State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

Utah Water Quality Board Meeting
DEQ Board Room 1015
195 N 1950 W
Salt Lake City, UT 84116
August 22, 2018

Board Meeting Begins at 8:30 a.m.

AGENDA

A. **Water Quality Board Meeting – Roll Call**

B. **Minutes:**

Approval of minutes for June 27, 2018 Water Quality Board Meeting
…….Myron Bateman

C. **Executive Secretary's Report** ……...….Erica Gaddis

D. **Funding Requests:**

1. Financial Report……..…..Emily Cantón

2. Duck Creek Authorization……..…….....Skyler Davies

3. Plain City Assistance Introduction……...Ken Hoffman

Next Meeting September 26, 2018
DEQ Board Room 1015
195 N 1950 W
Salt Lake City, UT 84116

Revised 8/13/2018
In compliance with the American Disabilities Act, individuals with special needs (including auxiliary communicative aids and services) should contact Larene Wyss, Office of Human Resources, at (801) 536-4281, TDD (801) 536-4284, or by email at lwyss@utah.gov, at least five working days prior to the scheduled meeting.

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MINUTES
UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
UTAH WATER QUALITY BOARD
195 N. 1950 W.
Salt Lake City, UT 84116
June 27, 2018

UTAH WATER QUALITY BOARD MEMBERS PRESENT

Jennifer Grant	Clyde Bunker
Steven Earley	Scott Baird
Michael Luers	Gregg Galecki
James VanDerslice	

Excused: Myron Bateman, David Ogden, Alan Matheson

DIVISION OF WATER QUALITY STAFF MEMBERS PRESENT

Erica Gaddis, Savannah Miller, Skyler Davies, Emily Cantón, John Mackey, Chris Bittner, Jeff Studenka, Kim Shelley, Jim Harris, Ken Hoffman, Marsha Case, Lonnie Shull

OTHERS PRESENT

Name	Organization Representing
Joe Phillips	Kane Co. Water/Sunrise Eng.
David Koctz	Barr Engineering
Michael Noel	KCWDC
Aaron Wade	Gilmore & Bell
Justin Atkinson	Sunrise Engineering
Jason Broome	Forsgren Associates
Bruce Ward	Salem City
Kurt Christensen	Salem City
Rudd Conover	Forsgren Associates
Karen	HDR
Ariel Calmes	Western Resource Advocates
Brian Baker	Zions Bank

Ms. Grant called the Board meeting to order at 9:30 AM and took roll call for the members of the Board and audience.

APPROVAL OF MINUTES OF THE MAY 23, 2018 MEETING

Motion: **Mr. Galecki moved to approve the minutes of the May 23, 2018 meeting. Dr. VanDerslice seconded the motion. The motion passed unanimously.**

EXECUTIVE SECRETARY REPORT

- The Division continues to track the most recent version of the congressional budget including eligibility requirements of the Clean Water Act SRF funds, nutrient criteria, and Waters of the U.S.
- Waters of the U.S. discussion continues to move forward. On June 15th, EPA and the U.S. Army Core of Engineers sent a proposed new rule to redefine Waters of the U.S. to the Office of Management and Budget. Public comment will begin after review.
- Dr. Gaddis provided the Board with handouts to follow up on requests from the members in the previous meeting.
    - The first handout was a summary of the Utah Lake Study to assist the Board members when answering questions from the public about the study.
    - Dr. Gaddis also provided a summary of potential projects and SRF needs through 2025. It included a project tracking list that estimates 58 facilities around the state, an approximate total projects cost of over $1 billion, and an estimated SRF demand of $320 million.
    - The Board was also provided with a summary of the last five years of loans. Interest rates ranged from 0%-2.8%, loan terms ranged from 20-30 years, and 6 communities qualified for hardship grants. It also reported MAGI ranging from 0.88% to 1.4%.
    - A National Academy of Public Administration (NAPA) report was also discussed that includes 20 recommendations. The Board will be updated in August regarding the Division's assessment and if any recommendations are particularly applicable to Utah.
- The Board's new finance subcommittee met once to continue the discussion of hardship, projected low balances, and prioritizing projects. It was decided the subcommittee will meet monthly in between Board meetings.
- Dr. Gaddis met with the communities in Southern Utah County regarding the potential for a regional wastewater treatment plant. Salem wishes to move forward with their proposed treatment plant. Spanish Fork and Springville are interested in evaluating regional options. There is a concern that without a regional plant, there will be septic systems put in along the shores of Utah Lake. DWQ will continue to provide support and incentives for the project.
- The Natural Resources, Agricultural, and Environment Legislative Interim Committee discussed HB365 on June 18, 2018 that was introduced in the last Legislative session. The bill outlined changes to 19-5-104.5, but didn't pass due to lack of time. The sponsor has made several changes since the session including:
    - TMDL and Standards were separated into two sections.
    - Lines 38 & 39: Eliminated the need for agricultural facilities to have a UPDES permit.
    - Any state agency that passes a rule that has an impact of $2 million for a single entity or $50 million for a group of entities must refer to the appropriations subcommittee for review.

  The Interim Committee discussed redrafting of the legislation to include only one threshold, of $10 million, for full legislative approval.
- Provo Bay and Mantua Reservoir have developed harmful algal blooms. Because of the

funding approved by the Legislature, the staff have been able to routinely monitor and collect samples from more sites. Provo Bay has a warning issued, but Mantua Reservoir has a localized bloom with no advisory in place. There are also warnings for Utah Lake in Lincoln Marina, Sandy Beach, and Utah Lake State Park due to exceedances of microcystin and detection of anatoxin. Rockport Reservoir also has a localized bloom in the main boat launch area. The health department has provided information to the public but has not issued a formal advisory.

FUNDING REQUESTS

Financial Report: Ms. Canton updated the Board on the loan funds and Hardship Grant funds, as indicated in the packet.

Kane County/Duck Creek Intro: Mr. Davies assisted Kane County Water Conservancy District to introduce a request for financial assistance to fund property acquisition and construction of the Duck Creek collection system, as well as any necessary upgrades to the facility. They will be requesting a total of $3,997,000, including $202,500 in costs advance to purchase the property to begin the project.

Motion: **Mr. Bunker moved to approve an advance for $203,000 to purchase the land. Mr. Earley seconded the motion. The motion passed unanimously.**

Salem City Request for Reauthorization: Mr. Davies reintroduced Salem City representatives to request reauthorization of their loan from $13 million to $20 million due to increases in construction costs when they received their bids. The loan term would increase to 30 years and remain at a rate of 1.15%.

Motion: **Mr. Luers moved to approve the reauthorization for $20 million for 30 years at 1.15% with the same special conditions as the original authorization. Mr. Galecki seconded the motion. The motion passed unanimously.**

RULE MAKING

Request to adopt amendments to R317-2: Mr. Bittner requested the Board to approve the amendments to rule R317-2 as outlined in the packet.

Motion: **Dr. VanDerslice moved to approve the adoption of the amendments to rule R317-2. Mr. Earley seconded the motion. The motion passed unanimously.**

OTHER BUSINESS

Proposed Water Quality Study Funding Priorities and Criteria: Mr. Harris presented the proposed funding priorities and criteria for Water Quality Studies as introduced in the April Board meeting. After the May meeting, the Board preferred to not dedicate funds from the Hardship Grant and to, instead, assist in setting priorities and criteria for the projects and participate in selection. It is also anticipated there will be a review committee made up of staff to finalize an RFP that includes

input from the Board. The recommendations of proposals will be brought to the Board in the Fall for review. Dr. VanDerslice is interested in serving on the review committee.

To listen to the full recording of the Board meeting go to: http://www.utah.gov/pmn/index.html

Next Meeting – August 22, 2018

_____
Myron Bateman, Chair
Utah Water Quality Board

LOAN FUNDS
FINANCIAL STATUS REPORT
AUGUST 2018

STATE REVOLVING FUND (SRF)	State Fiscal Year 2019	State Fiscal Year 2020	State Fiscal Year 2021	State Fiscal Year 2022	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025
Funds Available							
2015 - 2018 Capitalization Grants	21,610,000	-	-	-	-	-	-
2015 - 2018 State Match	4,198,401	-	-	-	-	-	-
Future Capitalization Grants (estimated)	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000
Future State Match (estimated)	1,400,000	1,400,000	1,400,000	1,400,000	1,400,000	1,400,000	1,400,000
SRF - 2nd Round	120,810,103	110,958,592	78,689,923	63,605,656	47,701,640	30,584,902	29,334,893
Interest Earnings at 1.5%	1,820,729	1,672,257	1,185,936	958,601	718,911	460,945	442,106
Loan Repayments	12,803,359	13,586,074	13,329,797	16,737,384	15,764,350	15,889,046	15,801,777
Total Funds Available	169,642,592	134,616,923	101,605,656	89,701,640	72,584,902	55,334,893	53,978,777
Project Obligations							
Duchesne City	(265,000)	-	-	-	-	-	-
Logan City	(23,131,000)	(23,000,000)	(23,000,000)	-	-	-	-
Moab City	(780,000)	-	-	-	-	-	-
Salem City	(7,189,000)	(10,000,000)	-	-	-	-	-
Loan Authorizations							
San Juan Spanish Valley SSD	(968,000)	(1,547,000)	-	-	-	-	-
South Davis Sewer District (with NPS)	(26,351,000)	(2,500,000)	-	-	-	-	-
Planned Projects							
Central Valley Water Reclamation Facility	-	(11,120,000)	(15,000,000)	(15,000,000)	(15,000,000)	-	-
South Salt Lake City	-	(7,760,000)	-	-	-	-	-
Provo City	-	-	-	(27,000,000)	(27,000,000)	(26,000,000)	-
Total Obligations	(58,684,000)	(55,927,000)	(38,000,000)	(42,000,000)	(42,000,000)	(26,000,000)	-
SRF Unobligated Funds	$ 110,958,592	$ 78,689,923	$ 63,605,656	$ 47,701,640	$ 30,584,902	$ 29,334,893	$ 53,978,777

