11.16**	**12.59**	**14.17**	**15.89**	**17.78**	**19.83**	**21.32**	**22.94**	**24.60**
30	Additional Fee Revenue		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
31	**Total Income for Debt Service Including Fees**	**Targ.**	**$ 10,820,585**	**$ 12,280,528**	**$ 13,851,439**	**$ 15,582,956**	**$ 17,478,459**	**$ 19,552,981**	**$ 21,807,897**	**$ 23,447,598**	**$ 25,231,848**	**$ 27,065,300**
32	*Calculated Senior Debt Service Coverage including Fees*	**1.75**	**9.84**	**11.16**	**12.59**	**14.17**	**15.89**	**17.78**	**19.83**	**21.32**	**22.94**	**24.60**
33	**Total Subordinate Debt Service Coverage Test**											
34	Net Income Available for Debt Service		**$ 10,820,585**	**$ 12,280,528**	**$ 13,851,439**	**$ 15,582,956**	**$ 17,478,459**	**$ 19,552,981**	**$ 21,807,897**	**$ 23,447,598**	**$ 25,231,848**	**$ 27,065,300**
35	Existing Loan Debt Service		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
36	New Loan Debt Service (Model Calculated)		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
37	**Total Annual Debt Service**	**Targ.**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
38	*Calculated Subordinate Debt Service Coverage*	**1.75**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

			FY2034	**FY2035**	**FY2036**	**FY2037**	**FY2038**	**FY2039**	**FY2040**	**FY2041**	**FY2042**	**FY2043**
39	**Total All-In Debt Service Coverage Test**											
40	Net Income Available for Debt Service		**$ 10,820,585**	**$ 12,280,528**	**$ 13,851,439**	**$ 15,582,956**	**$ 17,478,459**	**$ 19,552,981**	**$ 21,807,897**	**$ 23,447,598**	**$ 25,231,848**	**$ 27,065,300**
41	Total Bond Debt Service		$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000	$ 1,100,000
42	Total Loan Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
43	Total Other Debt Service		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
44	**Total Annual Debt Service**	**Targ.**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**	**$ 1,100,000**
45	*Calculated All-In Debt Service Coverage*	**1.75**	**9.84**	11.16	12.59	14.17	15.89	17.78	19.83	21.32	22.94	24.60
46	Additional Fee Revenue		**$ -**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
47	**Total Income for Debt Service Including Fees**		**$ 10,820,585**	**$ 12,280,528**	**$ 13,851,439**	**$ 15,582,956**	**$ 17,478,459**	**$ 19,552,981**	**$ 21,807,897**	**$ 23,447,598**	**$ 25,231,848**	**$ 27,065,300**
48	*Calculated All-In Debt Service Coverage with Fees*		**9.84**	11.16	12.59	14.17	15.89	17.78	19.83	21.32	22.94	24.60
49	**Cash Flow Test**											
50	Net Income Available For Debt Service		**$ 10,820,585**	**$ 12,280,528**	**$ 13,851,439**	**$ 15,582,956**	**$ 17,478,459**	**$ 19,552,981**	**$ 21,807,897**	**$ 23,447,598**	**$ 25,231,848**	**$ 27,065,300**
51	Less: Non-Operating Expenditures											
52	Net Interfund Transfers (In - Out)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
53	Debt Service Payment (Net of Development Fee Contributions)		$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)	$ (1,100,000)
54	Non-Revenue Fund System Development Fees		$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)	$ (500,000)
55	Projects Designated To Be Paid With Cash		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
56	Projects Paid With Reserve Funds		$ (5,452,206)	$ (11,191,239)	$ (10,954,563)	$ (11,298,200)	$ (12,431,130)	$ (12,016,710)	$ (15,598,736)	$ (28,543,508)	$ (13,177,347)	$ (39,956,892)
57	Capital Outlay		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

58	Other Below The Line Expenses	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
59	Plus: Revenues Excluded From Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
60	**Net Cash Flow**	**$ 3,768,379**	**$ (510,712)**	**$ 1,296,876**	**$ 2,684,757**	**$ 3,447,329**	**$ 5,936,271**	**$ 4,609,161**	**$ (6,695,910)**	**$ 10,454,501**	**$ (14,491,592)**
61	**Unrestricted Reserve Fund Test**										
62	Balance At Beginning Of Fiscal Year	$ 8,516,862	$ 12,285,071	$ 11,774,203	$ 13,070,993	$ 15,755,740	$ 19,203,057	$ 25,139,313	$ 29,747,884	$ 23,051,480	$ 33,505,962
63	Net Cash Flow	$ 3,768,379	$ (510,712)	$ 1,296,876	$ 2,684,757	$ 3,447,329	$ 5,936,271	$ 4,609,161	$ (6,695,910)	$ 10,454,501	$ (14,491,592)
64	**Balance At End Of Fiscal Year**	**$ 12,285,241**	**$ 11,774,360**	**$ 13,071,079**	**$ 15,755,750**	**$ 19,203,069**	**$ 25,139,328**	**$ 29,748,474**	**$ 23,051,974**	**$ 33,505,981**	**$ 19,014,370**
65	Minimum Working Capital Reserve Target	$ 3,399,354	$ 3,469,407	$ 3,541,200	$ 3,614,785	$ 3,690,214	$ 3,767,540	$ 3,846,819	$ 3,928,107	$ 4,011,465	$ 4,096,953
	Excess/(Deficiency) Of Working Capital To Target	**$ 8,885,887**	**$ 8,304,953**	**$ 9,529,879**	**$ 12,140,965**	**$ 15,512,855**	**$ 21,371,788**	**$ 25,901,655**	**$ 19,123,867**	**$ 29,494,516**	**$ 14,917,417**

APPENDIX F: PUBLIC COMMENTS AND COUNCIL NOTES

Public Comments (None Received)

City Council Meeting Minutes

ADVERTISEMENT FOR PUBLIC COMMENT/PUBLIC MEETING

Idaho Falls Wastwater Treatment Plant Facility Plan Update

PROJECT NO. 2-37-35-1-SWR-2023-18

A public meeting will be held at the City Council Chambers at 680 Constitution Way, Idaho Falls, Idaho 83402, from 6:00 PM until **7:30 PM LOCAL TIME, WEDNESDAY, APRIL 3, 2024**. A brief presentation will be presented regarding the Idaho Falls Wastewater Facility Plan Update followed by a question and answer process where public comments can be received.

IDAHO FALLS –The City of Idaho Falls invites community members to attend a public meeting and submit public comments regarding the 2024 Wastewater Facility Plan update.

The meeting will be held on Wednesday, April 3rd from 6 p.m. to 7:30 p.m. inside the City Council Chambers located at 680 Park Avenue. The meeting will begin with a short presentation and an opportunity to review the Wastewater Facility Plan, ask questions, and submit public comments.

The Wastewater Facility plan comprehensively analyzes the city's wastewater system. The plan, last updated and approved by the City Council in 2010, provides recommendations that help guide decision-making for City leadership and staff regarding the growth and sustainability of the wastewater system. The plan outlines some information, including planning projections, improvement opportunities for the Wastewater Treatment Plant, project prioritization, and funding suggestions for capital improvement projects.

Idaho Falls residents are invited to submit comments about the draft plan at the public meeting, in person, or online at **https://www.idahofallsidaho.gov/379/Wastewater-Sewer**, physically at the Wastewater Division's webpage.

The public comment period is open online from March 27, 2024 to April 10, 2024.

To review the water facility plan, visit the Idaho Falls Wastewater Division webpage go online to **https://www.idahofallsidaho.gov/379/Wastewater-Sewer** . The plan is also available for review at Idaho Falls Public Works, 380 Constitution, and the Wastewater Treatment Plant, 4075 Glen Koester Lane, during regular business hours, Monday through Friday, 8 a.m. to 5 p.m.

Those with questions can call the Wastewater Division at (208) 612-8108.

ANUNCIO PARA EL COMENTARIO PÚBLICO/REUNIÓN PÚBLICA

Actualización del Plan de Instalaciones de la Planta de Tratamiento de Aguas Residuales de Idaho Falls

PROYECTO NO. 2-37-35-1-SWR-2023-18

Se llevará a cabo una reunión pública en la Sala del Concejo Municipal en 680 Park Avenue, Idaho Falls, Idaho 83402, de **6:00 PM a 7:30 PM, HORA LOCAL, EL MIÉRCOLES 3 DE ABRIL DE 2024**. Se realizará una breve presentación sobre la Actualización del Plan de Instalaciones de la Planta de Tratamiento de Aguas Residuales de Idaho Falls, seguida de una sesión de preguntas y respuestas donde se recibirán comentarios públicos.

IDAHO FALLS- La Ciudad de Idaho Falls invita a los miembros de la comunidad a asistir a una reunión pública y a emitir comentarios sobre la actualización del Plan de Instalaciones de la Planta de Tratamiento de Aguas Residuales de 2024.

La reunión se llevará a cabo el miércoles 3 de abril de 6:00 p.m. a 7:30 p.m. en la Sala del Concejo Municipal ubicada en 680 Park Avenue. La reunión comenzará con una breve presentación y la oportunidad de revisar el Plan de Instalaciones de la Planta de Tratamiento de Aguas Residuales, hacer preguntas y emitir comentarios.

El Plan de Instalaciones de la Planta de Tratamiento de Aguas Residuales analiza de manera integral el sistema de aguas residuales de la ciudad. El plan, actualizado por última vez y aprobado por el Concejo Municipal en 2010, proporciona recomendaciones que ayudan a guiar la toma de decisiones para el liderazgo y el personal de la Ciudad con respecto al crecimiento y la sostenibilidad del sistema de aguas residuales. El plan incluye información sobre proyecciones de planificación, oportunidades de mejora para la Planta de Tratamiento de Aguas Residuales, priorización de proyectos y sugerencias de financiamiento para proyectos de mejora capital.

Se invita a los residentes de Idaho Falls a enviar comentarios sobre el borrador del plan en la reunión pública, en persona o en línea en **https://www.idahofallsidaho.gov/379/Wastewater-Sewer**, físicamente en la página web de la División de Aguas Residuales.

El período para recibir comentarios públicos está abierto en línea desde el 27 de marzo de 2024 hasta el 10 de abril de 2024.

Para revisar el plan de instalaciones de agua, visite la página web de la División de Aguas Residuales de Idaho Falls en **https://www.idahofallsidaho.gov/379/Wastewater-Sewer**. El plan también está disponible para su revisión en Obras Públicas de Idaho Falls. En el 380 Constitution Way y en la Planta de Tratamiento de Agas Residuales, 4075 Glen Koester Lane, durante horas laborales, de Lunes a Viernes, de 8 a.m. a 5 p.m.

Para preguntas favor de llamar a la division de Aguas Residuales al (208) 612-8108.

Published: March 23, 30, 2024 (PR10553-494025)

Wastewater / Sewer

2024 Wastewater Facility Plan Update

View the 2024 Wastewater Facility Plan HERE

The Wastewater Facility plan comprehensively analyzes the city's wastewater system. The plan, last updated and approved by the City Council in 2010, provides recommendations that help guide decision-making for City leadership and staff regarding the growth and sustainability of the wastewater system.

The plan outlines some information, including planning projections, improvement opportunities for the Wastewater Treatment Plant, project prioritization, and funding suggestions for capital improvement projects.

The City of Idaho Falls invited community members to attend a public meeting held on April 3 from 6 p.m. to 7:30 p.m. inside the City Council Chambers located at 680 Park Avenue.

The public comment period was open online from March 27 to April 10. It's anticipated the plan will go to the Idaho Falls City Council soon. Further information will be released as it is available.

Mission

The mission of the City of Idaho Falls Wastewater Treatment Plant is to treat domestic and industrial wastewater from the surrounding community, polishing it to the highest possible standards before releasing it into the Snake River.

The plant also strives to:

- Protect public health and the environment.
- Stay in compliance with local, state and federal regulations related to wastewater treatment.
- Provide our customers with highest quality wastewater services.

It is our goal to produce and discharge the highest quality effluent possible, to maintain and protect the Snake River and its downstream users through responsible use of the assets we manage.

Periodic Smoke Testing

- Smoke Testing Procedures (PDF)

DIGLINE INC. Call Before You Dig

Contact Us

Carl Utter

Wastewater Superintendent

Email

Phone: (208) 612-8108

More Information

Wastewater / Sewer

Email Wastewater

SIGN-IN SHEET FOR Wastewater Facilities Planning Study

PROJECT NAME: Wastewater Facilities Planning Study

DATE AND TIME: April 3rd, 2024.

THOSE PRESENT:

Name	Title	Organization	Phone
Nick Smith	Project Manager	Stantec	(208)340 8284
Emily Nicholas	Process Engineer	Stantec	(208) 388-4322
Chris Canfield	Asst. PWD	City of Idaho Falls	(208)612-8259
Carl Utter	WW Superintenden	City of I.F.	(208)612-8108
Colter Hollingshead	Project Manager	Keller Associates	(208) 238-2146
Sydney Burtenshaw-Lowe	Project Engineer	Keller Associates	(208)238-2146
Daniel Ramirez	post Register	Reporter	(208)997-1889
Eric Grossarth	PIO	City of IF	208 612 8562
ROLAND ROCHA	SANITARY INSPECTOR	BOWEN COLLINS	208 284 4122
Darin Youngstrom	ELECTRICAL ENGINEER	Bowen COLLINS	208 631 5550
tyler Seamons	Project Engineer	Bowen Collins	801-495-2224
CHRIS FREDERICKSEN	PUBLIC WORKS DIRECTOR	I.F.	208 612 8256
Jim Francis	City Counsil	I.F.	

Stantec

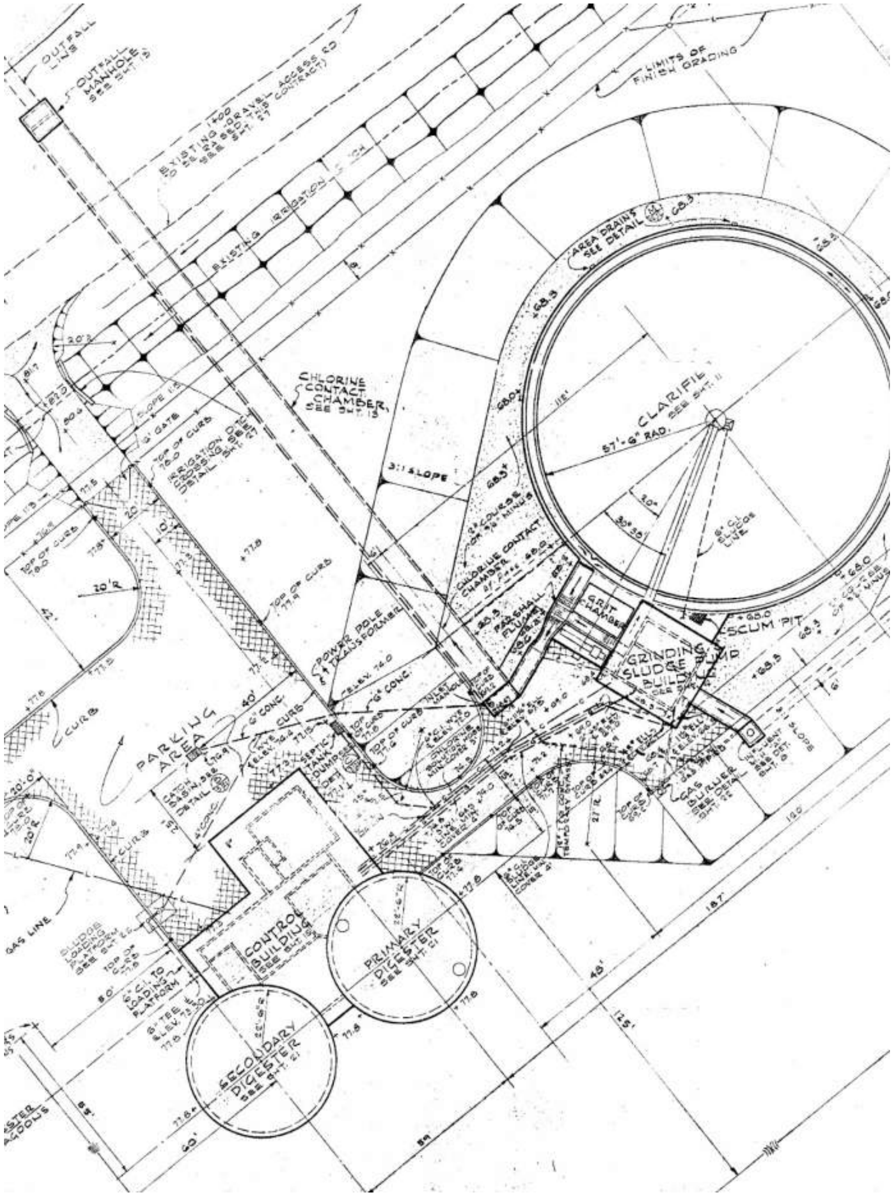
KELLER
ASSOCIATES

IDAHO FALLS
PUBLIC
WORKS

City of Idaho Falls

Open House 04.03.2024

Wastewater Facility Planning Study (WWFPS)



AGENDA

FACILITY PLAN GOALS

PLANNING PROJECTIONS

EXISTING WWTP

PLANT IMPROVEMENT OPPORTUNITIES

RECOMMENDED IMPROVEMENTS

PROJECT PRIORITIZATION

CAPITAL IMPROVEMENTS & FUNDING

FACILITY PLAN GOALS

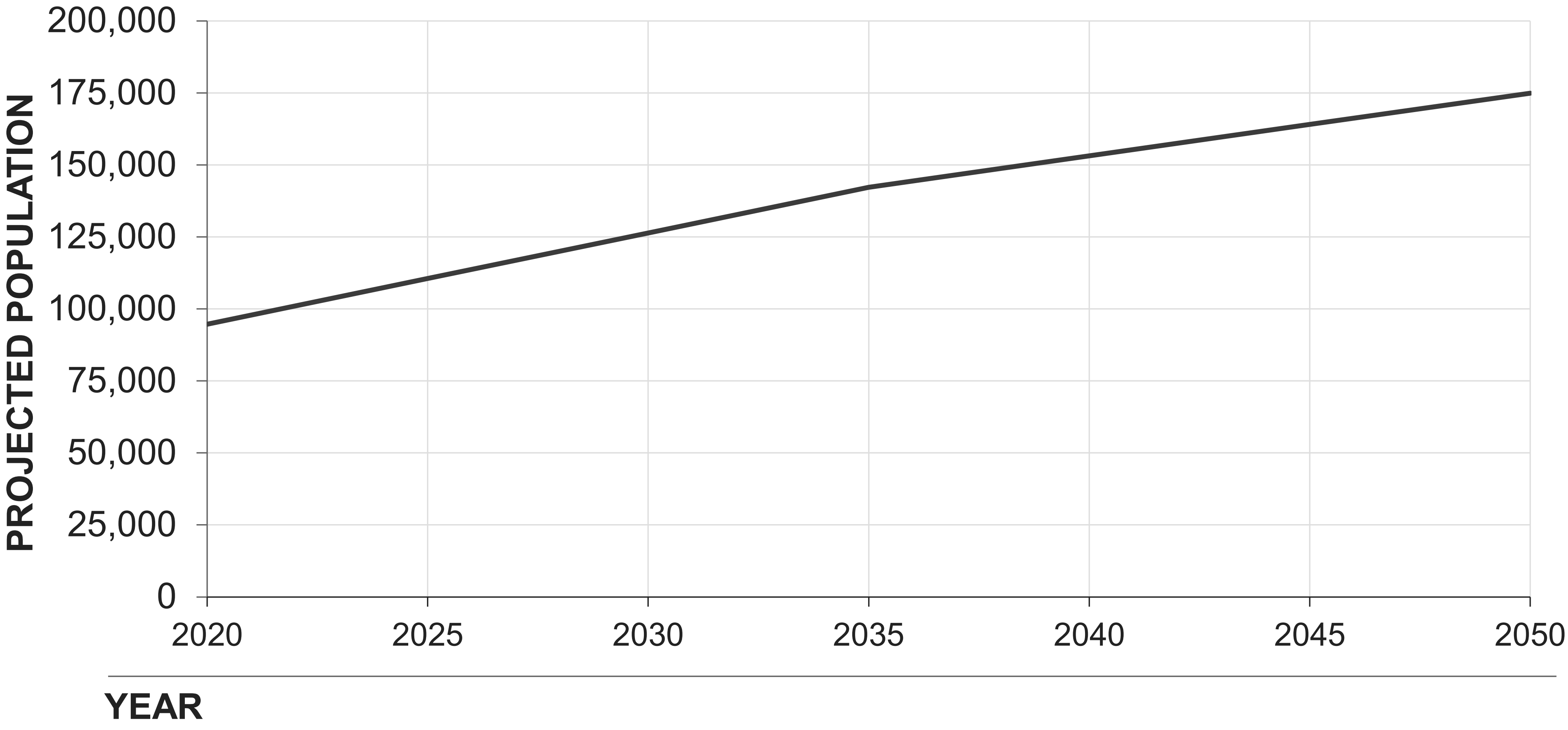
- Satisfy current and future IPDES permits
- Environmentally responsible approach
- 5 to 20-year road map
- Reasoned financial approach

- Create a management tool
- Identify & address current needs
- Industry standard decision-making process