UTAH WASTEWATER LOAN FUND (UWLF)	State Fiscal Year 2019	State Fiscal Year 2020	State Fiscal Year 2021	State Fiscal Year 2022	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025
Funds Available							
UWLF	$ 20,338,924	$ 7,389,785	$ 10,898,573	$ 14,446,993	$ 17,695,437	$ 20,980,513	$ 24,249,892
Sales Tax Revenue	3,587,500	3,587,500	3,587,500	3,587,500	3,587,500	3,587,500	3,587,500
Loan Repayments	2,870,662	2,914,188	2,953,819	2,653,844	2,690,476	2,674,779	2,675,223
Total Funds Available	26,797,086	13,891,473	17,439,893	20,688,337	23,973,413	27,242,792	30,512,614
General Obligations							
State Match Transfers	(5,598,401)	(1,400,000)	(1,400,000)	(1,400,000)	(1,400,000)	(1,400,000)	(1,400,000)
DWQ Administrative Expenses	(1,592,900)	(1,592,900)	(1,592,900)	(1,592,900)	(1,592,900)	(1,592,900)	(1,592,900)
Project Obligations							
Blanding City	(1,288,000)	-	-	-	-	-	-
Morgan City	(550,000)	-	-	-	-	-	-
Loan Authorizations							
Eagle Mountain City	(1,283,000)	-	-	-	-	-	-
Grantsville City	(4,880,000)	-	-	-	-	-	-
Planned Projects							
*Kane Co Water Conservancy Dist (Duck Creek)	(1,000,000)	-	-	-	-	-	-
*Plain City	(3,215,000)	-	-	-	-	-	-
Total Obligations	(19,407,301)	(2,992,900)	(2,992,900)	(2,992,900)	(2,992,900)	(2,992,900)	(2,992,900)
UWLF Unobligated Funds	$ 7,389,785	$ 10,898,573	$ 14,446,993	$ 17,695,437	$ 20,980,513	$ 24,249,892	$ 27,519,714

Contingency Calculation for Authorized Projects							
Total Unobligated Loan Funds	$ 118,348,378	$ 89,588,497	$ 78,052,649	$ 65,397,078	$ 51,565,415	$ 53,584,785	$ 81,498,491
25% Contingency for Authorized Projects	$ (8,370,500)	$ (1,011,750)	$ -	$ -	$ -	$ -	$ -
Remaining Balance	$ 109,977,878	$ 88,576,747	$ 78,052,649	$ 65,397,078	$ 51,565,415	$ 53,584,785	$ 81,498,491

*WQB Agenda Items

[1] Principal Forgiveness Amount (Maximum) = $7,293,200

HARDSHIP GRANT FUNDS
FINANCIAL STATUS REPORT
AUGUST 2018

HARDSHIP GRANT FUNDS (HGF)	State Fiscal Year 2019	State Fiscal Year 2020	State Fiscal Year 2021	State Fiscal Year 2022	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025
Funds Available							
Beginning Balance		$ 1,882,324	$ 2,118,585	$ 2,557,178	$ 2,907,969	$ 3,165,984	$ 3,344,952
Federal HGF Beginning Balance	5,717,666	-	-	-	-	-	-
State HGF Beginning Balance	1,598,164	-	-	-	-	-	-
Interest Earnings at 1.5%	110,257	28,369	31,929	38,539	43,826	47,715	50,412
UWLF Interest Earnings at 1.5%	306,528	111,371	164,252	217,731	266,688	316,197	365,470
Hardship Grant Assessments	1,225,888	1,101,353	974,418	854,384	731,418	623,670	514,199
Interest Payments	314,076	295,168	267,994	240,136	216,083	191,386	167,261
Advance Repayments	220,000	-	-	-	-	-	-
Total Funds Available	9,492,579	3,418,585	3,557,178	3,907,969	4,165,984	4,344,952	4,442,294
Financial Assistance Project Obligations							
Duchesne City - Construction Grant	(13,503)	-	-	-	-	-	-
Eagle Mountain City - Construction Grant	(510,000)	-	-	-	-	-	-
Emigration Sewer Imp Dist - Planning Grant	(26,158)	-	-	-	-	-	-
USU Extension - Hardship Grant	(42,000)	-	-	-	-	-	-
Non-Point Source/Hardship Grant Obligations							
(FY11) Gunnison Irrigation Company	(48,587)	-	-	-	-	-	-
(FY11) DEQ - Willard Spur Study	(113,326)	-	-	-	-	-	-
(FY12) Utah Department of Agriculture	(504,551)	-	-	-	-	-	-
(FY13) DEQ - Great Salt Lake Advisory Council	(187,673)	-	-	-	-	-	-
(FY15) DEQ - Ammonia Criteria Study	(41,130)	-	-	-	-	-	-
(FY15) DEQ - Nitrogen Transformation Study	(14,500)	-	-	-	-	-	-
(FY16) DEQ - San Juan River Monitoring	(125,083)	-	-	-	-	-	-
(FY17) DEQ - GW Quality Study	(5,051)	-	-	-	-	-	-
(FY17) DEQ - Utah Lake Water Quality Study	(608,164)	(300,000)	-	-	-	-	-
FY 2013 - Remaining Payments	(2,019)	-	-	-	-	-	-
FY 2014 - Remaining Payments	-	-	-	-	-	-	-
FY 2015 - Remaining Payments	(52,650)	-	-	-	-	-	-
FY 2016 - Remaining Payments	(295,676)	-	-	-	-	-	-
FY 2017 - Remaining Payments	(354,446)	-	-	-	-	-	-
FY 2018 - Remaining Payments	(668,738)	-	-	-	-	-	-
Future NPS Annual Allocations	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)
Planned Projects							
*Kane Co Water Conservancy Dist (Duck Creek)	(2,997,000)	-	-	-	-	-	-
Total Obligations	(7,610,255)	(1,300,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)
HGF Unobligated Funds	$ 1,882,324	$ 2,118,585	$ 2,557,178	$ 2,907,969	$ 3,165,984	$ 3,344,952	$ 3,442,294

*WQB Agenda Items

State of Utah
Wastewater Project Assistance Program
Project Priority List

Ranking as of 8/1/2018	Project Name	Funding Authorized	Total Points	Point Categories			
				Project Need	Potential Improvement	Population Affected	Special Consideration
1	South Davis Sewer District	x	138	50	18	10	60
2	Central Valley Water Reclamation Facility		118	50	18	10	40
3	Salem City	x	108	50	12	6	40
4	Eagle Mountain City (White Hills)	x	106	60	5	1	40
5	Plain City		105	50	10	5	40
6	Grantsville City	x	94	35	12	7	40
7	San Juan Spanish Valley SSD	x	86	45	0	1	40
8	Kane County Water Conservancy District (Duck Creek)		62	40	21	1	0

Date Received: May 17, 2018
Date to be presented to the WQB: August 22, 2018

WATER QUALITY BOARD
FEASIBILITY REPORT FOR WASTEWATER COLLECTION & TREATMENT PROJECT

AUTHORIZATION

APPLICANT:	Kane County Water Conservancy District 725 E. Kaneplex Drive Kanab, Utah 84741 Telephone: 435-644-3997
PRESIDING OFFICIAL:	Mike Noel, Executive Director
CONTACT PERSON:	Amanda Buhler, Office Manager
TREASURER:	Mike Kenner, Board Member
CONSULTING ENGINEER:	Joe Phillips, P.E. Sunrise Engineering 11 North 300 West Washington, Utah 84780 Telephone: 435-652-8450
BOND COUNSEL:	Richard Chamberlain Chamberlain Associates 225 North 100 East Richfield, Utah 84701 Telephone: 435-896-4461

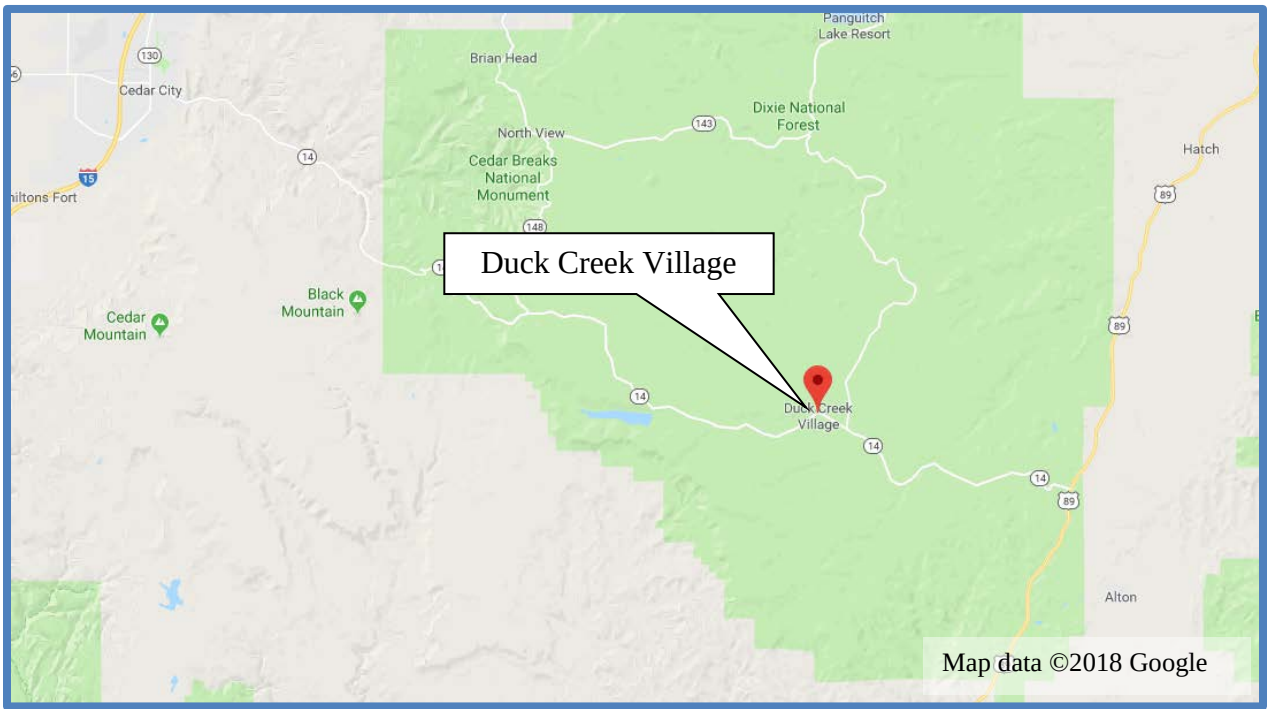
APPLICANT'S REQUEST

Kane County Water Conservancy District (the District) requests **financial assistance in the amount of $3,997,000** including a **$759,500 Design Advance;** this also includes the previously authorized **$203,000 in property acquisition costs advance** that was approved in the June 27, 2018 Water Quality Board meeting. This funding will be used for the construction of the collection system, the purchase of the Forest Service lagoons and property, and upgrades to the treatment facility that are necessary to connect and provide effective sewer service to the town.

The applicant has stated that the most they can afford to repay is a $1,000,000 loan, based on 30 year 0% interest terms.

APPLICANT'S LOCATION

Duck Creek is an unincorporated community in Kane County located on the edge of Cedar Mountain, approximately 30 miles east of Cedar City.



[Figure 1]

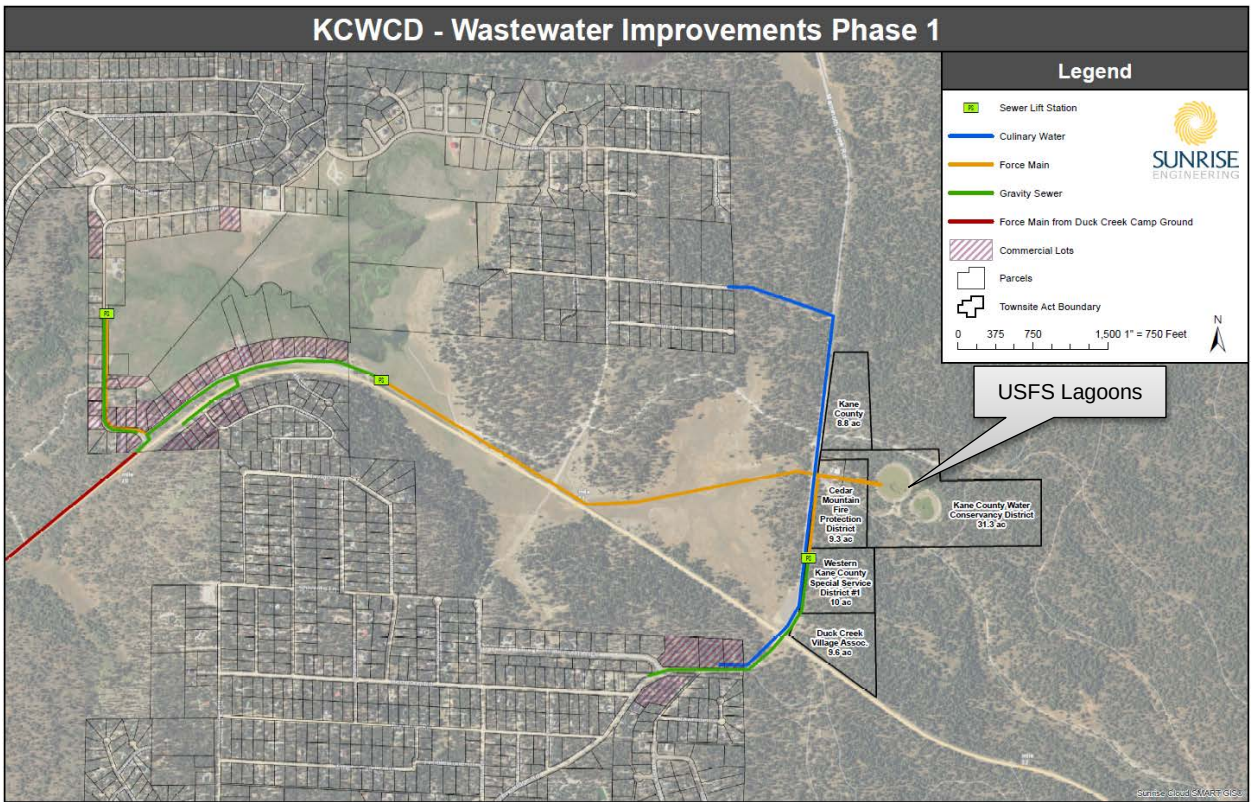
BACKGROUND

In 2007, the District commissioned a Wastewater Planning Study that documented significant risk to ground and surface waters from failing onsite systems in the Duck Creek area. Of particular concern is the "valley area" near Duck Creek Village [Figure 2] where high ground water levels frequently cause the onsite systems in the area to become inundated with water. This high groundwater limits the ability of the soils to provide adequate absorption and treatment. Surfacing septage has occurred on numerous occasions, creating a risk to public health and water quality. The recommended alternative in the 2007 study was to purchase the nearby wastewater lagoon facility that services the Duck Creek campground and extend service to the Duck Creek area. The lagoon system is located within the Dixie National Forest and is owned and operated by the USFS.

On May 1, 2013 the Water Quality Board authorized a planning grant of $173,000 to assist the District in funding a Townsite Act application. The Townsite Act process is one of only two mechanisms to purchase property from the United States Department of Agriculture Forest Service (USFS); the other mechanism is Congressional Action.

On June 27, 2018 the project was introduced to the Water Quality Board and the Board

authorized an advance of $203,000 to purchase land that contains the USDA Forest Service lagoons. Since that meeting, more accurate information on the number of ERU's being served has been obtained and is included in the cost model provided in Appendix 1.



[Figure 2]

ALTERNATIVES

The District thoroughly explored alternatives to address the onsite wastewater system problem in the Duck Creek area. They investigated constructing various mechanical treatment plants but the issue of effluent disposal in this area is unusually complicated. The District evaluated several alternative treatment and collection systems including:

Collection System Alternatives

- Alternative 1 - Gravity Collection with Lift Stations
- Alternative 2 - Pressurized Effluent Sewer System
- Alternative 3 - Pressurized Grinder Pump Sewer System

Treatment System Alternatives

- Alternative A - Total Containment Lagoon Treatment
- Alternative B - SBR Treatment with Rapid Infiltration Basin (RIB) Disposal
- Alternative C - SBR Treatment with Injection Well Disposal

The above alternatives were analyzed in the Facility Plan and the preferred alternative - Collection System Alternative 1 and Treatment System Alternative B – was identified. Due to high costs, a phased implementation approach was developed. The first phase consists of purchasing the existing lagoon facility and constructing a sewer collection and transmission system that will connect most of the businesses in Duck Creek. Several residences are reasonably close to the proposed alignment and could be connected in the near future. Additionally, the lagoons will be improved to bring them into compliance with DWQ standards. This phase will establish a collection system backbone to which other customers can be connected as it becomes feasible. As connections are added and the lagoons treatment capacity is reached, Phase 2 of the project would be implemented wherein the lagoons would be replaced with SBR treatment system and RIB disposal.

PROJECT DESCRIPTION

The Duck Creek Wastewater Project, Phase 1, represents the project phase that will most directly address the identified surface and groundwater contamination concerns in the Duck Creek area of Cedar Mountain, Kane County, Utah.

The Phase 1 project accomplishes multiple critical steps in establishing an overall wastewater solution in the Duck Creek area, including:

I. The project is in the process of transferring the existing Duck Creek Campground wastewater lagoon site from the USFS into the ownership of Kane County Water Conservancy District. The site will serve as the treatment facility for the Phase 1 project and as the treatment site for future phases that could ultimately serve the Duck Creek, Strawberry Creek, Swains Creek, and Zion View Estates areas, all now on septic systems.

II. The project will establish a new public wastewater utility service in the area that will be sponsored and administered by the Kane County Water Conservancy District. Operational and maintenance capacity will be initiated and developed through operation of the Phase 1 project.

III. The project will establish a “backbone” infrastructure system and a “rate base” that will develop operational and financial capacity upon which future expansion can be built as need and feasibility occur.

IV. The project will establish key alignment rights-of-way in the form of Special Use Permits issued by the USFS for the Phase 1 project and future expansions expected to become necessary in the Duck Creek valley.

V. The Phase 1 project eliminates septic tank use by the commercial entities in Duck Creek Village; these on-site treatment units are considered to be the greatest threat to surface and groundwater quality in the Duck Creek area.

VI. The project converts the USFS from a wastewater system operator to a wastewater system customer.

VII. The Phase 1 project capitalizes on the current support of the commercial property owners to participate in the development of a wastewater treatment solution at Duck Creek.

VIII. The Phase 1 project capitalizes on the current intent of the USFS to dispose the lagoon site through the Townsite Act process and to issue Special Use Permits for the necessary

infrastructure improvements.

IX. The project establishes a wastewater treatment solution for future governmental services at Duck Creek, including the Townsite parcels reserved for Kane County, Cedar Mountain Fire Protection District, Western Kane County SSD #1, and the Duck Creek Village Association, and potentially the future Duck Creek Town.

The Phase 1 project includes as primary infrastructure components approximately 7,500 linear feet of 8-inch and 10-inch gravity sewer main, 7,000 linear feet of 6-inch and 8-inch force main, two secondary and one primary lift stations, basic lagoon site improvements, 40 gravity and pressurized sewer connections, power and SCADA improvements necessary to operate the wastewater system, and other miscellaneous appurtenances typical of a wastewater system installation in an alpine environment. Professional and incidental costs include those related to planning and environmental updates, mapping and survey efforts, design, bidding, construction administration, financing the project, and establishing the wastewater utility administratively. Also included in the project is the effort to finalize the Townsite Act process which transfers and subdivides the Townsite parcel disposed by the Forest Service.

IMPLEMENTATION SCHEDULE:

Introduction to WQB for Funding:	June 27, 2018
To WQB for Funding Authorization:	August 22, 2018
Begin Construction	2019
Complete Construction:	2021

POSITION ON PROJECT PRIORITY LIST:

The project is currently ranked 7th of 7 projects.