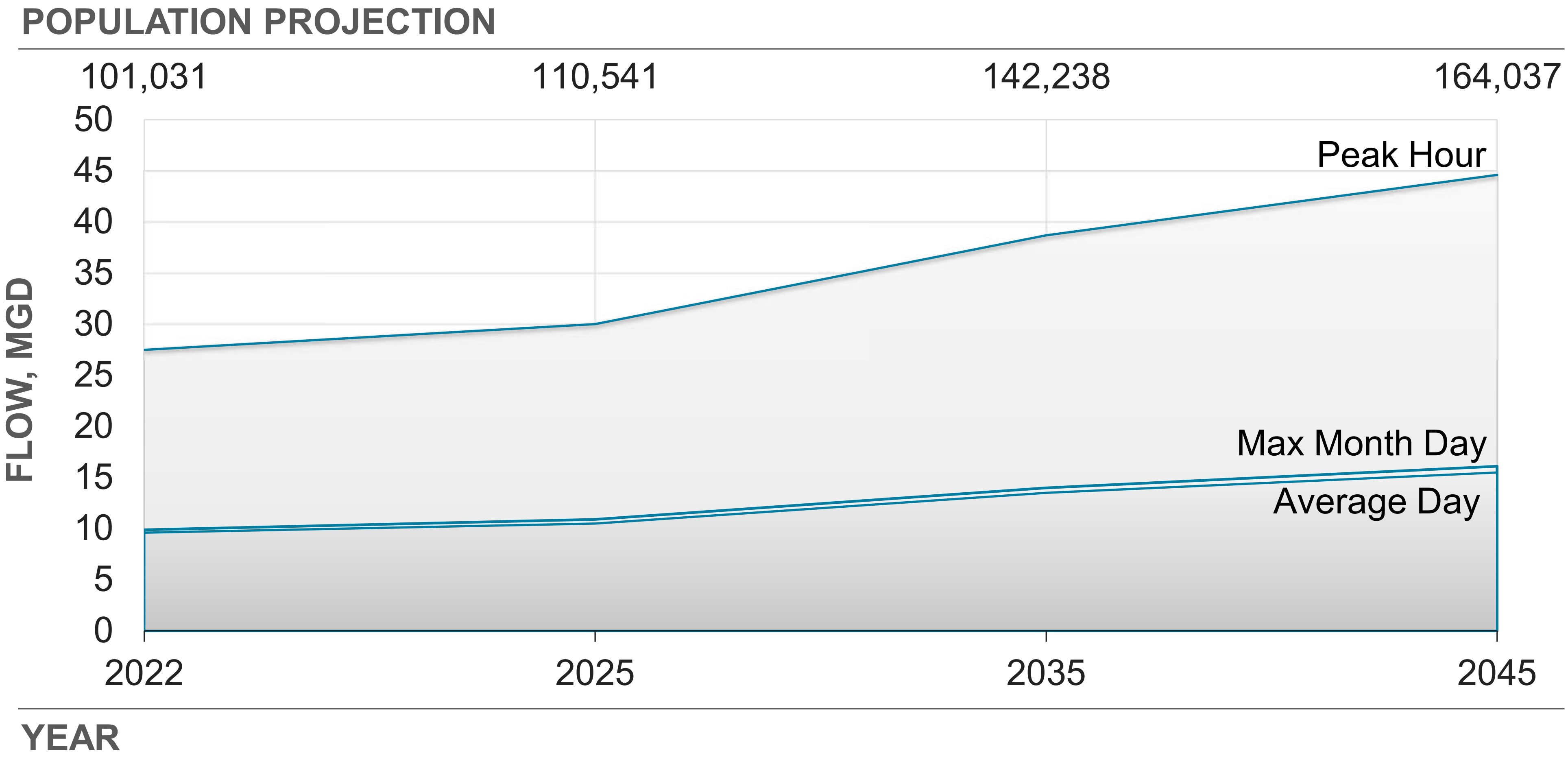
PLANNING PROJECTIONS

- Service Population
- Design Flows

PROJECTED SERVICE POPULATION



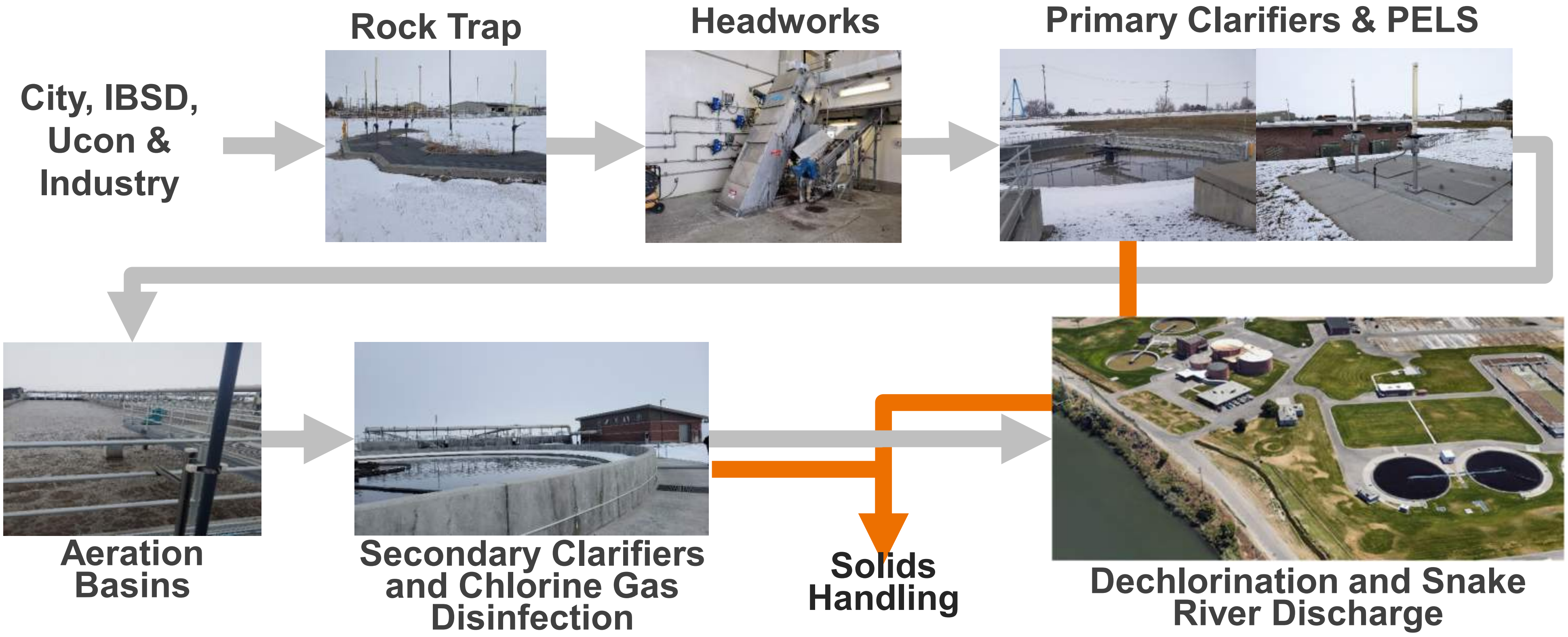
PROJECT DESIGN FLOWS



EXISTING WWTP SYSTEMS

- Liquids
- Solids

EXISTING TREATMENT SYSTEM - LIQUIDS



City, IBSD, Ucon & Industry

Rock Trap

Headworks

Primary Clarifiers & PELS

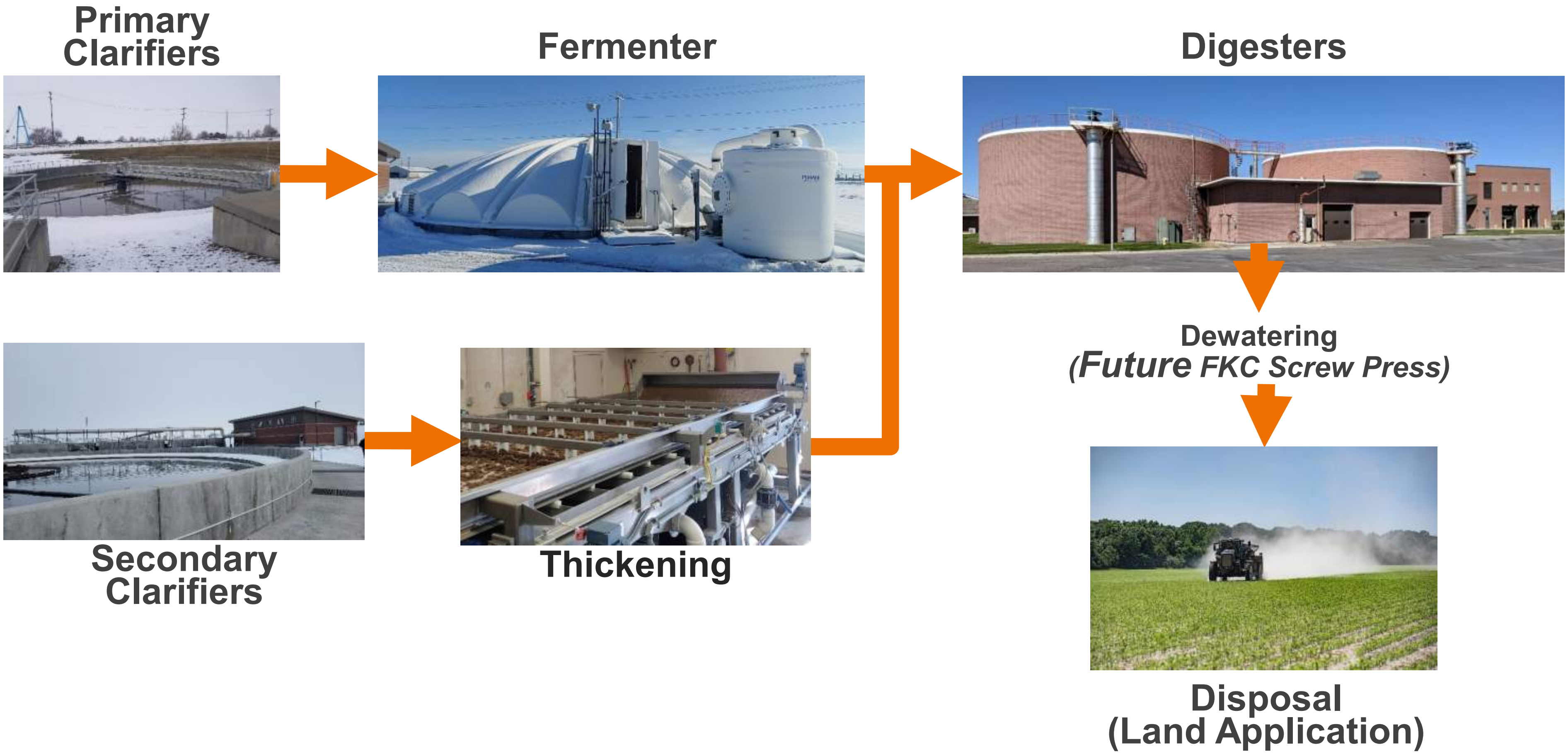
Aeration Basins

Secondary Clarifiers and Chlorine Gas Disinfection

Solids Handling

Dechlorination and Snake River Discharge

EXISTING TREATMENT SYSTEM - SOLIDS



Primary Clarifiers

Fermenter

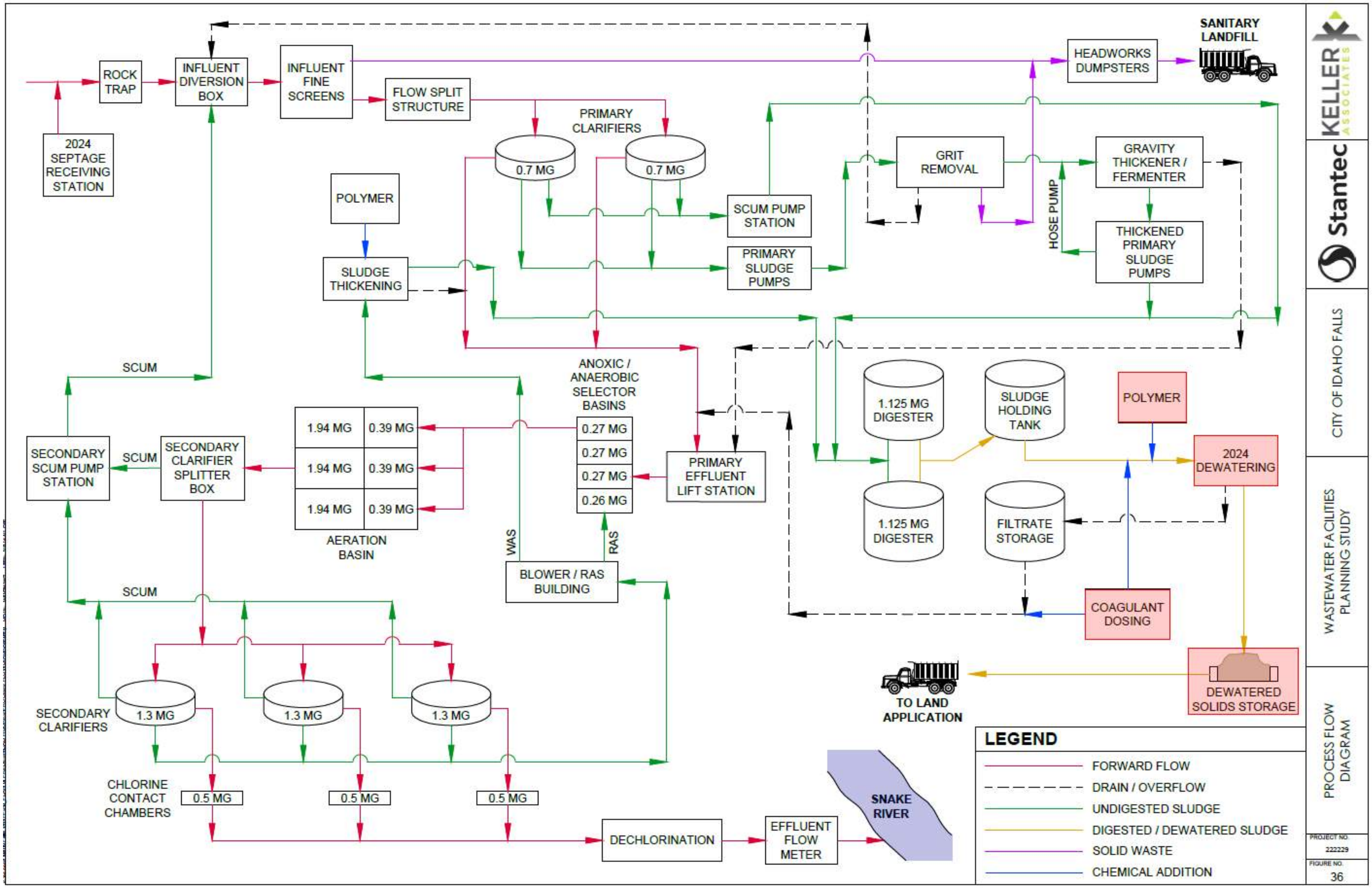
Digesters

Secondary Clarifiers

Thickening

Dewatering
(Future FKC Screw Press)

Disposal
(Land Application)


ROCK TRAP
INFLUENT DIVERSION BOX
INFLUENT FINE SCREENS
FLOW SPLIT STRUCTURE
2024 SEPTAGE RECEIVING STATION
HEADWORKS DUMPSTERS
SANITARY LANDFILL
PRIMARY CLARIFIERS
0.7 MG
0.7 MG
SCUM PUMP STATION
PRIMARY SLUDGE PUMPS
GRIT REMOVAL
GRAVITY THICKENER / FERMENTER
HOSE PUMP
THICKENED PRIMARY SLUDGE PUMPS
POLYMER
SLUDGE THICKENING
SCUM
ANOXIC / ANAEROBIC SELECTOR BASINS
0.27 MG
0.27 MG
0.27 MG
0.26 MG
PRIMARY EFFLUENT LIFT STATION
1.125 MG DIGESTER
1.125 MG DIGESTER
SLUDGE HOLDING TANK
FILTRATE STORAGE
POLYMER
2024 DEWATERING
COAGULANT DOSING
DEWATERED SOLIDS STORAGE
TO LAND APPLICATION
SECONDARY SCUM PUMP STATION
SCUM
SECONDARY CLARIFIER SPLITTER BOX
1.94 MG
0.39 MG
1.94 MG
0.39 MG
1.94 MG
0.39 MG
AERATION BASIN
WAS
RAS
BLOWER / RAS BUILDING
SCUM
SECONDARY CLARIFIERS
1.3 MG
1.3 MG
1.3 MG
CHLORINE CONTACT CHAMBERS
0.5 MG
0.5 MG
0.5 MG
DECHLORINATION
EFFLUENT FLOW METER
SNAKE RIVER
LEGEND
FORWARD FLOW
DRAIN / OVERFLOW
UNDIGESTED SLUDGE
DIGESTED / DEWATERED SLUDGE
SOLID WASTE
CHEMICAL ADDITION
KELLER ASSOCIATES
Stantec
CITY OF IDAHO FALLS
WASTEWATER FACILITIES PLANNING STUDY
PROCESS FLOW DIAGRAM
PROJECT NO.
222229
FIGURE NO.
36

PLANT IMPROVEMENT OPPORTUNITIES

IMPROVEMENT OPPORTUNITIES

Headworks

- Hydraulics (diversion box to screens)
- Influent flow meter needed
- Inadequate screenings capture rate
- Improve screen cleaning
- Improve ventilation (H_2S)

Primary Clarifiers

- Scum trough buildup concerns
- Grit accumulation in primary clarifier splitter box

Biological Process

- Near nitrogen removal capacity
- Improve scum skimmer (installed high)

Disinfection

- Chlorine gas safety
- Deteriorating chlorine contact gates
- Improve dosing control for de-chlorination

IMPROVEMENT OPPORTUNITIES (cont'd.)

Solids

- Unrated electrical components
- Rags in heat exchangers
- Struvite accumulation
- Digesters near capacity
- Limited biosolids application sites

Fermenter Air Quality

- Nuisance odors
- Safety (elevated H2S)
- Corrosion

Collections

- Storm water connections
- Aging infrastructure
- Ongoing lift station maintenance

Other

- Recommend plant-wide arc flash study
- SCADA ability

RECOMMENDED IMPROVEMENTS

- Process Alternatives
- Solids & Disposal
- Collections & Other

RECOMMENDED IMPROVEMENTS

Process:

- Primary Scum Pit Upgrade
- Screening/ Washing Improvements
- Other Headworks Improvements
- 15 Years+: New Headworks Building
- Secondary System Evaluation
- MBBR

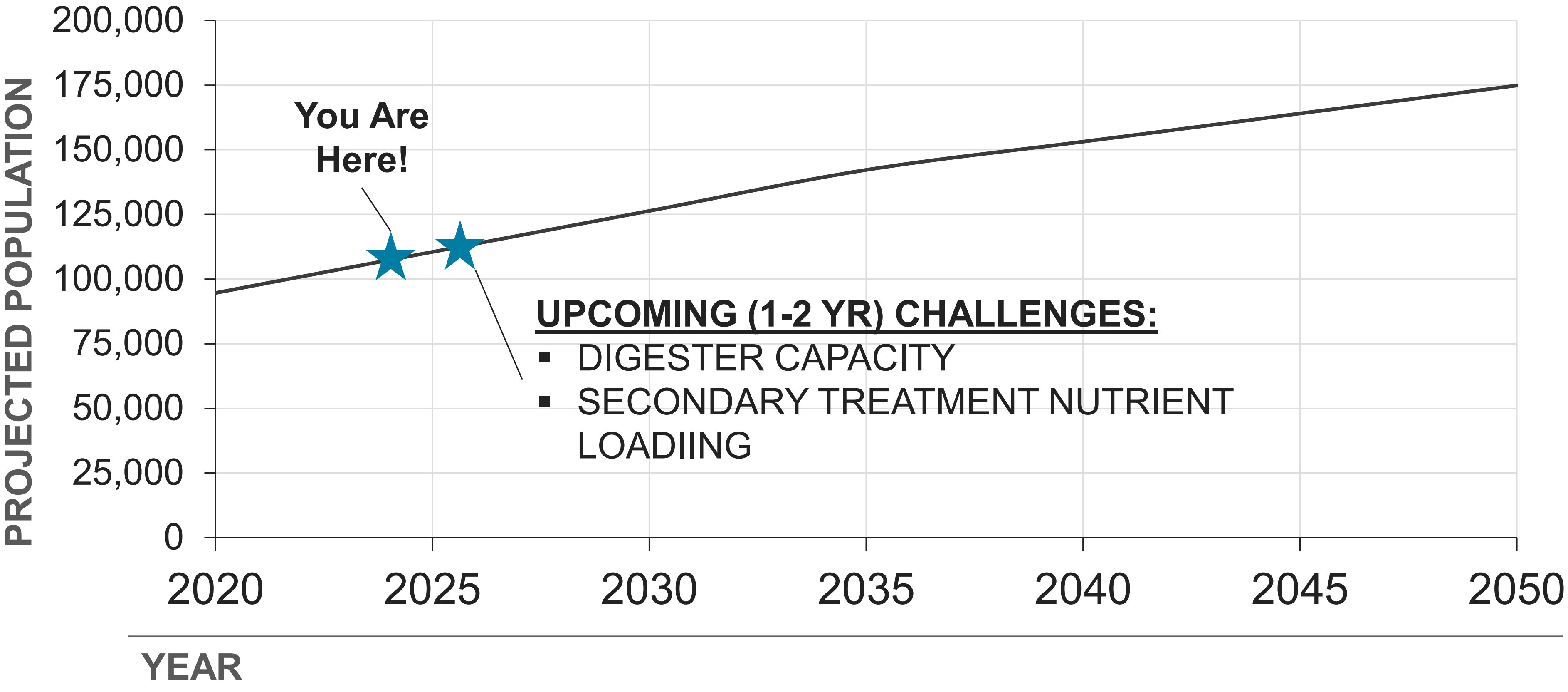
Process (cont.)