COST ESTIMATE:

Engineering (Design & CMS)	$	688,000
Construction	$	3,002,000
Contingency (~ 15%)	$	451,000
Property Purchase	$	203,000
Legal & Bonding	$	30,000
Loan Origination (1% of Loan)	$	40,000
Total	**$**	**4,414,000**

COST SHARING:

Funding Request	Cost Sharing
Local Contribution (Culinary Water Portion of Project)	$417,000
WQB Loan (0% 30 Years)	$1,000,000
WQB (Requested as **Grant**)	$2,997,000
Total	**$4,414,000**

STAFF COMMENTS

A cost model is included as Appendix 1. The model indicates that the applicant will exceed 1.4% of MAGI with operation and maintenance costs alone. However, this phase of the project primarily serves businesses, which makes it difficult to rely on the normal affordability criteria alone. As such the recommendation is based on the District's indication that proposed commercial rate payers are "willing-to-pay" a maximum loan of $1,000,000, based on a 0% 30 year term. A $1,000,000 loan commits the District to significant repayments that are well above normal affordability standards. Staff believes this level of commitment should motivate the District to continue the phased approach of connecting additional customers as it becomes feasible, to provide broader water quality protection and to help support loan repayments.

Staff recognizes that there are water quality and human health concerns that this project would address. There have been failed septic systems in the area, and a sewer will provide a long term solution.

The O&M budget in the cost motel indicates the anticipated O&M costs to operate the wastewater system. The budget is based on a similarly sized entity. To minimize the operation budget for this system, the District plans to utilize existing resources and staff to economize. The District estimated this will reduce the operation and maintenance costs for the wastewater system by about $36,800 per year. This reduction in cost is indicated in the cost model as Shared Utility Labor & Overhead Savings as a negative $36,783 per year.

STAFF RECOMMENDATION

Staff recommends that the Water Quality Board Authorize Kane County Water Conservancy District's requests **for a loan in the amount of $1,000,000 at an interest rate of 0% repayable over 30 years and a grant in the amount of $2,997,000 including a $759,500 Design Advance, and the previously authorized $203,000 in property acquisition costs advance** subject to these special conditions:

1. The District must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).

2. As part of the facility planning, the District must complete a Water Conservation and Management Plan.

3. The District must pursue and retain additional funding necessary to fully implement the project.

4. The District must provide a Plan of Operation consistent with R317-101-3 Q.

5. As part of its Plan of Operations, the District must develop and implement an asset management program that is consistent with EPA's Fiscal Sustainability Plan guidance.

6. The District must consult the Division of Water Quality prior to disposing any of the land purchased with Water Quality Board funding.

eDocs: DWQ-2018-008072
File: SRF- KCWCD Duck Creek, Administration, Section 1

KCWCD Duck Creek
Introduction
June 27, 2018
Appendix 1

WATER QUALITY BOARD STATIC COST MODEL

Duck Creek Sewer System Project

Project Costs	
Legal/Bonding	30,000
DWQ Loan Origination Fee	40,000
Engineering (Design & CMS)	688,000
Construction	3,002,000
Contingency (~15%)	451,000
Property Obtainment	203,000
Total Project Cost:	**4,414,000**

Project Funding	
Applicant Contribution	417,000
WQB Funding	3,997,000
Total Project Cost:	**4,414,000**

Funding Conditions	
Loan Repayment Term:	30
Reserve Funding Period:	6

Current Customer Base & User Charges	
Residential ERUs	5
Comercial ERUs	104
Haul-In Disposal ERUs	3
Forest Service ERUs	39
Total ERUs	151
MAGI (Duck Creek 2016 household):	25,344
1.4% MAGI Sewer Bill:	**$29.57**
Existing O&M expenses Treatment & Collection	$0
New O&M expenses Treatment & Collectiocn	$ 76,495.00
Shared Utility Labor & Overhead Savings	$ (36,783.00)
Net New O&M Expenses	**$ 39,712.00**

ESTIMATED COST OF SEWER SERVICE

WQB Grant Amount	WQB Loan Amount	WQB Loan Interest Rate	WQB Loan Debt Service	WQB Loan Reserve	Annual Sewer O&M Cost	Total Annual Sewer Cost	Monthly Sewer Cost/ERU	Sewer Cost as a % of MAGI
$ 3,997,000	$ -	0.00%	$0	$ -	$ 39,712	$ 39,712	21.92	1.04%
$ 3,500,000	$ 397,000	0.00%	$13,233	$ 3,308	$ 39,712	$ 56,254	31.05	1.47%
$ 2,997,000	$ 1,000,000	0.00%	$33,333	$ 8,333	$ 39,712	$ 81,379	44.91	2.13%
$ 2,737,945	$ 1,259,055	0.00%	$41,969	$ 10,492	$ 39,712	$ 92,173	50.87	2.41%
$ 1,998,500	$ 1,998,500	0.00%	$66,617	$ 16,654	$ 39,712	$ 122,983	67.87	3.21%
$ 1,998,500	$ 1,998,500	0.00%	$66,617	$ 16,654	$ 39,712	$ 122,983	67.87	3.21%
$ 1,868,000	$ 2,129,000	0.00%	$70,967	$ 17,742	$ 39,712	$ 128,420	70.87	3.36%
$ 1,530,851	$ 2,466,149	0.00%	$82,205	$ 20,551	$ 39,712	$ 142,468	78.62	3.72%
$ -	$ 3,997,000	0.00%	$133,233	$ 33,308	$ 39,712	$ 206,254	113.83	5.39%

Application Number: _____
Date Received: July 25, 2018
Date to be presented to the WQB: August 22, 2018

WATER QUALITY BOARD
FEASIBILITY REPORT FOR PLANNING ADVANCE
INTRODUCTION

APPLICANT:	Plain City 4160 West 2200 North Plain City, UT 84404 Telephone: (801) 731-4908
PRESIDING OFFICIAL:	Mayor Jon Beesley
TREASURER/RECORDER:	Steve Davis/Diane Hirschi
CONSULTING ENGINEER:	Gary Vance, P.E. J-U-B Engineers Telephone: (801) 547-0393
BOND COUNSEL:	Smith Hartvigsen 257 East 200 South, Suite 500 Salt Lake City, UT 84111 (801) 413-1620

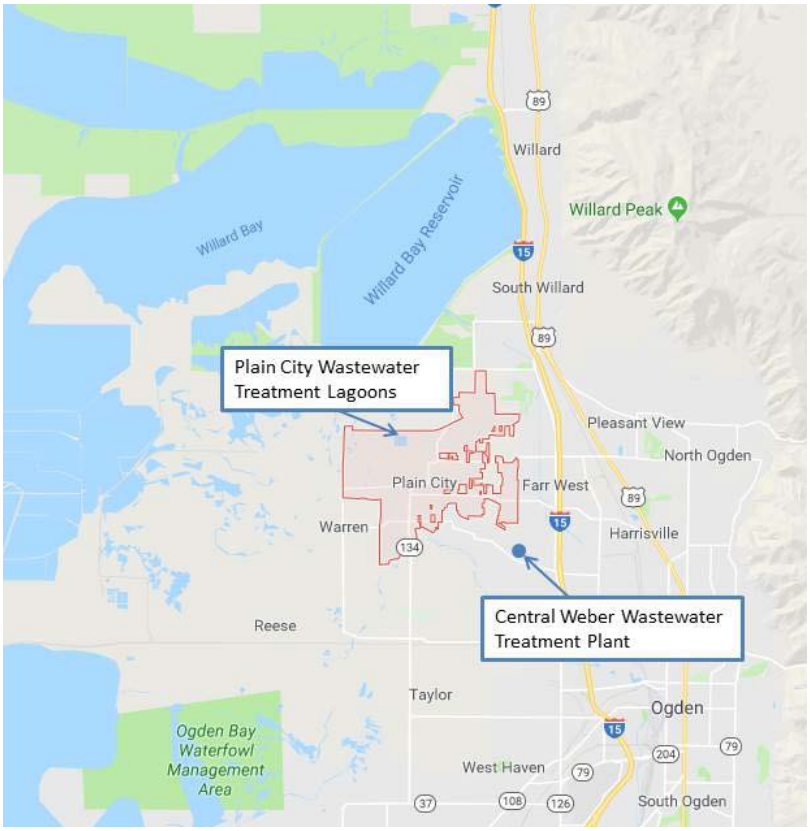
APPLICANT'S REQUEST:

Plain City is requesting a construction loan from the Utah Water Quality Board in the amount of $3,065,000 to pay for construction of a segment of proposed Central Weber Sewer Improvement District (CWSID) trunk line. The segment of trunk line would provide capacity for approximately 520 existing ERUs and 1,600 future ERUs from Plain City.

APPLICANT'S LOCATION:

Plain City is located in Weber County northwest of Ogden. CWSID's treatment plant is located on the southern border between Plain City and Farr West City.

MAP OF APPLICANT'S LOCATION



BACKGROUND AND PROJECT NEED:

Plain City owns and operates a collection system with sixteen (16) lift stations and a six cell discharging aerated lagoon (a pair of three cell tracks) which was constructed in 1970. The lagoons have a design flow of an average daily flow of 0.61 mgd that discharge into a drainage ditch that flows from Dix Creek to the Harold S. Crane Waterfowl Management Area and ultimately to the Willard Spur area of the Great Salt Lake.

Plain City currently treats 2,036 ERUs with a wastewater treatment lagoon and 90 ERUs are treated by CWSID. Plain City recently initiated a Capital Facility planning process for future compliance of their wastewater lagoons. Plain City commissioned a Facility Plan to explore alternatives to plan for and accommodate future growth and the recently enacted phosphorus limit. Part of this process was the consideration of regionalization with CWSID.

CWSID is a 69.5 MGD treatment plant located in Ogden. The facility serves the area including the towns of Farr West, Hooper, Harrisville, North Ogden, Ogden, Pleasant View, Marriott-Slaterville, Riverdale, South Ogden, West Haven, South Weber, Washington Terrace, Weber County and portions of Plain City, Roy and Uintah. CWSID is currently undertaking a truckline upgrade to address capacity needs in the Farr West area.