- Clean B Installation
- Gas Chlorine Disinfection (to liquid)
- Disinfection Gate Replacement
- Fermenter Air Quality (Air Unit / GAC)
- Digester & Biogas Improvements
- 10 Years+: New Digester

Collections & Other:

- Plant Wide Arc Flash Study
- SCADA Improvements
- Remove Stormwater Connections
- Upgrade Lift Stations
- Collection System Plan and Model
- Future Developer Project Coordination
- Asset Management

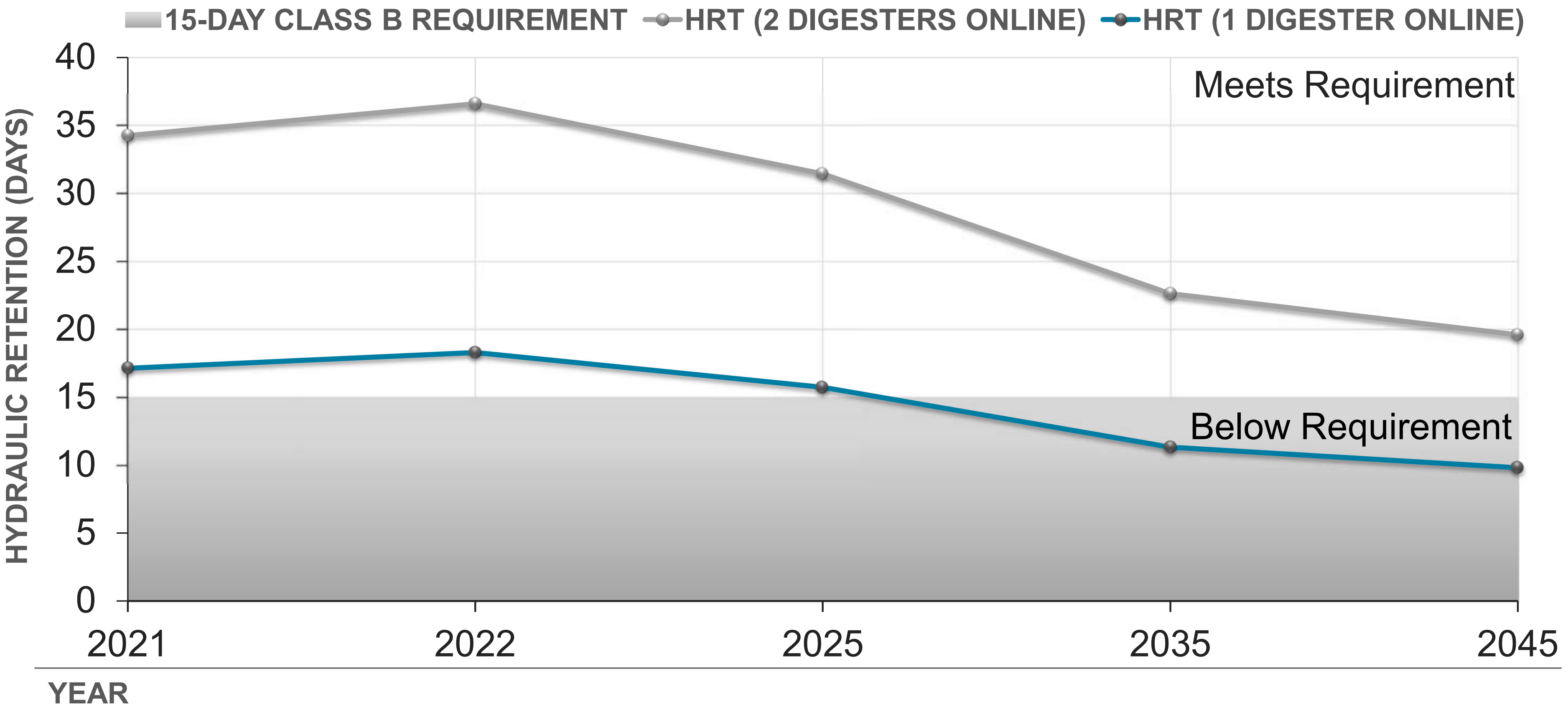
SHORT-TERM CAPACITY CHALLENGES



UPCOMING (1-2 YR) CHALLENGES:

- DIGESTER CAPACITY
- SECONDARY TREATMENT NUTRIENT LOADIING

DIGESTER CAPACITY



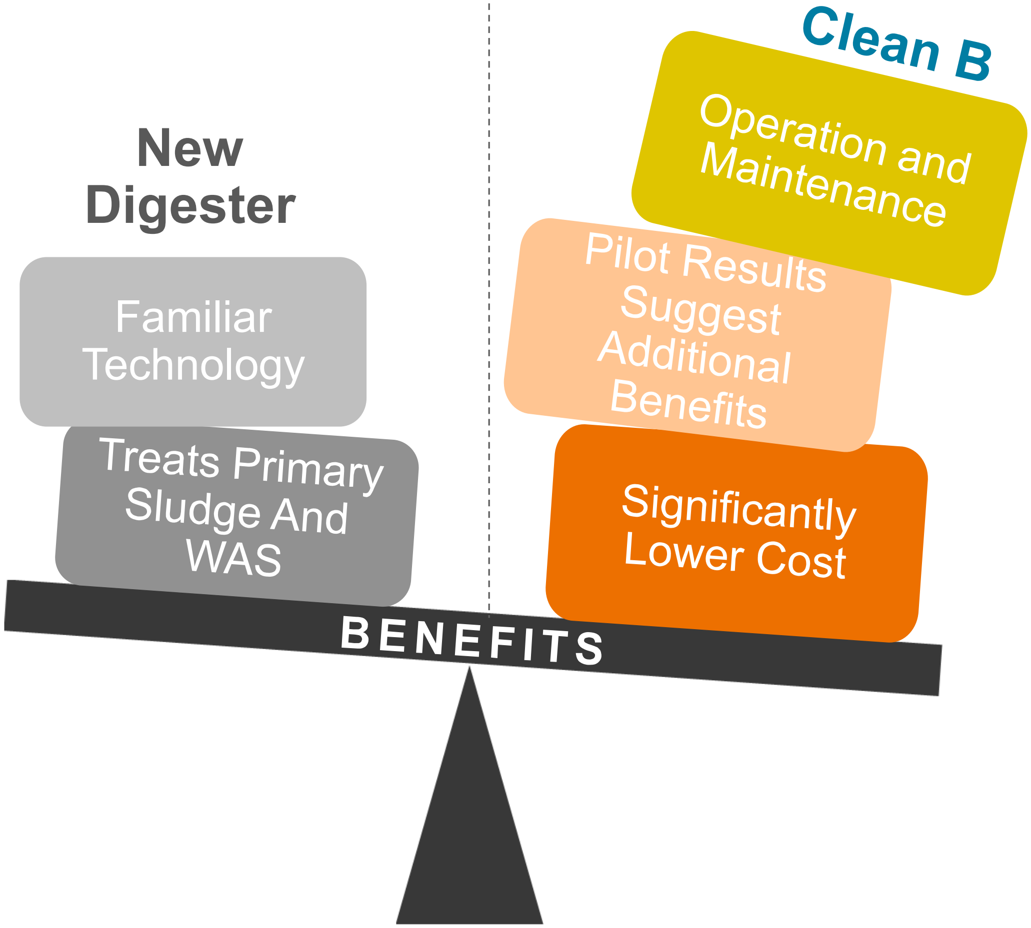
DIGESTER CAPACITY

Existing Digesters

Clean B Pilot

Note: Clean B alternative significantly *delays* the need for a new digester.

RECOMMENDED ALTERNATIVE!



New Digester

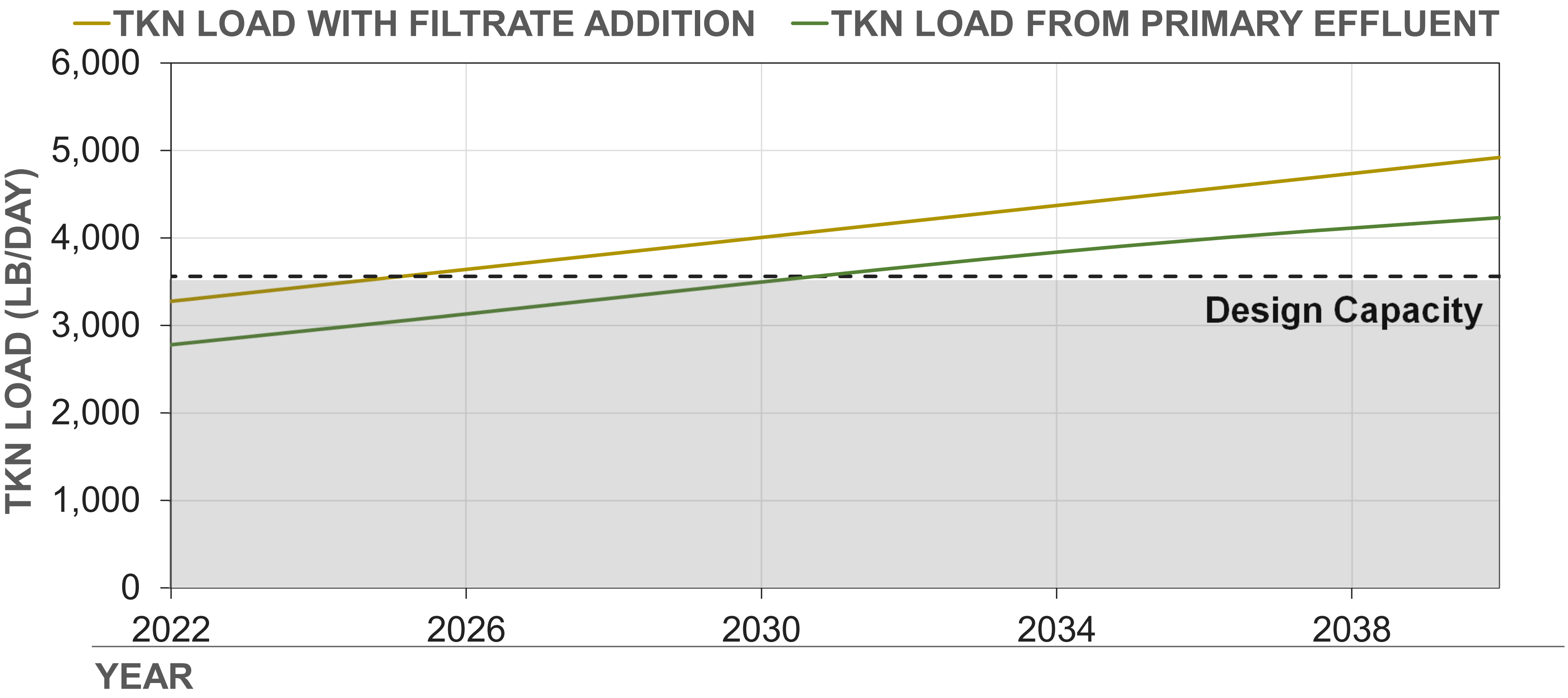
- Familiar Technology
- Treats Primary Sludge And WAS