PROJECT NEED:

During 2017, Plain City's lagoons had an approximate effluent average daily flow of 0.4 mgd from 2,036 ERUs. Plain City projects by 2037 effluent average daily flows would be up to 0.85 mgd from 4050 ERUs. This would be greater than the current permitted average daily flow. Plain City needs to find a treatment technology or compliance method to address their future capacity needs.

PROJECT DESCRIPTION:

CWSID is currently in planning for a new trunk line that could serve the east side of Plain City. This line will replace their existing "Farr West" trunk line and lift station that does not have adequate capacity. Two potential alignments for the new CWSID trunk line are under consideration. Alignment 1 has a cost of $7,800,000 for CWSID and would not accommodate any flows from Plain City. Alignment 2, at a cost of $8,900,000, would relocate the trunk line further west and into Plain City. This alignment will allow for the connection of existing developable land along the alignment (approximately 1,600 ERUs) in addition to approximately 520 existing homes. Plain City would be expected to pay for this additional $1.1 million cost. In addition, CWSID would require a treatment capacity purchase of approximately $2,333/ERU for all connections. Plain City will need to pay this fee for the 520 existing home to be connected.

ALTERNATIVES EVALUATED:

Alternative	Description	Estimated Cost
1	Do Nothing	Not a Feasible Alternative
2	Upgrade Lagoons, Discharge in Winter, Land Application during Growing Season	$2,437,000, other costs to be negotiated with landowner
3	Regionalization - Divert Some Flows to Central Weber SID	$2,658,000
4	Hybrid Lagoons - SAGR	$9,892,000
5	Conventional Activated Sludge with Nutrient Removal (MLE Process)	$15,371,000
6	Sequencing Batch Reactor	$12,299,000

POSITION ON PROJECT PRIORITY LIST:

This project is ranked 5th out of 8 projects on the Wastewater Treatment Project Priority List.

POPULATION GROWTH:

There are an estimated 2,126 ERUs in Plain City's service area. The following populations for Plain City are taken from the US Census Bureau, City officials, and Utah Governor's Office of Management and Budget (GOMB).

Year	Population
2010	5,476
Current	6,922
Estimated 2020	7,895
Planning year 2037	13,768

PUBLIC PARTICIPATION AND DEMONSTRATION OF PUBLIC SUPPORT:

Plain City Council held a public meeting to discuss the proposed project and passed a motion to request project funding from DWQ. Plain City Council stated their intent to engage additional public participation prior to loan authorization.

IMPLEMENTATION SCHEDULE:

The discussed schedule for implementation of the Plain City construction project is as follows:

WQB Introduction	August 22, 2018
WQB Funding Authorization:	September 26, 2018
Complete Construction	Fall 2019

APPLICANT'S CURRENT USER CHARGE:

The 2016 median adjusted gross income (MAGI) for Plain City is approximately $70,893, which is 60 percent higher that the state average of $44,268. Based on the Board's affordability criterion of 1.4% MAGI, the maximum affordable sewer bill for Plain City is $82.71.

COST ESTIMATE:

The estimated cost of Plain City's participation in the trunk line project is outlined in the following table. Staff prepared a static cost model for this project that is attached.

Item	Plain City Contribution	Funded Project Cost
Planning Advance		$ 55,000
Legal/Bonding		$ 50,000
DWQ Loan Origination		$ 32,000
Engineering, Construction Observation, Legal, Admin. 8%	$ 150,000	
CWSID Treatment Capacity		$ 1,213,000
Trunk Line Construction		$ 1,395,000
Contingency		$ 320,000
Total	$ 150,000	$ 3,065,000
Project Cost		**$ 3,215,000**

COST SHARING:

Funding Source	Cost Sharing	Percent of Project
Local Contribution (cash)	$ 150,000	4.7%
WQB Loan	$ 3,065,000	95.3%
Total	$ 3,215,000	100%

STAFF SUPPORT & RECOMMENDATIONS:

Staff supports the Plain City regionalization project. It is an important water quality project that will enable Plain City to plan for the future of its constituents. In addition, the project has the added benefit of accomplishing high quality effluent produced by CWSID's treatment plant for the served connections.

The attached static cost model shows that the required user rates will be below the Board's affordability criteria of 1.4% of MAGI, i.e., a loan is affordable at interest rates that exceed those of the current market.

SPECIAL COSIDERATIONS:

This feasibility report is an introduction of the proposed project to the Board and as such there are no staff recommendations. Staff will provide recommendations to the Board with the request for funding authorization.

Attachment: Plain City Cost Model

File: Plain City, Admin, Section 1

STATIC COST MODEL - Plain City 2018

Project Costs

Upfront Expenses (planning/design, site prep)	$	55,000
Legal/Bonding	$	50,000
DWQ Loan Origination Fee	$	32,000
Engineering, Construction Observation, Legal, Admin. 8%	$	150,000
CWSID Treatment Capacity	$	1,213,000
Trunk Line Construction	$	1,395,000
Contingency (approx 10% const. cost)	$	320,000
Total Project Cost:	**$**	**3,215,000**

Project Funding

Applicant Contribution	$	150,000
Applicant's Upfront Expenses	$	-
WQB Loan	$	3,065,000
	$	-
Total Project Cost:	**$**	**3,215,000**

Current Customer Base & User Charges

ERU's Plain City	2,036
Total ERU's	2,036
MAGI SDSD:	$70,893
Affordable Monthly Rate at 1.4%	$82.71
Current Impact Fee (per ERU):	$3,075.00
Plain City Current Monthly User Fee (per ERU)	$23.00
Existing O&M expenses Treatment & Collection	$515,000
New O&M expenses Treatment & Collection	$515,000
Existing Sewer Debt Service	$202,200

Funding Conditions

Loan Repayment Term:	20
Reserve Funding Period:	6

ESTIMATED COST OF SEWER SERVICE

WQB Loan Amount	WQB Loan Interest Rate	WQB Loan Debt Service	WQB Loan Reserve	Annual Sewer O&M Cost	Existing Sewer Debt Service	Total Annual Sewer Cost	Monthly Sewer Cost/ERU	Sewer Cost as a % of MAGI
3,065,000	0.00%	153,250	38,313	515,000	202,200	908,763	37.20	0.63%
3,065,000	0.25%	157,305	39,326	515,000	202,200	913,831	37.40	0.63%
3,065,000	0.50%	161,423	40,356	515,000	202,200	918,978	37.61	0.64%
3,065,000	0.75%	165,604	41,401	515,000	202,200	924,205	37.83	0.64%
3,065,000	1.00%	169,848	42,462	515,000	202,200	929,510	38.04	0.64%
3,065,000	1.25%	174,154	43,539	515,000	202,200	934,893	38.27	0.65%
3,065,000	1.50%	178,523	44,631	515,000	202,200	940,354	38.49	0.65%
3,065,000	1.75%	182,954	45,738	515,000	202,200	945,892	38.72	0.66%
3,065,000	2.00%	187,445	46,861	515,000	202,200	951,507	38.95	0.66%
3,065,000	2.25%	191,998	47,999	515,000	202,200	957,197	39.18	0.66%
3,065,000	2.50%	196,611	49,153	515,000	202,200	962,964	39.41	0.67%
3,065,000	2.75%	201,284	50,321	515,000	202,200	968,805	39.65	0.67%
3,065,000	3.00%	206,016	51,504	515,000	202,200	974,720	39.90	0.68%
3,065,000	3.25%	210,807	52,702	515,000	202,200	980,709	40.14	0.68%

Monthly Service Fees	**Cost**	**Special Notes**
Garbage collection (per can within City limits)	$ 8.50	
Garbage collection (per can outside City limits)	$ 18.00	landfill not available
Recycle Cans (per can within City limits) (Econo Waste delivers)	$ 3.54	not available outside city limits
Sewer Collection Fee (all Plain City residents)	$ 13.80	
Sewer Treatment Fee (lagoon system)	$ 9.20	
Sewer Treatment Fee (Central Weber sets this rate)	$ 23.18	
Copy Fees	**Cost**	
Copies (each)	$ 0.15	
GRAMA Research fee's (per hr)	$ 13.00	
GRAMA Request copies (each)	$ 0.25	
Faxes (per sheet)	$ 0.25	
History Book	$ 10.00	
New Construction Fees (single family dwellings)	**Cost**	
Garbage Cans	$ 100.00	
Parks, Recreation & Trails Impact Fee	**$ 1,920.32**	
Public Safety Impact Fee	$ 90.00	
Storm Sewer Fee	$ 790.00	
Sewer Connection	$ 300.00	
Sewer Impact Fee (includes CW impact fee on applicable lots)	$ 3,075.00	
Transportation Impact Fee	$ 575.00	
Rental Fees	**Cost**	
Senior Center-West Room + $100 cleaning deposit	$ 75.00	
Senior Center-East Room + $100 deposit	$ 50.00	
Business License Fees	**Cost**	
Beer License (Class A)	$ 60.00	
Beer License (Class B)	$ 120.00	
Beer License (Class C)	$ 150.00	
Commercial Business License (base fee per year)	$ 60.00	
Door-to-door sales License (per year)	$ 25.00	
Home Occupation License (per year)	$ 50.00	
Excavation Permit (see road cut fee schedule)	$ 75.00	
Filing Fees	**Cost**	
Technical Review Meeting - Zoning, Lot Line, Lot Consolidation	$ 25.00	
Technical Review Meeting - Minor Subdivision (2 lots and under)	$ 50.00	
Technical Review Meeting - Large Subdivision	$ 100.00	
Annexation Filing Fee (plus reimburse for costs incurred to city)	$ 1,000.00	
Land Use Appeal Filing Fee	$ 200.00	
Conditional Use Permit Filing Fee	$ 200.00	
Consolidation of Parcels	$ 200.00	
Lot Line Adjustment	$ 200.00	
Site Plan	$ 200.00	
PRUD (this fee is on top of the subdivision filing fee)	$ 250.00	
Rezone Fee	$ 200.00	
Subdivision Filing Fees	$ 200.00	
per lot	$ 50.00	
Engineering fees (per lot)	$ 105.00	
Planner fees (over 1 hour will be passed on to developer)	$60/hr	
Legal fees (over 1 hour will be passed on to developer)	$85/hr	
Phasing fee (per phase)	$ 100.00	
Subdivision Final Extension	$ 100.00	
per lot	$ 25.00	
Subdivision Plat Amendment	$ 200.00	

STATIC COST MODEL - Plain City 2018

Project Costs

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Project Funding

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Applicant's Upfront Expenses	$	-
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	$	-
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Funding Conditions

Loan Repayment Term:	20
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ESTIMATED COST OF SEWER SERVICE

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3,065,000	3.25%	210,807	52,702	515,000	202,200	980,709	40.14	0.68%

PLAIN CITY APPROVED BUDGET
JULY 2018 THROUGH JUNE 2019

SEWER FUND	06-30-17 ACTUAL	06-30-18 ESTIMATED	06-30-19 APPROVED	
REVENUES				
3410- SEWER USER FEES FEES	533,524.00	540,000.00	560,000.00	
3420- CONNECTION FEES	27,600.00	25,000.00	25,000.00	
3520- IMPACT FEES	339,403.00	300,000.00	300,000.00	
3560-PLANNING GRANT	0.00	55,000.00	0.00	
3620- MISCELLANEOUS REVENUES	5,880.00	2,000.00	2,000.00	
3610- INTEREST EARNINGS	5,208.00	2,000.00	2,000.00	
TOTAL REVENUES	911,615.00	924,000.00	889,000.00	0.00
EXPENDITURES				
4011- SALARIES AND WAGES	106,251.00	140,000.00	145,600.00	
4013 - EMPLOYER TAXES	0.00	10,800.00	11,150.00	
4014- EMPLOYEE BENEFITS	0.00	44,000.00	44,000.00	
4025- EQUIPMENT-SUPPLIES AND MAINT	143,742.00	160,000.00	160,000.00	
4027- UTILITIES	45,531.00	50,000.00	50,000.00	
4031- PROFESSIONAL AND TECHNICAL	7,900.00	70,000.00	25,000.00	
4033 - EDUCATION AND TRAINING	0.00	2,500.00	2,500.00	
4034 - AUDIT SERVICES	0.00	2,000.00	2,000.00	
4036- ENGINEERING		15,000.00	15,000.00	
4058- BONA VISTA - COLLECTION SERVICES	23,754.00	22,000.00	22,000.00	
4059- SEWER CONNECTION-CENTRAL WEBE	23,501.00	25,000.00	20,000.00	
4062-PENSION EXPENSE	2,411.00	0.00	0.00	
4065- DEPRECIATION	166,605.00	160,000.00	175,000.00	
4082- DEBT SERVICE INTEREST	46,895.00	48,000.00	45,000.00	
TOTAL EXPENDITURES	566,590.00	749,300.00	717,250.00	0.00
NET REVENUE OVER EXPENDITURES	345,025.00	174,700.00	171,750.00	0.00

III. DETAILED NOTES ON TRANSACTION CLASSES/ACCOUNTS (continued)

D. Long-Term Liabilities (continued)

Business-type Activities:	Balance June 30, 2016	Additions	Reductions	Balance June 30, 2017	Amounts Due Within One Year
2005 Revenue Bonds	$ 1,708,000	$ -	$ (152,000)	$,556,000	$ 155,000
Landfill Closure Costs	40,348	760	-	41,108	-
Net Pension Liability	35,998	819	-	36,817	-
Total Business-type Activities	$ 1,784,346	$ 1,579	$ (152,000)	$ 1,633,925	$ 155,000

5100 W Sewer Project 2005

2005 Sewer Revenue Bonds. The City issued $3,000,000 in bonds to fund sewer expansion in the City. The proceeds from the bonds will only be received as needed for expansion costs. Principal payments together with interest accruing on the unpaid principal balance at the rate of 3% and are to be made once a year on August 1, beginning August 1, 2006. The bonds will fully mature on August 1, 2025.

The annual requirements to amortize the 2005 Revenue Bonds are as follows:

Year Ended June 30,	2005 Sewer Revenue Bonds 3.00% Principal	Interest	Total
Paid ~~2018~~	~~$ 155,000~~	~~$ 46,860~~	~~$ 201,860~~
2019	160,000	42,210	202,210
2020	165,000	37,410	202,410
2021	170,000	32,460	202,460
2022	175,000	27,360	202,360
2023	180,000	22,110	202,110
2024-2026	551,000	33,300	584,300
Totals	**$1,556,000**	**$ 241,710**	**$ 1,797,710**
	1,401,000		

As of 6-30-18

E. Landfill Closure and Post-Closure Care Costs

State and federal laws and regulations require the City to place a two foot final cover on its landfill site with additional seed, mulch, and fertilizer. Although closure and post closure costs will be paid near the date that the landfill stops accepting waste, the City still reports these closure costs as an operating expense in the period based on the landfill capacity used. As of June 30, 2017 the estimated liability for landfill closure is $41,108 which is based on the original projection and adjusted for inflation each year, as required by the original permit. The City is funding the estimated liability each year with a deposit to a separate bank account within the Landfill Fund. The total estimated cost is currently funded and will be adjusted each year for inflation.

PROJECT PRIORITY LIST DATA SHEET

PROJECT NAME: SDSD South

Staff Reviewer: JKM

PROJECT STATUS:	
1. New interceptor and treatment.	
2. Improve system to meet secondary standards.	X
3. Improve treatment to meet water quality standards.	
4. Future needs for interceptor and/or treatment	
5. Future needs for improvement and/or expansion	
6. Project in planning phase	X
7. Project in design phase	
8. Project under construction	
9. Other (describe)	

I. PROJECT NEED POINTS:	**50**
1. Documented substantial health hazard	0
2. Raw sewage discharge	0
3. Impaired surface WQ standards (R317-2)	0
4. Impaired ground WQ standards (R317-6)	0
5. Need to provide secondary treatment or meet UPDES or ground water permit or Sludge regs.	50
6. Documented WQ degradation due to septics	0
7. Chronic failure of on-site systems	0
8. 95% capacity	0
9. Facilities do not meet design criteria in R317-3 or 6	0
10. Existing GW, pollution, or public health concerns	0
11. Regionalization	25
12. Future needs for existing system	10
13. Future needs for new system	0

II. POTENTIAL FOR IMPROVEMENT POINTS	**10**
1. Discharge Stream	(name of water body)
Water Use Classification	1A, 2A, 3B, 4, etc.
Classified Water Use Point Total:	0
2. Discharge Standard Factor:	0
3. Water Quality Use Restoration:	0
4. Estimated improvement:	10

III. POPULATION POINTS:	**5**
Population Serviced:	6922
Data Source:	(lots, ERUs, GOPB)

IV. SPECIAL CONSIDERATION POINTS:	**40**
1. interceptor sewer necessary to regionalization plan	20
2. Project needed to preserve high quality waters	0
3. Project will change facility's sludge disposal practice from non-beneficial to beneficial use method	0
4. Users of proposed project are subject to documented water conservation plan	0
5. The sponsor of the proposed project has completed and submitted the most recent Municipal Wastewater Planning Program (MWPP) questionaire	20
6. The sponsor of the proposed project, or its member entities, is certified as meeting the requirements for a Quality Growth Community	0

TOTAL POINTS	**105**
I. PROJECT NEED:	50
II. POTENTIAL FOR IMPROVEMENT	10
III. POPULATION	5
IV. SPECIAL CONSIDERATION	40

Reviewer Initials:

Date:

APPLICATION FORM FOR PROJECT ASSISTANCE
FROM THE UTAH STATE WATER QUALITY BOARD

Application Number: _____
(LEAVE BLANK-FOR STATE USE ONLY)
Preapplication Meeting Date:_____

PROJECT IDENTIFICATION AND DESCRIPTION

1. APPLICANT: Plain City Corporation
(Municipality, Sewer District, Special Improvement District, etc.)
Address: 4160 West 2200 North
City: Plain City Zip Code: 84404
EIN # _____
DUNS # _____
Phone: 801-731-4908

2. PRESIDING OFFICIAL: Mayor Jon Beesley
(Name and Title)

3. CONTACT PERSON: Mayor Jon Beesley
(Name and Title)

4. TREASURER/RECORDER: Treas - Steve Davis, Rec - Diane Hirschi
(Name and Title)

5. CONSULTING ENGINEER: Gary Vance, P.E.
(Name and Title)
Name of Firm: J-U-B ENGINEERS, Inc
Address: 466 North 900 West
City: Kaysville Zip Code: 84037
EIN # 82-0290774
Phone: 801-547-0393

6. BOND COUNSEL: _____
(Name and Title)
Name of Firm: Smith Hartvigsen
Address: 257 East 200 South, Suite 500
City: Salt Lake City Zip Code: 84111
Phone: 801-413-1620

7. FINANCIAL ADVISOR: _____
(Name and Title)
Name of Firm: _____
Address: _____
City: _____ Zip Code: _____
Phone: _____

For the following questions please attach explanations on a separate sheet if adequate space is not provided on this form.

8. DESCRIPTION OF PROJECT SETTING
   A. Location of the Project: Plain City, UT
   B. County: Weber County

9. GENERAL PROJECT OVERVIEW
   A. Description of the project: Plain City to pay for the segment of proposed Central Weber SID trunkline that will be routed through the east side of the city. The new trunkline would pick up a portion of existing and future growth in Plain City, approximately 2,120 ERUs. Includes demo of up to three existing lift stations and tie-ins to new trunk line.
      (1) Year construction will be initiated: 2019
      (2) Year of completion: 2019
      (3) Total project cost: $2.65M to Plain City

   B. Position on the Utah Priority List #_____ List Date: _____

   C. Explain why project is needed: Diverts existing and future flows away from the lagoons, freeing up capacity in both the treatment and collection system. Gives the city time to comply with the phosphorus load cap rule and hydraulic deficiencies even as growth continues to occur. Eliminates up to three lift stations in the city.

   D. State and Federal water quality and public health regulations to be addressed by the project: Phosphorus load cap rule, hydraulic deficiencies in both the treatment system and collection system.