Clean B

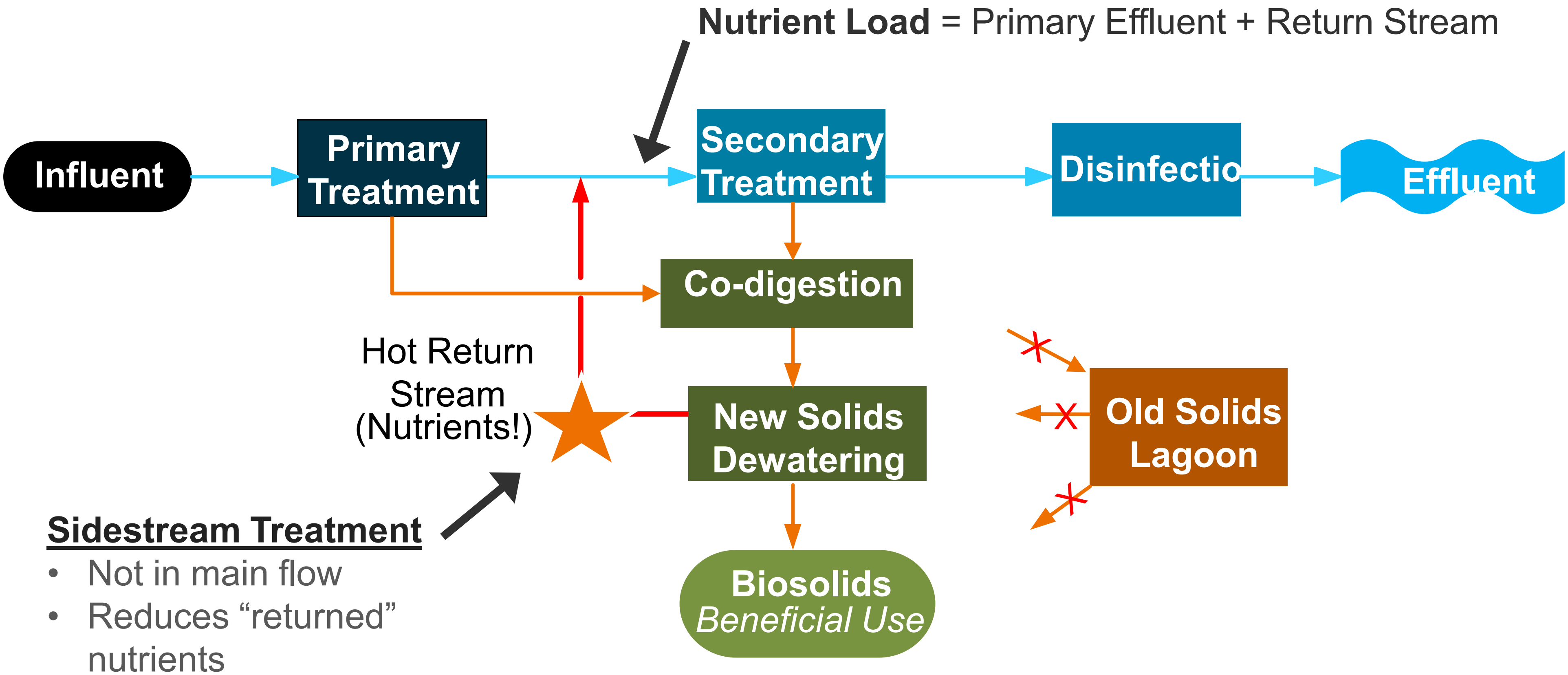
- Operation and Maintenance
- Pilot Results Suggest Additional Benefits
- Significantly Lower Cost

BENEFITS

SECONDARY CAPACITY



SECONDARY TREATMENT NUTRIENT LOADING

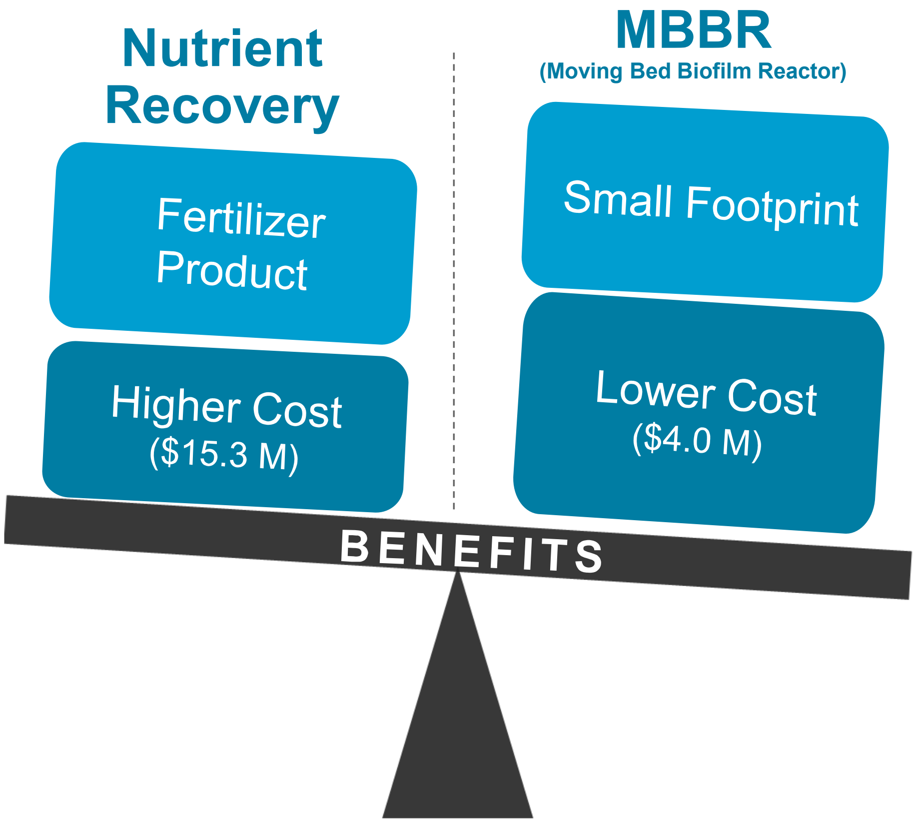


Sidestream Treatment

- Not in main flow
- Reduces "returned" nutrients

AERATION BASIN NUTRIENT LOADING

These alternatives *delay* the need for secondary improvements.



Nutrient Recovery

Fertilizer Product

Higher Cost ($15.3 M)

MBBR
(Moving Bed Biofilm Reactor)

Small Footprint

Lower Cost ($4.0 M)

BENEFITS

Recommendations:

1. Updated Secondary Capacity Eval.
    - Incorporate Dewatering Project impacts
    - Clean B considerations

2. Pending outcome of Secondary Eval, MBBR maybe most economical

PROJECT PRIORITIZATION

- Regulatory / Environment
- Operations Efficiency
- Capacity / Redundancy
- Public Involvement / Acceptance
- Health and Safety

DRAFT CAPITAL IMPROVEMENTS PLAN AND FUNDING

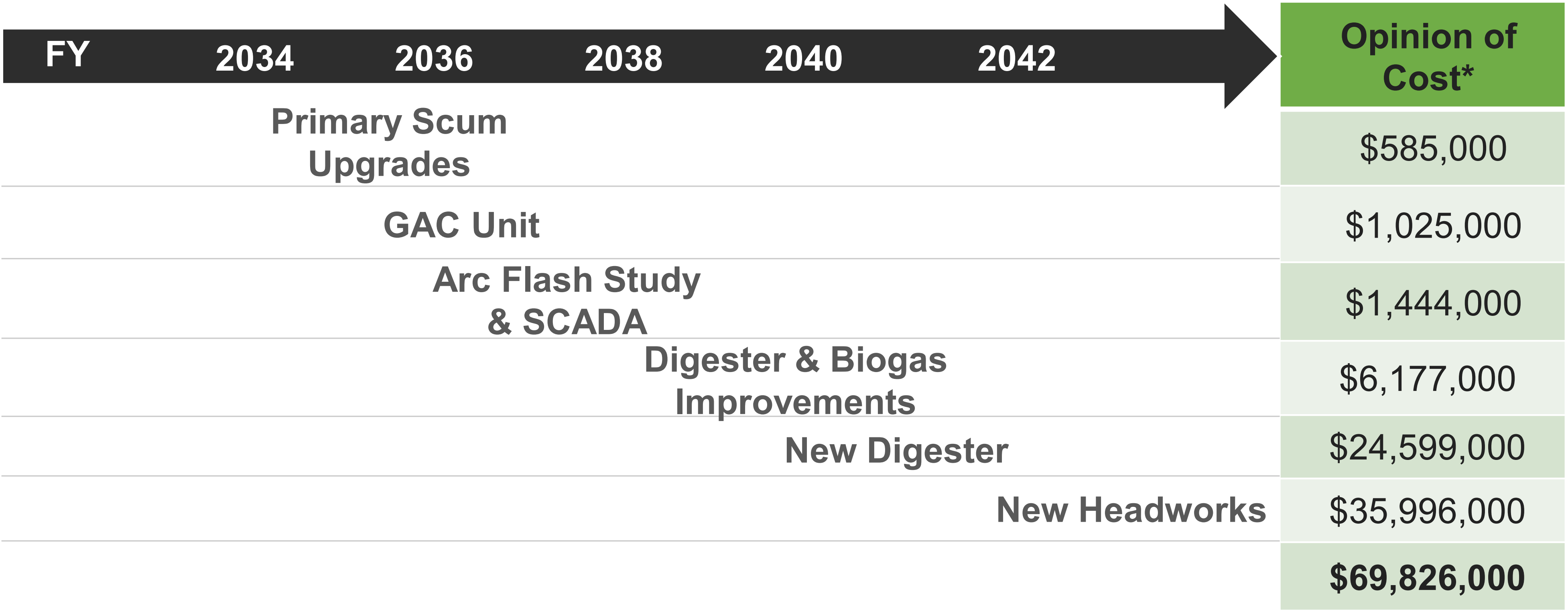
- 2024-2034 Improvements: Priority 1
- Capital Improvements Plan (CIP)

2024-2034 IMPROVEMENTS: PRIORITY 1

	Opinion of Cost*
Secondary System Evaluation	$212,000
Clean B Installation	$3,844,000
Liquid Chlorine Disinfection	$920,000
Screening & Washer/Compactors	$5,172,000
Headworks	$1,974,000
MBBR	$5,625,000
Makeup Air & Corrosion	$309,000
	$18,057,000

**Cost estimates are presented based off a 3% capital cost annual escalation factor and are based on the perception of current conditions at the project location. The estimate reflects an opinion of probable costs at this time and is subject to change as the project design matures. The project team has no control over variances in the cost of labor, materials, equipment, services provided by others, market conditions, or bidding strategies. The project team cannot and does not warrant nor guarantee that bids or actual costs will not very from costs presented herein.*

2034-2043 IMPROVEMENTS: PRIORITY 2



FY 2034 2036 2038 2040 2042

	Opinion of Cost*
Primary Scum Upgrades	$585,000
GAC Unit	$1,025,000
Arc Flash Study & SCADA	$1,444,000
Digester & Biogas Improvements	$6,177,000
New Digester	$24,599,000
New Headworks	$35,996,000
	$69,826,000

**Cost estimates are presented based off a 3% capital cost annual escalation factor and are based on the perception of current conditions at the project location. The estimate reflects an opinion of probable costs at this time and is subject to change as the project design matures. The project team has no control over variances in the cost of labor, materials, equipment, services provided by others, market conditions, or bidding strategies. The project team cannot and does not warrant nor guarantee that bids or actual costs will not very from costs presented herein.*

CAPITAL IMPROVEMENT PLAN (CIP)

PRIORITY 1 (2024 – 2034)

$18,057,000

- Secondary evaluation
- Clean B system
- MBBR
- Liquid chlorine disinfection & gate
- Screening / washer compactor
- Headworks other
- Fermenter makeup air unit & corrosion

PRIORITY 2 (2035 – 2043)

$69,826,000

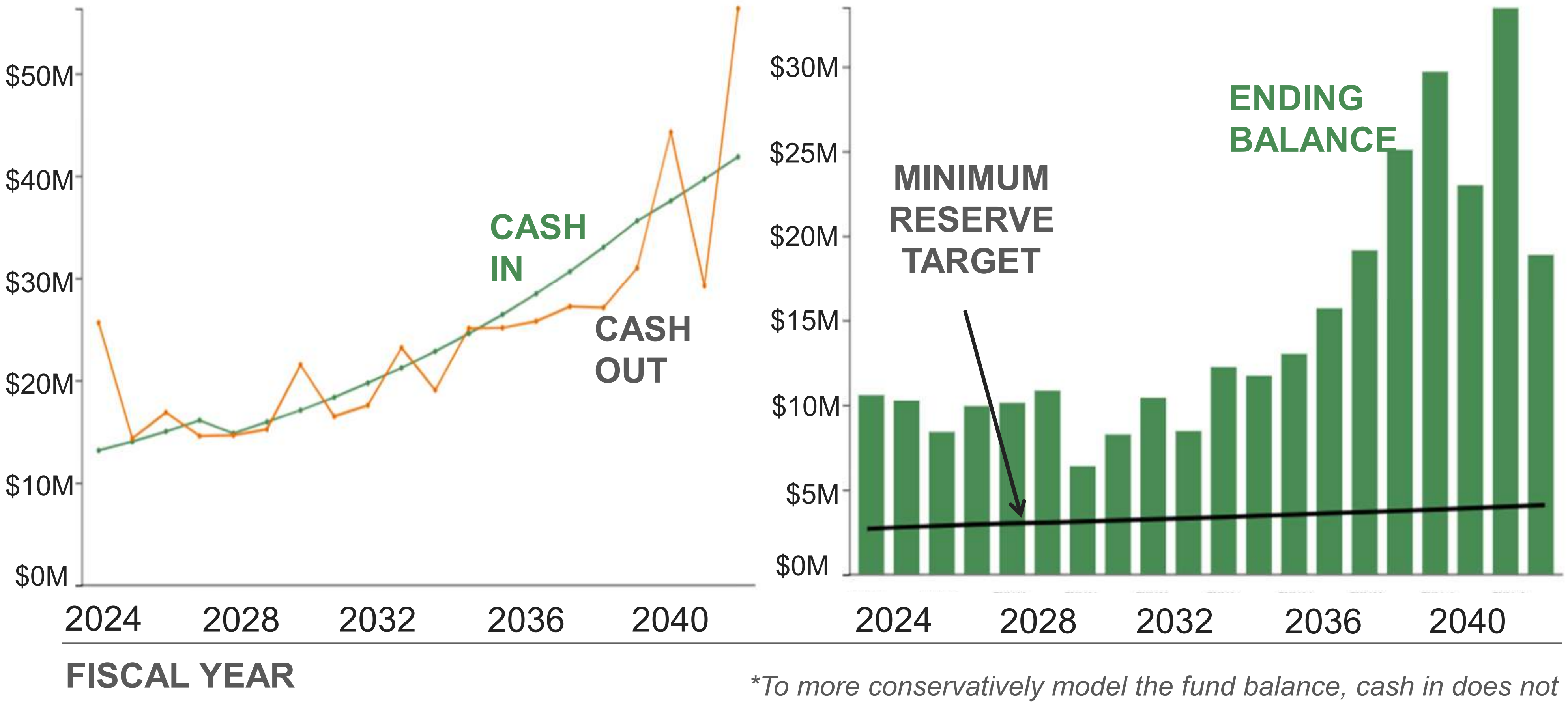
- Primary scum pit upgrades
- New digester
- GAC adsorption unit
- New headworks
- Arc flash study
- Digester and biogas improvements