   E. What good faith efforts to secure all of part of services and funds from the other funding agencies: _____

   F. Public participation: City council meetings
      (meetings, fact sheets, referenda, etc.)

   G. Describe Demonstrations of Public support for project: Motion from City Council to prepare project funding application.

   H. Type of planning document prepared: Wastewater Treatment Facilities Plan
      (Facility plan, engineering report, etc.)
      Planning Document Date: July 2018 (draft)
      (Note: Enclose a copy of current planning document.)

FINANCIAL ASSESSMENT - ESTIMATED ANNUAL COST OF SEWER SERVICES

1. PROJECT COST ESTIMATE:
   A. Construction
      (1) Wastewater treatment plant: ..... $
      (2) Pump stations: ..... $
      (3) Interceptor sewers: ..... $
      (4) Collection sewers: ..... $ 1,394,000
      (5) Small systems (neighborhood or community septic tanks): ..... $
      (6) Land acquisition: ..... $
      (7) Other (specify): _____ ..... $
      (8) Other (specify): _____ ..... $
      (9) Other (specify): _____ ..... $
      (10) Other (specify): _____ ..... $

      (11) Total Construction Costs: .....(1.A(11)) ..... $ 1,394,000

   B. Other Project Costs:
      (1) Engineering - Planning ..... $
      (2) Engineering - Design ..... $ 21,000
      (3) Engineering - CMS ..... $ 16,000
      (4) Engineering - Other ..... $ 3,000
      (5) Legal – Bonding ..... $ 2,000
      (6) Legal - Rights of Way & Easements ..... $
      (7) Other (specify): Impact Fees to CWSID ..... $ 1,213,000
      (8) Other (specify): _____ ..... $
      (9) Other (specify): _____ ..... $
      (10) Other (specify): _____ ..... $

      (11) Total Other Costs: .....(1.B(11)) ..... $ 1,255,000

2. ESTIMATED ANNUAL COSTS:
   A. Operation & Maintenance Costs of the Proposed Facility*
      (1) Labor: ..... $ 195,000 per year
      (2) Utilities: ..... $ 100,000 per year
      (3) Materials: ..... $ 10,000 per year
      (4) Contracted services (i.e. laboratory): ..... $ 20,000 per year
      (5) Miscellaneous expenses: ..... $ 40,000 per year
      (6) Equipment replacement: ..... $ 150,000 per year

      (7) Total OM&R costs: .....(2.B)(7)..... $ 515,000 per year
   *Include current O&M costs which will continue with the new facility

   B. Existing annual debt service: ..... $ 202,200 per year
      (for sewer services only, attach a copy of debt authorization schedules)

   C. Estimate costs for installation of individual service laterals
      (if the project includes a new collection system): .....$ _____

3. FINANCING THE NEW FACILITIES
   A. Total construction cost (from 1.A(11)):.....$ 1,394,000
   B. Other Project Costs (from 1.B.(10)): .....$ 1,255,000

   C. TOTAL PROJECT COSTS.....$ 2,649,000

   D. Funds available for the project
   (reserve accounts, contingency, etc.):.....$ To be determined

   E. Grants (specify agencies and status of funds):
   _____.....$_____
   _____.....$_____

   F. Other sources of funding (specify):
   _____.....$_____
   _____.....$_____
   _____.....$_____

   G. TOTAL FUNDS AVAILABLE .....$ To be determined

   H. AMOUNT TO BE FINANCED (from 3.C - 3.G.):.....$ To be determined

4. BOND MARKET FORECAST INFORMATION

   A. Estimated terms your project would be required to meet if project was financed through the sale of a bond on the open market.
   Interest Rate: ....._____
   Term:......_____
   Principal Amount:.....$_____
   Source:....._____
   Comments: ....._____

5. DEBT STRUCTURE OF YOUR COMMUNITY
   A. Legal general obligation debt limit:
   (1) Assessed Valuation:.....$_____ x 12% =....$_____
   (2) Less: Current Annual General Obligation Debt: .....$_____
   (3) Available General Obligation Debt Limit (1)-(2) .....$_____

6. DEMOGRAPHIC OUTLINE
   A. Population Estimates:
   (1) Current Population:.....6,922
   (2) Population in 2010:.....5,476
   (3) Estimated Population in 2020:.....7,895
   (4) Planning Year Population:.....13,768
   (5) Planning Year: 2037
   (6) Source of Estimates: US Census Bureau, City officials, GOMB

B. Current Cost of Sewer Service:

(1) Current basic, monthly user charge:

Residential.....$ 23.00
Commercial.....$ 23.00
Industrial .....$ N/A

(2) If user charges are based on water usage:

Base Rate .....$ / Gallons
Overage Rate.....$ / Gallons

(3) If property tax, or other tax, is levied to fund sewer debt, operation or maintenance:

Tax Rate (for sewer only) .....
Assessed Valuation .....$
Annual Revenue from Taxes .....$

(4) Is sewer service subsidized by any other source of revenue not previously mentioned, please explain: _____

C. Impact & Hookup Fees:

(1) Current Impact Fee: .....$ 3,075
(2) Current Hookup Fee: .....$ 300
(3) Have you completed a Capital Facilities Plan which meets the requirement of the Utah Impact Fee Act? Yes: ☒ No: ☐

Please attach a copy of the Capital Facilities Plan

D. Current number of equivalent residential connections: .....2,036 (+90 to CWSID)

(1) Last year's annual sewer user charge revenue: .....$ 533,524
(2) Last year's annual, residential, user rate: .....$ 23.00
(3) Revenue Divided by User Rate (1)/(2)* 1,933
*a rough estimate of residential equivalent connections

E. Median Adjusted Gross Income (to be completed by DWQ staff)

Year: _____
MAGI: _____

F. Major Industries and approximate percent of workforce employed by each:

There are no industries in Plain City and limited commercial

_____
_____

G. Please list additional capital intensive projects which your community is planning or will require in the near future? (Please include such needs as schools, roads, water systems, parks, municipal buildings, etc.)

Project Description	Projected Construction Date	Estimated Cost
3600 West road reconstruction (Grant by WFRC)	2020	$ 3,100,000 (Grant)
		$

Project Description	Projected Construction Date	Estimated Cost
		$

H. Please provide audited financial statements for the past two years and a copy of your current operating budget.

I. Please provide a copy of your current sewer rate ordinance and user charge system.

Signature of person responsible for completion of this form:

_____

Signature of Authorized Representative:

_____

REMINDER

Have you remembered to enclose the following:

1. Facility Plan or other planning documents.
2. Amortization table for each outstanding debt.
3. Financial statements for the past 2 years plus this year's current budget.
4. Current sewer rate ordinance and user charge system.
5. Capital Facilities Plan which meets the Utah Impact Fee Act.

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Chapter 1
SEWER SERVICE REGULATIONS

8-1-1: PUBLIC WORKS DEPARTMENT:

A. Creation: The public works department is hereby created. It shall comprise all of the property, equipment and personnel necessary to the maintenance and operation of the city's sewage collection and disposal system. The department shall administer the operation and maintenance of the city sewer system.

B. Public Works Director: There is hereby created the position of public works director.

C. Duties: The public works director shall manage and supervise the city's sewer system under the direction of the city council, which from time to time shall by resolution or otherwise, prescribe his powers and duties and direct the manner and frequency with which he shall make reports to the mayor relating to the sewer system. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-2: USE OF SYSTEM MANDATORY:

It shall be unlawful for the owner or any other person occupying or having charge of any premises within the city which are located within three hundred feet (300') of a sewer main to dispose of sewage therefrom by any means other than by use of the city sewer system. It shall be unlawful to construct or to continue the use of any other sewage disposal system such as a privy vault, cesspool or septic tank on the property, except by written approval of the city council in cases of undue hardship. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-3: APPLICATION FOR SERVICE:

A. Agreement: Any person who desires or is required to secure sewer service when such service is available from the city sewer systems shall apply therefor to the city recorder or public works director and file an agreement with the city which shall be on file in the city office.

B. Nonowner Applicants: Applications for sewer service made by the tenant or an owner must, in addition to the above requirement, be guaranteed by an agreement signed by the owner of the premises or his duly authorized agent in such form as is on file in the city office.

C. Treatment Costs: All costs and expenses associated and incidental to providing for the required handling and treatment of all sewage including inflow and infiltration (I/I) shall be borne by all users of the Plain City public sewer system. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-4: FEES:

A. Service Rates And Connection Fees: The sewer service rates, penalty fees for delinquency in payment and connection fees shall be fixed from time to time by resolution or ordinance of the city council. The city council may from time to time enact rules for levying, billing, guaranteeing and collecting charges for sewer services and all other rules necessary for the management and control of the sewer system.

B. Special Rates: The city council may from time to time fix by agreement or resolution special rates and conditions upon such terms as they may deem proper for users of the sewer service discharging wastes of unusual characteristics or making use thereof under exceptional circumstances.

C. Annual Review: The city council shall review the total annual cost of operation and maintenance and the long term debt service relating to the public sewer system, not less often than once every year. The user charge system shall be set so as to be no higher than the level necessary to assure equity of the system is established, and to assure that sufficient funds are obtained from the city's user charge system to:

1. Adequately operate and maintain the wastewater treatment works;

2. Cover debt service; and

3. Provide for adequate reserves.

Users will be notified at least annually of any changes to the user charge system.

D. Complaints; Corrections: The city council is hereby constituted a board of equalization of sewer rates to hear complaints and make corrections of any assessments or charges deemed to be illegal, unequal or unjust. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-5: STATEMENT OF CHARGES; DELINQUENCY:

A. Statement: The public works department, or such other person as the city council may designate, shall furnish to each user or mail or leave at his place of residence or usual place of business, a written or printed statement stating the sewer service charges assessed against him once each month or at such other regular intervals as the city council shall direct. The statement shall specify the amount of the bill, the place of payment and the date due.

B. Notice Of Delinquency: If any person fails to pay his sewer charges within thirty (30) days of the due date, the city recorder or the public works director shall give the customer notice in writing of the intent to discontinue the service of water to the premises unless the customer pays the bill in full within five (5) days from the date of notice.