ONGOING (ANNUAL AVERAGE)

$6,654,000

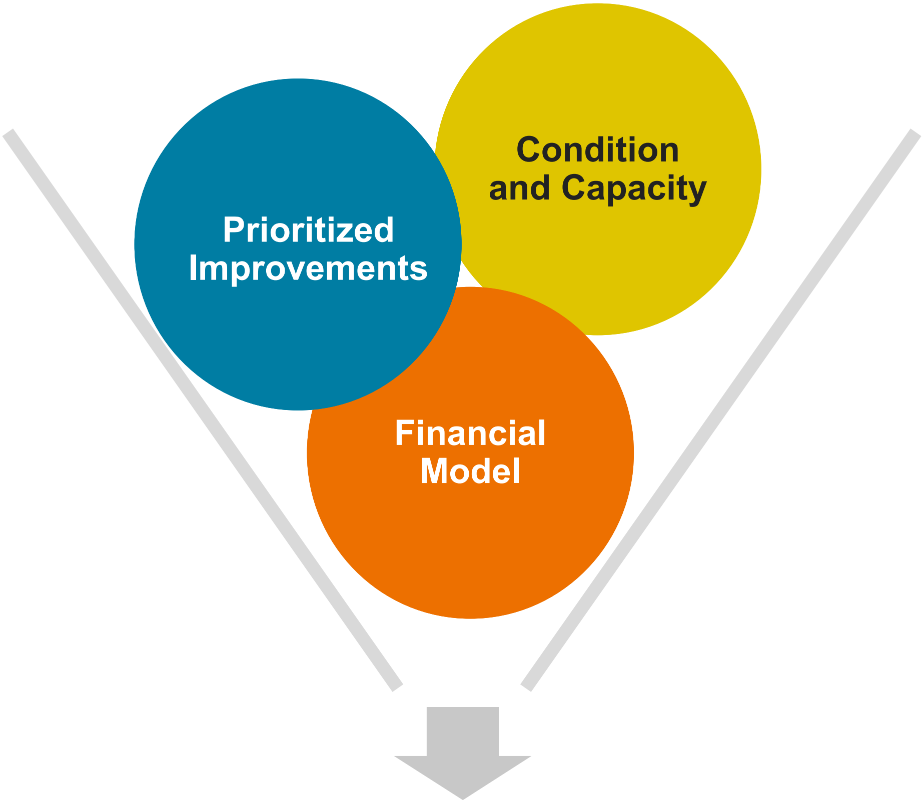
- Remove stormwater connections
- Facility plan update
- Upgrade 1% of the collection system
- Collection system master plan
- Lift station upgrades (3 per year)
- Facility asset management
- Biosolids handling trucks
- Developer participation

FUND BALANCE (annual 5% increase)



**To more conservatively model the fund balance, cash in does not include funds from IBSD or UCON past 2028.*

TAKEAWAYS



Condition and Capacity

Prioritized Improvements

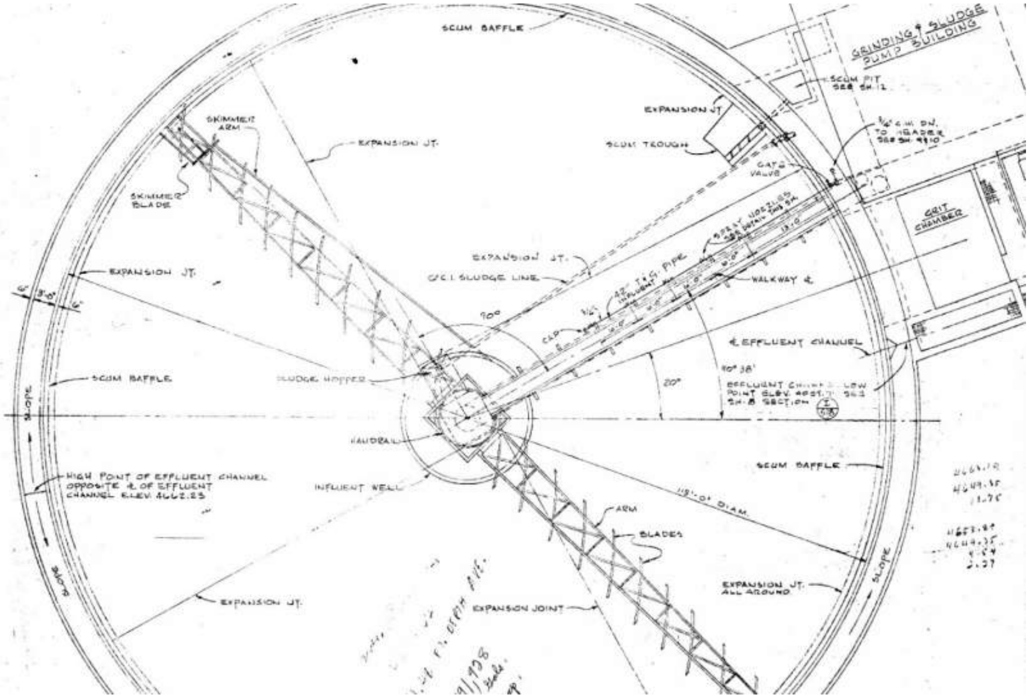
Financial Model

FACILITY PLAN

QUESTIONS?

STANTEC.COM
208-345-5865 | Boise, ID

KELLERASSOCIATES.COM
208-238-2146 | Pocatello, ID



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  chollingshead@kellerassociates.com
- **Jared Richens, PE**
  jrichens@kellerassociates.com

Idaho Falls Public Works

ENVIRONMENTAL SCREENING TABLE

Description	No Action Alternative	Remove Storm Water Connections	Upgrade 3 Lift Stations per Year and Backup Generation	Upgrade at least 1% of Collection System	Procure Biosolids Handling Trucks	Facility Plan Update	Collection System Master Plan & Model Update	Developer Participation	Facility Asset Management	Secondary System Evaluation	Clean B System	Liquid Chlorine Disinfection and Gate Replacement	Screening/ Washer Compactor Improvements	Headworks Improvements	Moving Bed Biofilm Reactor (MBBR)	Makeup Air Unit and Corrosion Improvements
Physical Aspects	No Adverse Impact	Some Rock excavation may be necessary	Some Rock excavation may be necessary	Some Rock excavation may be necessary	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	Some Rock excavation may be necessary	No Impact	No Impact	No Impact	Some Rock excavation may be necessary	Some Rock excavation may be necessary
Land Use	No Adverse Impact	No impact due to public right of way	No impact due to site already being used	No impact due to site already being used	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	Minimal Impact due to location of building already, land has previously been disturbed	Minimal Impact due to change occurring in current site	No impact due to site already being used	No impact due to site already being used	Minimal Impact due to location of building already, land has previously been disturbed	No impact due to site already being used
Wetlands and Water Quality	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	No impact to wetlands but would improve encroaching nutrient limits	No Impact	No Impact	No Impact	No impact to wetlands but would improve encroaching nutrient limits	No Impact
Flora and Fauna	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Air Quality & Noise	No Adverse Impact	Temporary Noise & Dust During Construction	Temporary Noise & Dust During Construction	Temporary Noise & Dust During Construction	Only slight increase when in use but not more than what current trucks make	No Impact	No Impact	Unknown. Dependent on Developer	Slight increase during maintenance phase	No Impact	Slight Noise increase with new process. Potential air quality odor decrease	Slight increase during construction	Slight Increase during construction. No noise louder than current screening	Slight Increase during construction.	Slight Noise increase with new process	Slight Noise increase with new process, but air odor quality decrease
Energy	No Adverse Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Unknown. Dependent on Developer	Improved energy use	No Impact	Slight energy increase for new process	Slight energy increase	Slight energy improvement with new screen	Improved Efficiency	Slight energy increase for new process	Slight energy increase for new process
Public Health	Potential Contamination as Maintenance is Deferred	Positive Impact due to reduced infiltration and unnecessary process treatment of excess water at WWTP	Keeps maintenance to prevent public flooding	Keeps maintenance updated to prevent public flooding	No Impact	No Impact	Improves	Unknown. Dependent on Developer	No Impact	Determines upcoming nutrient loads to meet permitting requirements	Decreases the odors and improves was sludge for biosolid permitting before dewatering	Removes possible public health disaster with chlorine gas	Improves all processes by decreasing ragging	No Impact	Lowers upcoming nutrient loads to meet permitting requirements	Decreases H2S exposure

Memorandum

File #: 24-204 **City Council Meeting**

FROM: Chris H Fredericksen, Public Works Director
DATE: Wednesday, April 17, 2024
DEPARTMENT: Public Works

Subject
Bid Rejection - Water Service Line Replacement (1st Street & Lincoln Road)

Council Action Desired
☐ Ordinance ☐ Resolution ☐ Public Hearing
☒ Other Action (Approval, Authorization, Ratification, etc.)
Reject the single bid received from Knife River Corporation for the Water Service Line Replacement (1st Street & Lincoln Road), find that these services can be best procured on the open market, and direct staff to solicit the work on the open market (or take other action deemed appropriate).

Description, Background Information & Purpose
On Tuesday, April 16, 2024, bids were received and opened for the Water Service Line Replacement (1st Street & Lincoln Road) project. A tabulation of bid results is attached.

The only bid received was for $1,201,894.50 which is 252% of the engineer’s estimate. Public Works staff reviewed the bid and concluded that awarding this contract is not in the best interest of the city.

Alignment with City & Department Planning Objectives

☒ ☐ ☐ ☐ ☐ ☐ ☐ ☐

This action supports the community-oriented result of good governance by rejecting a bid for this project that greatly exceeds the engineer’s estimate.

Interdepartmental Coordination
N/A

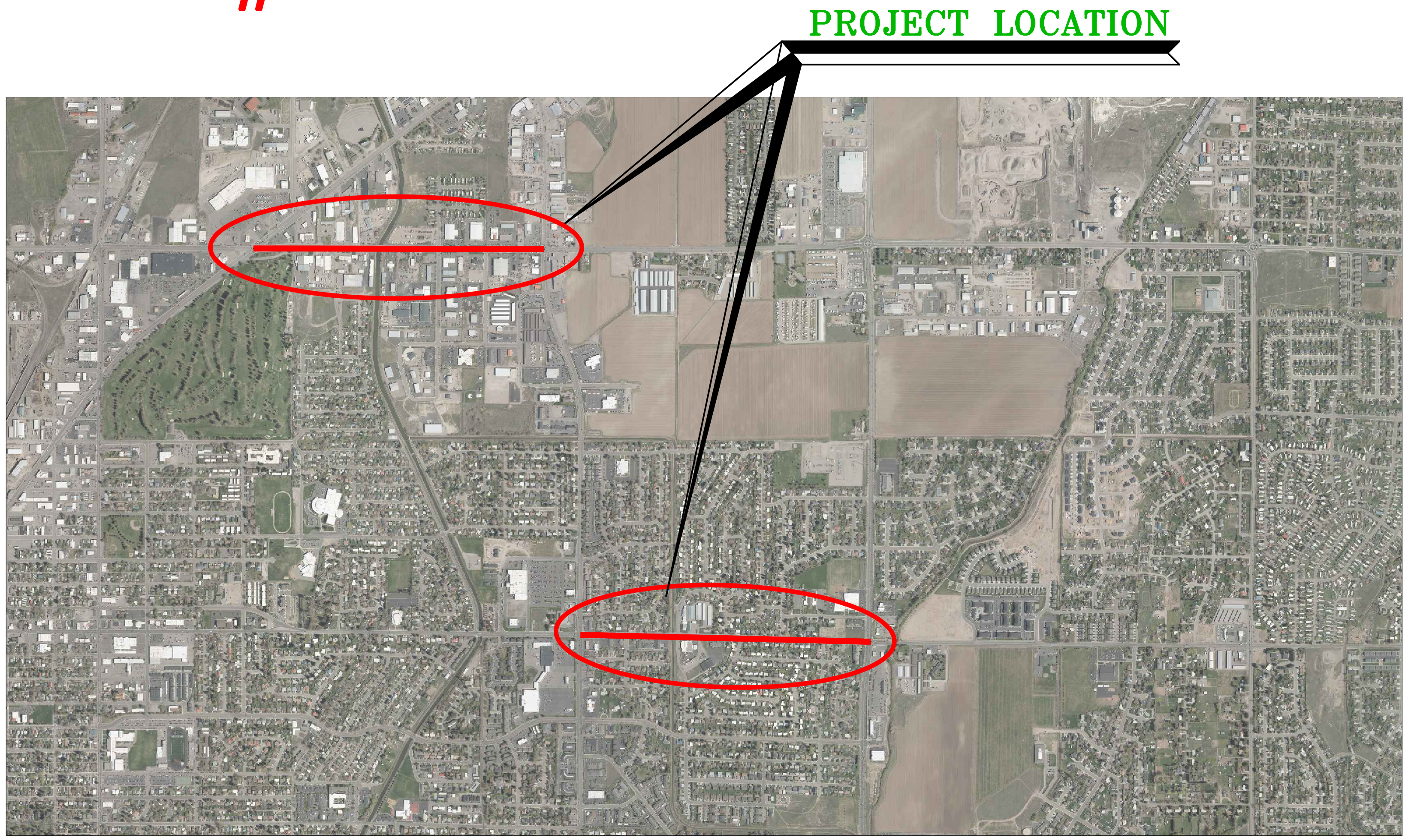
Fiscal Impact
N/A

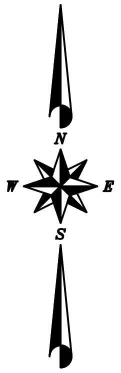
Legal Review

The Legal Department reviewed the bid process and concurs that the Council action desired is compliant with Idaho State Statute.

0-00-00-0-WTR-2024-18
2024-021

WATER SERVICE LINE REPLACEMENT
1ST ST AND LINCOLN RD
PROJECT # 0-00-00-0-WTR-2024-18





MAYOR

REBECCA L. NOAH CASPER

CITY COUNCIL

MICHELLE ZIEL-DINGMAN	JIM FRANCIS
LISA BURTENSHAW	JOHN B. RADFORD
KIRK LARSEN	JIM FREEMAN

ENGINEERING DIVISION

PUBLIC WORKS DIRECTOR
CHRIS H FREDERICKSEN, P.E.

CITY ENGINEER
KENT J. FUGAL, P.E., PTOE

2024

9247
KENT J. FUGAL

AS BUILT DATE / BY:
_____ / _____

SCALE SHOWN IS FOR SHEET 11 x 17 ONLY

ENGINEERING DIVISION

IDAHO FALLS PUBLIC WORKS

WATER SERVICE LINE REPLACEMENTS
1ST AND LINCOLN

CHECKED BY:	DESIGN TECH:	DATE PLOTTED:	SHEET NO.
CW	ME	3/29/2024	1 OF 16

F:\Projects\WTR\WTR-2024-18\Dsg\WTR-2024-18-Titlepage.dwg

City of Idaho Falls

Engineering Division

Engineer's Estimate

Project: WATER SERVICE LINE REPLACEMENT (1st Street & Lincoln Road) **Number:** WTR-2024-18
Submitted: Kent Fugal **Date:** April 15, 2024

Item Number	Reference Number	Description	Estimated Quantity	Unit	Engineer's Estimate		Knife River	
					Unit Price	Total Amount	Unit Price	Total Amount
2.01	201.4.1.D.1	Removal of Concrete	154	SY	$20.00	$3,080.00	$75.00	$11,550.00
2.02	201.4.1.E.1	Removal of Curb and Gutter	1190	LF	$15.00	$17,850.00	$8.50	$10,115.00
		DIVISION 400 - WATER						
4.01	401.4.1.A.1.a	Water Main Pipe – Size 4"	24	LF	$40.00	$960.00	$165.00	$3,960.00
4.02	401.4.1.A.1.b	Water Main Pipe – Size 8"	71	LF	$60.00	$4,260.00	$142.00	$10,082.00
4.03	402.4.1.A.1.b	Valve – Size 8" - Type Gate	2	EA	$1,000.00	$2,000.00	$1,250.00	$2,500.00
4.04	402.4.1.A.1.c	Valve – Size 12" - Type Butterfly	3	EA	$1,500.00	$4,500.00	$1,650.00	$4,950.00
4.05	403.4.1.A.1	Hydrant	2	EA	$3,000.00	$6,000.00	$5,790.00	$11,580.00
4.06	404.4.1.A.1.a	Water Service Connection, Size 1"	11	EA	$3,400.00	$37,400.00	$6,000.00	$66,000.00
4.07	404.4.1.A.1.c	Water Service Connection, Size 2"	2	EA	$4,000.00	$8,000.00	$6,000.00	$12,000.00
4.08	404.4.1.B.1.a	Replace Water Service, Size 1"	22	EA	$3,600.00	$79,200.00	$6,350.00	$139,700.00
4.09	404.4.1.B.1.b	Replace Water Service, Size 1.5"	22	EA	$3,900.00	$85,800.00	$6,350.00	$139,700.00
4.1	404.4.1.B.1.c	Replace Water Service, Size 2"	8	EA	$4,300.00	$34,400.00	$6,400.00	$51,200.00
		DIVISION 700 - CONCRETE						
7.01	706.4.1.A.7.a	Curb and Gutter, Type Standard	1190	LF	$65.00	$77,350.00	$83.00	$98,770.00
7.02	706.4.1.E.1.a	Concrete Sidewalks, thickness 4"	128	SY	$140.00	$17,920.00	$210.00	$26,880.00
7.03	706.4.1.E.1.b	Concrete Sidewalks, thickness 5"	26	SY	$180.00	$4,680.00	$181.00	$4,706.00
		DIVISION 2000 - MISCELLANEOUS						
20.01	2010.4.1.A.1	Mobilization	1	LS	$75,000.00	$75,000.00	$571,551.00	$571,551.00
		SPECIAL PROVISIONS						
SP-1	S0480.a	Meter Box 1"	4	EA	$1,200.00	$4,800.00	$3,175.00	$12,700.00
SP-2	S0480.c	Meter Box 2"	1	EA	$1,500.00	$1,500.00	$3,200.00	$3,200.00
SP-3	S0404	Fire Hydrant Only	1	EA	$2,000.00	$2,000.00	$3,950.00	$3,950.00
SP-4	S0406	Water Main Access Manhole	2	EA	$5,000.00	$10,000.00	$8,400.00	$16,800.00
		TOTAL				**$476,700.00**		**$1,201,894.00**

Memorandum

File #: 24-205 **City Council Meeting**

FROM: Chris H Fredericksen, Public Works Director
DATE: Wednesday, April 17, 2024
DEPARTMENT: Public Works

Subject

State Local Agreement and Resolution with the Idaho Transportation Department (ITD) for the Elm Street - Yellowstone to South Boulevard Project.

Council Action Desired

☐ Ordinance ☒ Resolution ☐ Public Hearing
☒ Other Action (Approval, Authorization, Ratification, etc.)

Approve the State/Local Agreement and Resolution with ITD for the Elm Street-Yellowstone to South Boulevard Project- and authorize the Mayor and City Clerk to sign the documents (or take other action deemed appropriate).

Description, Background Information & Purpose

Attached for your consideration is a State/Local Agreement for development and a Resolution with ITD for the Elm Street -Yellowstone to South Boulevard project. The proposed project involves reconstructing Elm Street between Yellowstone and South Boulevard.

Alignment with City & Department Planning Objectives

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☒

This agreement supports the community-oriented results of reliable public infrastructure and transportation by reconstructing Elm to eliminate adverse roadway crowning.

Interdepartmental Coordination

Project reviews will be conducted with all necessary city departments to ensure coordination of project activities.

Fiscal Impact

The total cost of the project is anticipated to be $1,285,940. The agreement requires city financial contribution toward the project with a match rate of 7.34% for an estimated total of $94,388. The city is required to make an initial deposit of $5,000 prior to the commencement of design activities.

Legal Review
The Agreement has been reviewed by the City Attorney.

2024-022

STATE/LOCAL AGREEMENT
(PROJECT DEVELOPMENT)
PROJECT NO. A023(023)
ELM ST; YELLOWSTONE TO SOUTH BLVD
BONNEVILLE COUNTY
KEY NO. 23023

PARTIES

THIS AGREEMENT is made and entered into this _________ day of _________________, _______, by and between the IDAHO TRANSPORTATION BOARD, by and through the **IDAHO TRANSPORTATION DEPARTMENT**, hereafter called the State, and **CITY OF IDAHO FALLS**, acting by and through its Board of Commissioners, hereafter called the Sponsor.

PURPOSE

The Sponsor has requested that the State include in its Idaho Transportation Investment Program Federal-Aid Project No. A023(023), described as Elm St; Yellowstone to South Blvd. Project development is to be performed by Sponsor's staff/Consultant Engineers. The purpose of this Agreement is to set out the terms and conditions to accomplish the project development phase of this project.

NOTE: Securing the services of a consultant for project development services must follow the process outlined in the Idaho Transportation Department Guidelines for Local Public Agency Projects.

Since certain functions under this Agreement are to be performed by the State, requiring the expenditure of funds, and since the State can only pay for work associated with the State Highway System, the Sponsor is fully responsible for all costs incurred by the State related to the project.

Authority for this Agreement is established by Section 40-317 of the Idaho Code.

The Parties agree as follows:

SECTION I. GENERAL

1. It is necessary to develop construction plans and specifications in order that federal participation may be obtained in the construction costs of the project. Federal-aid for project development and right of way is available on this project.

2. Federal participation in the project is at the rate of 92.66%; local participation is 7.34% (percent). Scheduled funding for this project is listed in the approved Idaho Transportation Investment Program, and subsequent revisions. Current estimated funding is as follows:

   a. Project Development - $162,000
      PE-($5,000) PL-($36,000) PC-($121,000)
   b. Right-of-Way (RW) - $0
   c. Utilities - $0
   d. Construction (CN)-$902,940
   e. Construction Engineering- $221,000
      CE-($5,000) CL-($36,000) CC-($180,000)
   f. Total Estimated Project Costs - $1,285,940

3. The Sponsor’s match for this project will be provided in cash in the amount of 7.34% (percent) of the entire project (current estimate $94,388).

4. Funds owed by the Sponsor shall be remitted to the State through the ITD payment portal at: *https://apps.itd.idaho.gov/PayITD* .

5. This project shall be designed to State Standards as defined in the current version of the Idaho Transportation Department’s Design Manual, or as subsequently revised. The current version of the Design Manual can be viewed at the following web site: http://itd.idaho.gov/manuals/ManualsOnline.htm.

6. All information, regulatory and warning signs, pavement or other markings, and traffic signals required and warranted will be developed as a part of the plans, regardless of whether the work is done as a portion of the contract or by the Sponsor’s forces.

7. If the project is terminated by the Sponsor prior to completion, the Sponsor shall repay to the State all federal funds received for the project, and shall be liable to the State for any un-reimbursed incidental expenses as provided for in Section II, Paragraph 1 of this Agreement.

8. Sufficient Appropriation. It is understood and agreed that the State and the Sponsor are governmental agencies, and this Agreement shall in no way be construed so as to bind or obligate the State or the Sponsor beyond the term of any particular appropriation of funds by the Federal Government or the State Legislature as may exist from time to time. The State and the Sponsor reserve the right to terminate this Agreement if, in its sole judgment, the Federal Government or the legislature of the State of Idaho fails, neglects or refuses to appropriate sufficient funds as may be required for the State to continue payments. Any such termination shall take effect immediately upon notice and be otherwise effective as provided in this Agreement.

SECTION II. That the State shall:

1. Provide the following services incidental to the project development:

   a. Assist Sponsor in the selection of a Consulting Engineer and negotiations as needed, and furnish the Agreement for Engineering Services and any supplements thereto, to be used between the Sponsor and Consultant Engineers on this project.

   b. Review Preliminary Environmental Evaluation and recommend other appropriate environmental documentation.

   c. Furnish to the engineers copies of materials test reports and other data applying to the project and available to the State.

   d. Provide a hearing officer to conduct a formal public hearing as necessary.

   e. Assign State personnel or assist in hiring a qualified relocation agent consultant to determine relocation entitlements and assistance which might be required by the project.

f. File with the Federal Highway Administration applications for exceptions to AASHTO Standards when appropriate and for government land withdrawals for rights-of-way and airport clearance.

g. If requested by the Sponsor, assist in negotiations with public carriers and utilities for agreements on behalf of the Sponsor.

h. Review the Consultant plans, estimates, reports and environmental studies, and issue notice of approval.

i. Supply roadway summary sheets and such standard drawings as may be required to supplement the plans.

j. Print and assemble plans, special provisions, specifications and contracts.

k. Advertise for bids and let the construction contract. Prior to construction, the parties will enter into a separate agreement covering responsibilities of the parties relating to construction.

2. Within sixty (60) days of receipt of appropriate documentation from the Sponsor showing expenditure of funds for project development, reimburse the Sponsor for eligible expenses at the approved Federal-aid rate.

3. Bill the Sponsor for costs incurred by the State under this Agreement for project development, if those costs exceed the amount set out in Section III, Paragraph 1.

4. Bill the Sponsor for any federal funds to be repaid by the Sponsor if the project is terminated by the Sponsor prior to completion, and the Sponsor has been reimbursed with federal funds for preliminary engineering and/or right-of-way acquisition.

5. Appoint the Local Highway Technical Assistance Council as the contract administrator for the State.

SECTION III. That the Sponsor shall:

1. Pay to the State, before the State begins the incidental services referred to in Section II, Paragraph 1, the sum of **FIVE THOUSAND DOLLARS ($5,000)**, estimated to be the total expense to the State referred to in Section I, Paragraph 2. In addition, pay to the State the cost of all incidental services provided by the State upon receipt of the billing provided for in Section II, Paragraph 3. These funds will be credited towards the Sponsor's match on the project.

2. Sponsor warrants that it will repay any federal reimbursements on this project if the project is terminated by the Sponsor prior to completion.

3. With the assistance of the State, hire a consultant for development of the project.

4. Make timely payment of all consultant invoices throughout the design of the project. Periodically the Sponsor may submit allowable Consultant invoices and receipts to the State showing payment of same. The State will reimburse the Sponsor for eligible expenses less the Sponsor's match.

5. Advertise for and hold a formal public hearing if required in accordance with the Idaho Open Meetings Law.

6. Coordinate the relocation of utilities within the right-of-way of the project. Federal-aid utility relocations will be processed in accordance with the applicable provisions of 23 CFR and the Sponsor's utility policies and procedures.

7. Right of Way

    a. Acquire all rights-of-way and easements needed to provide for construction and maintenance of the project.

    b. Employ an approved certified general appraiser to complete all appraisals and an independent certified general appraiser to review appraisals required for the project unless the property value meets the requirements in Idaho Code Section 54-4105(5) and 45 CFR 24.102.

c. Review the appraisal reviewer's statement of the estimated fair market value and approve an amount to be just compensation for each parcel to be acquired.

d. Provide a monthly right-of-way status report (ITD-2161), and forward it to the project manager.

e. Before initiating negotiations for any real property required for right-of-way, establish, in writing, an amount considered to be just compensation, under Idaho law, Federal Regulations or any other applicable law, and make a prompt offer to acquire the property for the full amount established.

f. Make a good faith effort, in accordance with Real Property Acquisition Policies Act of 1970, to acquire the real property by negotiation. Employ a State Approved Negotiator if necessary.

g. Inform the property owner, in those cases where he indicates a willingness to donate a portion of his real property for rights-of-way, of all his rights including his right to full compensation in money for land and damages, if any, in accordance with Idaho Code.

h. Provide relocation assistance and payments for any displaced person, business, farm operation, or nonprofit organization in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970; 49 CFR 24; 23 CFR 710; the Idaho Real Property Acquisition Act of 1971; Title 40, Chapter 20; and Title 58, Chapter 11; Idaho Code, as amended, and regulations promulgated thereunder. No individual or family shall be displaced until decent, safe and sanitary replacement housing is available to the relocatees for immediate occupancy. In addition, advise the State of any relocations required by the project and upon request of the State, authorize the State to negotiate on the Sponsor's behalf for all relocation assistance and payments, the cost of which will be assumed by the Sponsor at the time of negotiation.

   i. Ensure to the greatest extent practicable that no person lawfully occupying the real property shall be required to move from his home, farm or business without at least ninety (90) days written notice prior to advertisement of the project.

8. Before advertisement for bids, provide a certification that all rights-of-way, easements, permits, materials sources and agreements necessary for the construction of the project have been acquired in accordance with the provisions of this Section. Provide a value of any right-of-way donations obtained, which may be credited as a matching share.

9. Evaluate the impact the project might have on the quality of the human environment and prepare and furnish to the State an environmental evaluation that includes cultural resources and any other documentation required by the National Environmental Policy Act.

10. At all required public hearings, furnish all necessary exhibits and provide for a representative of the Sponsor to describe the project; present information about the location and design, including alternates; discuss the tentative schedules for rights-of-way acquisitions and construction; discuss the Sponsor's relocation assistance program; discuss the economic, sociological, and environmental effects of the project; and answer all questions concerning the project.

11. Comply with Attachment 1 attached hereto and made a part hereof. By this agreement Sponsor agrees to comply with and be bound to the Civil Rights provisions of Title VI of the Federal Code and to generally insert those provisions in all contracts that it enters into that are federally funded on this project. If property acquired for this project with Federal financial assistance is transferred, the recipient of the property will be subject to Attachment 1 if the property is used for the same purpose it was originally acquired or for another purpose involving similar services or benefits to the general public. Sponsor should contact the State prior to disposing of any property acquired under this

agreement.

12. Maintain all project records, including source documentation for all expenditures and in-kind contributions, for a period of three (3) years from the date of final acceptance. If any litigation, claim, negotiation, or audit has been started before expiration of the three-year period, the records shall be retained until completion of the action and resolution of all issues that arise from it.

13. Comply with all other applicable State and Federal regulations.

EXECUTION

This Agreement is executed for the State by its Division Administrator, and executed for the SPONSOR by the MAYOR AND COUNCIL, attested to by the CITY CLERK, with the imprinted Corporate Seal of the CITY OF IDAHO FALLS.

IDAHO TRANSPORTATION DEPARTMENT

____
Division Administrator

ATTEST:

____
City Clerk

CITY OF IDAHO FALLS

____
Mayor

(SEAL)

By regular/special meeting
on ______________________.

cs: 23023 SLA PD

ATTACHMENT 1

1050.20 Appendix A:

During the performance of work covered by this Agreement, the Consultant for themselves, their assignees and successors in interest agree as follows:

1. **Compliance With Regulations**. The Consultant shall comply with all regulations of the United States Department of Transportation relative to Civil Rights, with specific reference to Title 49 CFR Part 21, Title VI of the Civil Rights Act of 1964 as amended, and Title 23 CFR Part 230 as stated in the ITD EEO Special Provisions and Title 49 CFR Part 26 as stated in the appropriate ITD DBE Special Provisions. http://apps.itd.idaho.gov/apps/ocr/index.aspx

2. **Nondiscrimination**. The Consultant, with regard to the work performed by them during the term of this Agreement, shall not in any way discriminate against any employee or applicant for employment; subcontractor or solicitations for subcontract including procurement of materials and equipment; or any other individual or firm providing or proposing services based on race, color, sex, national origin, age, disability, limited English proficiency or economic status.

3. **Solicitations for Subcontracts, Including Procurement of Materials and Equipment.** In all solicitations, either by bidding or negotiation, made by the Consultant for work or services performed under subcontract, including procurement of materials and equipment, each potential subcontractor or supplier shall be made aware by the Consultant of the obligations of this Agreement and to the Civil Rights requirements based on race, color, sex, national origin, age, disability, limited English proficiency or economic status.

4. **Information and Reports.** The Consultant shall provide all information and reports required by regulations and/or directives and sources of information, and their facilities as may be determined by the State or the appropriate Federal Agency. The Consultant will be required to retain all records for a period of three (3) years after the final payment is made under the Agreement.

5. **Sanctions for Noncompliance.** In the event the Consultant or a Subconsultant is in noncompliance with the EEO Special Provisions, the State shall impose such sanctions as it or the appropriate Federal Agency may determine to be appropriate, including, but not limited to:

- Withholding of payments to the Consultant until they have achieved compliance;
- Suspension of the agreement, in whole or in part, until the Consultant or Subconsultant is found to be in compliance, with no progress payment being made during this time and no time extension made;
- Cancellation, termination or suspension of the Agreement, in whole or in part;
- Assess against the Consultant's final payment on this Agreement or any progress payments on current or future Idaho Federal-aid Projects an administrative remedy by reducing the final payment or future progress payments in an amount equal to 10% of this agreement or $7,700, whichever is less.

6. **Incorporation of Provisions.** The Consultant will include the provisions of paragraphs 1 through 5 above in every subcontract of $10,000 or more, to include procurement of materials and leases of equipment unless exempt by the Acts, the Regulations, and directives pursuant thereto. The Consultant shall take such action with respect to any subcontract or procurement as the State or the appropriate Federal Agency may direct as a means of enforcing such provisions, including sanctions for noncompliance. Provided, that if the Consultant becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Consultant may request the State to enter into any litigation to protect the interest of the State. In addition, the Consultant may request the United States to enter into the litigation to protect the interests of the United States.

1050.20 Appendix E

During the performance of this contract, the Consultant, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with all non- discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 4 71, Section 4 7123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U .S.C. 1681 et seq).

Implementation Procedures
This agreement shall serve as the Sponsor’s Title VI plan pursuant to 23 CFR 200 and 49 CFR 21.

For the purpose of this agreement, “Federal Assistance” shall include:

1. grants and loans of Federal funds,
2. the grant or donation of Federal property and interest in property,
3. the detail of Federal personnel,
4. the sale and lease of, and the permission to use (on other than a casual or transient basis), Federal property or any interest in such property without consideration or at a nominal consideration, or at a consideration which is reduced for the purpose of assisting the Sponsor, or in recognition of the public interest to be served by such sale or lease to the Sponsor, and
5. any Federal agreement, arrangement, or other contract which has as one of its purposes, the provision of assistance.

The Sponsor shall:

1. Issue a policy statement, signed by the Sponsor’s authorized representative, which expresses its commitment to the nondiscrimination provisions of Title VI. The policy statement shall be circulated throughout the Sponsor’s organization and to the general public. Such information shall be published where appropriate in languages other than English.

2. Take affirmative action to correct any deficiencies found by ITD or the United States Department of Transportation (USDOT) within a reasonable time period, not to exceed 90 days, in order to implement Title VI compliance in accordance with this agreement. The Sponsor’s authorized representative shall be held responsible for implementing Title VI requirements.

3. Designate a Title VI Coordinator who has a responsible position in the organization and easy access to the Sponsor's authorized representative. The Title VI Coordinator shall be responsible for initiating and monitoring Title VI activities and preparing required reports.

4. Adequately implement the civil rights requirements.

5. Process complaints of discrimination consistent with the provisions contained in this agreement. Investigations shall be conducted by civil rights personnel trained in discrimination complaint investigation. Identify each complainant by race, color, national origin, sex, or disability; the nature of the complaint; the date the complaint was filed; the date the investigation was completed; the disposition; the date of the disposition; and other pertinent information. A copy of the complaint, together with a copy of the Sponsor's report of investigation, will be forwarded to ITD's EEO Office – External Programs within 10 days of the date the complaint was received by the Sponsor.

6. Collect statistical data (race and sex) of participants in, and beneficiaries of the Transportation programs and activities conducted by the Sponsor.

7. Conduct Title VI reviews of the Sponsor and sub-recipient contractor/consultant program areas and activities. Revise where applicable, policies, procedures and directives to include Title VI requirements.

8. Attend training programs on Title VI and related statutes conducted by ITD's EEO Office.

9. Participate in an annual review of the Sponsor's Title VI Program, the purpose of which is to determine to what extent the Sponsor has complied with Title VI requirements including the ADA. This review is conducted one year from the date of approval of the Non-Discrimination Agreement and then annually on the same date. The format for the Title VI review will be provided each year to the Sponsor for completion. A determination of compliance will be made by ITD's EEO Office based on the information supplied in the review. This review of the Sponsor's Title VI Program may also include an on-site review in order to determine compliance.

Discrimination Complaint Procedure
Any person who believes that he or she, individually, as a member of any specific class, or in connection with any disadvantaged business enterprise, has been subjected to discrimination prohibited by Title VI of the Civil Rights Act of 1964, the American with Disabilities Act of 1990, Section 504 of the Vocational Rehabilitation Act of 1973 and the Civil Rights Restoration Act of 1987, as amended, may file a complaint with the Sponsor. A complaint may also be filed by a representative on behalf of such a person. All complaints will be referred to the Sponsor's Title VI Coordinator for review and action.

In order to have the complaint consideration under this procedure, the complainant must file the complaint no later than 180 days after:

a) The date of alleged act of discrimination; or
b) Where there has been a continuing course of conduct, the date on which that conduct was discontinued.

In either case, the Sponsor or his/her designee may extend the time for filing or waive the time limit in the interest of justice, specifying in writing the reason for so doing.

Complaints shall be in writing and shall be signed by the complainant and/or the complainant's representative. Complaints shall set forth as fully as possible the facts and circumstances surrounding the claimed discrimination. In the event that a person makes a verbal complaint of discrimination to an officer or employee of the Sponsor, the person shall be interviewed by the Title VI Coordinator. If necessary, the Title VI Coordinator will assist the person in reducing the complaint to writing and submit the written version of the complaint to the person for signature. The complaint shall then be handled according to the Sponsor's investigative procedures.

Within 10 days, the Title VI Coordinator will acknowledge receipt of the allegation, inform the complainant of action taken or proposed action to process the allegation, and advise the complainant of other avenues of redress available, such as ITD and USDOT.

The Sponsor will advise ITD within 10 days of receipt of the allegations. Generally, the following information will be included in every notification to ITD:

- a) Name, address, and phone number of the complainant.
- b) Name(s) and address(es) of alleged discriminating official(s).
- c) Basis of complaint (i.e., race, color, national origin or sex)
- d) Date of alleged discriminatory act(s).
- e) Date of complaint received by the Sponsor.
- f) A statement of the complaint.
- g) Other agencies (state, local or Federal) where the complaint has been filed.
- h) An explanation of the actions the Sponsor has taken or proposed to resolve the issue raised in the complaint.

Within 60 days, the Title VI Coordinator will conduct an investigation of the allegation and based on the information obtained, will render a recommendation for action in a report of findings to the Sponsor’s authorized representative. The complaint should be resolved by informal means whenever possible. Such informal attempts and their results will be summarized in the report of findings.

Within 90 days of receipt of the complaint, the Sponsor’s authorized representative will notify the complainant in writing of the final decision reached, including the proposed disposition of the matter. The notification will advise the complainant of his/her appeal rights with ITD, or USDOT, if they are dissatisfied with the final decision rendered by the Sponsor. The Title VI Coordinator will also provide ITD with a copy of this decision and summary of findings upon completion of the investigation.

Contacts for the different Title VI administrative jurisdictions are as follows:

Idaho Transportation Department
Equal Employment Opportunity Office – External Programs
EEO Manager
PO Box 7129
Boise, ID 83707-1129
208-334-8884

Federal Highway Administration
Idaho Division Office
3050 Lakeharbor Lane, Suite 126
Boise, ID 83703
208-334-9180

Sanctions

In the event the Sponsor fails or refuses to comply with the terms of this agreement, the ITD may take any or all of the following actions:

1. Cancel, terminate, or suspend this agreement in whole or in part;
2. Refrain from extending any further assistance to the Sponsor under the program from which the failure or refusal occurred until satisfactory assurance of future compliance has been received from the Sponsor.
3. Take such other action that may be deemed appropriate under the circumstances, until compliance or remedial action has been accomplished by the Sponsor;
4. Refer the case to the Department of Justice for appropriate legal proceedings.

Distribution: EEO Office
Revised: 03-09, 08-10, 08-17

RESOLUTION

WHEREAS, the Idaho Transportation Department, hereafter called the **STATE**, has submitted an Agreement stating obligations of the **STATE** and the **CITY OF IDAHO FALLS**, hereafter called the **CITY,** for construction of **A023(023) ELM STREET; YELLOWSTONE TO SOUTH BLVD**; and

WHEREAS, the **STATE** is responsible for obtaining compliance with laws, standards and procedural policies in the development, construction and maintenance of improvements made to the Federal-aid Highway System when there is federal participation in the costs; and

WHEREAS, certain functions to be performed by the **STATE** involve the expenditure of funds as set forth in the Agreement; and

WHEREAS, The **STATE** can only pay for work associated with the State Highway system; and

WHEREAS, the **CITY** is fully responsible for its share of project costs; and

NOW, THEREFORE, BE IT RESOLVED:

1. That the Agreement for Federal Aid Highway Project A023(023) is hereby approved.

2. That the Mayor and the City Clerk are hereby authorized to execute the Agreement on behalf of the **CITY.**

3. That duly certified copies of the Resolution shall be furnished to the Idaho Transportation Department.

CERTIFICATION

I hereby certify that the above is a true copy of a Resolution passed at a *regular, duly* called special (X-out non-applicable term) meeting of the City Council, City of Idaho Falls, held on

______________________, _______.

(Seal)

____
City Clerk