C. Discontinued Service: If the water service is thereafter discontinued for failure to make payment of the sewer service charges, before the water service to the premises shall again be provided, all delinquent sewer charges must have been paid to the city treasurer or arrangements made for their payment that are satisfactory to the city.

D. Reconnection: In the event water is turned off for nonpayment of sewer charges, before the water service to the premises shall again be provided, the customer shall pay, in addition to all delinquent charges, such extra charge for turning the water on and off as the city council may have established by resolution or ordinance.

E. Interest Charges: The mayor and city council may, at their discretion and in circumstances that are equitable, impose interest as a penalty at the highest legal rate on all past due accounts either for connection fees, user charges, maintenance, repair, or any other legally imposed charges as authorized by this chapter.

F. Legal Proceedings: If any person fails to pay his sewer charges within thirty (30) days of the due date, the city recorder or the public works director is hereby authorized to take all action necessary to enforce collection, including, but not limited to, the commencement of legal proceedings in a court of proper jurisdiction seeking judgment for the amount of the delinquent fees and service charges and all costs of collection, including court costs and attorney fees. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-6: INSTALLATION AND CONNECTION TO SYSTEM:

A. Permit Required: It shall be unlawful for any person to directly or indirectly engage in the laying, repairing, altering or connecting of any drain or sewer pipe connected with or part of the city sewer system without first having received a permit from the office of the city recorder or the public works director.

B. Licensed Plumber; Exception: It shall be unlawful for any person to connect any drain or sewer pipe with the city sewer system unless the person is a duly licensed plumber or unless, in the absence of a duly licensed plumber, any proposed connection to, alteration of or change of connection to the sewer system shall be first submitted to the public works director for review and approval. After such approval, the installation or work done shall be subject to inspection by the public works director or his agent.

C. Connection To Basement: In order to determine the feasibility of connecting a basement or proposed basement to the sanitary sewer, the owner or plumber may make application for a trial sewer survey, the cost of which shall be as established from time to time by resolution of the city council. The result of a trial sewer survey shall not constitute a permit to connect to the sewer and is merely for information purposes.

D. Plumbing Requirements: Permits to connect to the city sewer system shall not be issued unless the plumbing in the house or building to be connected is in accordance with the provisions of the building and plumbing codes of the city.

E. Revocation Of Permit: All construction permits for sewer connections or installations shall be issued to the plumber who is to do the work or to the owner of the property, subject to the supervision and inspection by the public works director or his agents. The city recorder or public works director may at any time revoke a permit because of defective work or because of undue delay in completing the permitted work. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-7: PIPE REQUIREMENTS:

A. Good Repair: All users of the sewer services shall keep their service pipes, connections and other apparatus in good repair and protected from frost at their own expense. No person, except under the direction of the public works director, shall be allowed to dig into the street for the purpose of removing or repairing any sewer service pipe or main.

B. Quality Of Service Pipe: All service and other pipes used in conjunction with the sewer services of the city shall be of such material, quality and specifications as the city council may from time to time by resolution provide, and shall be installed at such distances belowground as may be specified by regulations relating to the public works department. All work, alterations or extensions affecting sewer pipes shall be subject to the acceptance of the public works director, and no connections with sewer mains shall be made without first obtaining a permit therefor from the city recorder or public works director. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-8: ACCESS BY DEPARTMENT:

The public works director and his agents shall at all ordinary hours have free access to places supplied with sewer services from the city system for the purpose of examining the apparatus, ascertaining the sewer service being used and the manner of its use. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-9: PROHIBITED USES AND REGULATIONS:

A. Scope: The city council shall have power to and retains the right to adopt regulations controlling the manner and circumstances under which the sewer system may be used in addition to the regulatory provisions set forth expressly in this chapter.

B. Inflammables: It shall be unlawful for any person to injure, break or remove any part or portion of any sewer appliance or appurtenance, or to discharge into a sewer any inflammable gas, gasoline or oil, any calcium carbide or residue therefrom, or any liquid or other materials or substance which will emit an inflammable gas when in contact with water, sewage or fire. Oil separators installed in any building where volatile fluids are used must not be connected directly or indirectly with a sewer.

C. Excess Residential Waste: Unless permitted, it shall be unlawful for any person to discharge, or cause to be discharged into the public sewer system, waste that is deemed by the city to be in excess, or abnormal from that expected from a typical residential user. Abnormal residential discharge includes, but may not be limited to, excess flow, excess total suspended solids (TSS), and excess biological oxygen demand (BOD). Discharge of these wastes may be permitted if additional charges and/or conditions are imposed by the city.

D. Waste From Certain Establishments: The contents of waste pipes from water filters, gas engines, air compressors, vacuum or dry cleaners, garages, wash racks, stores or warehouses containing inflammable substances, car barns, buildings for the stabling or keeping of horses, cows and other animals, or plants using milk or processing milk products, shall not be disposed of through connection with a sanitary sewer, unless such contents are discharged into settling tanks properly trapped and vented. The construction of such tanks must be approved by the city engineer, and must be subject to his inspection, approval or condemnation before cement is poured and at all times thereafter until completion of such construction. Upon condemnation by the city engineer, the sewage from the tanks shall not be allowed to flow into the sewer until satisfactory alterations have been made and the construction approved by the city engineer.

E. Obstructive Materials: It shall be unlawful for any person to empty or discharge into the public sanitary sewer any garbage, refuse or other similar matter or substance likely to obstruct the sewer, or any substance, solid or liquid other than the waste products for which the sewer is provided.

F. Drainage Waters And Destructive Materials: It shall be unlawful for any person to connect with a public sanitary sewer any drain or pipe which discharges rainwater, cellar or surface water, acids, alkalis, lye or other injurious liquids, or the contents of any spring, flowing well, creek, ditch or other watercourses. No boiler or heating plant shall be directly connected to the sanitary sewer. The overflow from boilers or heating plants, when cooled to a temperature not to exceed one hundred twenty degrees Fahrenheit (120°F), will be allowed to run to a sump, which sump shall be connected to the sewer. The discharge of the contents of waste pipes from water filters, gas engines, air compressors, vacuum or dry cleaners, garages, wash racks, stores or warehouses which contain inflammable substances, buildings for the stabling or keeping of horses, cows and other animals, and all similar establishments, shall not be made into or connected with a sanitary sewer, unless such contents are discharged into settling tanks properly trapped and vented. Settling tanks shall be constructed of a material approved by the public works director and shall be at all times subject to his inspection and approval or condemnation. Upon condemnation by the public works director, the sewage from said tanks shall not be allowed to flow into sewer until satisfactory alterations have been made and the construction approved by the public works director.

G. Control Of Harmful Waste: If any water or wastes are discharged, or are proposed to be discharged to the public sewer system, which contain the substances or possess the characteristics enumerated in this section, or which are determined by the city to have a deleterious effect upon the wastewater facilities, processes, equipment, or receiving waters, or which otherwise create a hazard to life or constitute a public nuisance, the city may:

1. Reject the wastes;

2. Require pretreatment to and acceptable condition for discharge to the public sewers;

3. Require control over the quantities and rates of discharge, and/or wastes not covered by existing taxes or sewer charges under the provisions of this chapter. If the city permits the pretreatment or equalization or waste flows, the design and installation of the plants and equipment shall be subject to review and approval of the city.

H. Destruction Of System: It shall be unlawful for any person to destroy, deface, injure or interfere with the operation of any part or appurtenance of the sewer system.

I. Ownership Of Connecting Lines: Unless a provision is expressly made for ownership of mains or lines by the owner of the adjacent property by means of written agreement, all lines and mains connecting the sewer system to a landowner's or resident's premises which are situated on the public way between the main and the property line shall be deemed to be the property of the city and subject to its absolute control and supervision even though actual installation may have been performed by the owner or resident of the premises.

J. Sewer Manholes: It shall be unlawful for any person to open any sewer manhole without permission from the public works director. (Ord. 2005-08, 8-18-2005, eff. 8-18-2005)

8-1-10: PENALTY:

Any person, firm or corporation who shall violate any of the provisions of this chapter shall be guilty of a class C misdemeanor and, upon conviction, subject to penalty as provided in section 1-4-1 of this code. If any violation be continued, each day's violation shall be deemed a separate offense. (Ord. 2009-04, 5-7-2009, eff. 5-7-2009)

PLAIN CITY

WASTEWATER TREATMENT FACILITIES PLAN

-DRAFT FOR COUNCIL REVIEW-

JULY 2018

Prepared by

J-U-B ENGINEERS, Inc.
466 North 900 West
Kaysville, UT 84037

Project No. 55-17-031

Foreword

Plain City, in conjunction with J-U-B Engineers, has undertaken to complete this Wastewater Treatment Facilities Plan. The outline of this report follows the United States Department of Agriculture (USDA) Rural Utilities Service (RUS) Bulletin 1780-2 for development of Preliminary Engineering Reports including the Utah Supplement to Bulletin 1780-2 (both dated April 4, 2013). This PER format is suitable for submittal to USDA and DWQ for potential project funding and for use by the City in planning decisions

This Facilities Plan was substantially developed in 2018 and covers an assumed 20 year planning period to 2037. Periodic updates are recommended and all capital cost opinions are based on typical observations of construction costs observed in the 2018 time period. Future project costs should be escalated with an appropriate inflation factor.

1.0 PROJECT PLANNING

a) Location

Plain City is a growing community located in Weber County northwest of Ogden. In 1858, the area was surveyed by a group of farmers from Lehi and Kay's Creek looking for a new place to settle. Led by Lorin Farr, the group settled in 1859. The City was named City of Plains because of the large, open, flat valley the city is located in. The name was later changed to Plain City. According to the United States Census Bureau, Plain City has a total land area of 11.73 square miles.

Plain City is a quiet, rural, and family-friendly community. However, the City is beginning to feel development pressure and become more of a suburban bedroom community due to its desirable location near the fast-growing Ogden and Salt Lake City metropolitan area. A map showing the project planning area and city limits is included on the following page.

b) Environmental Resources Present

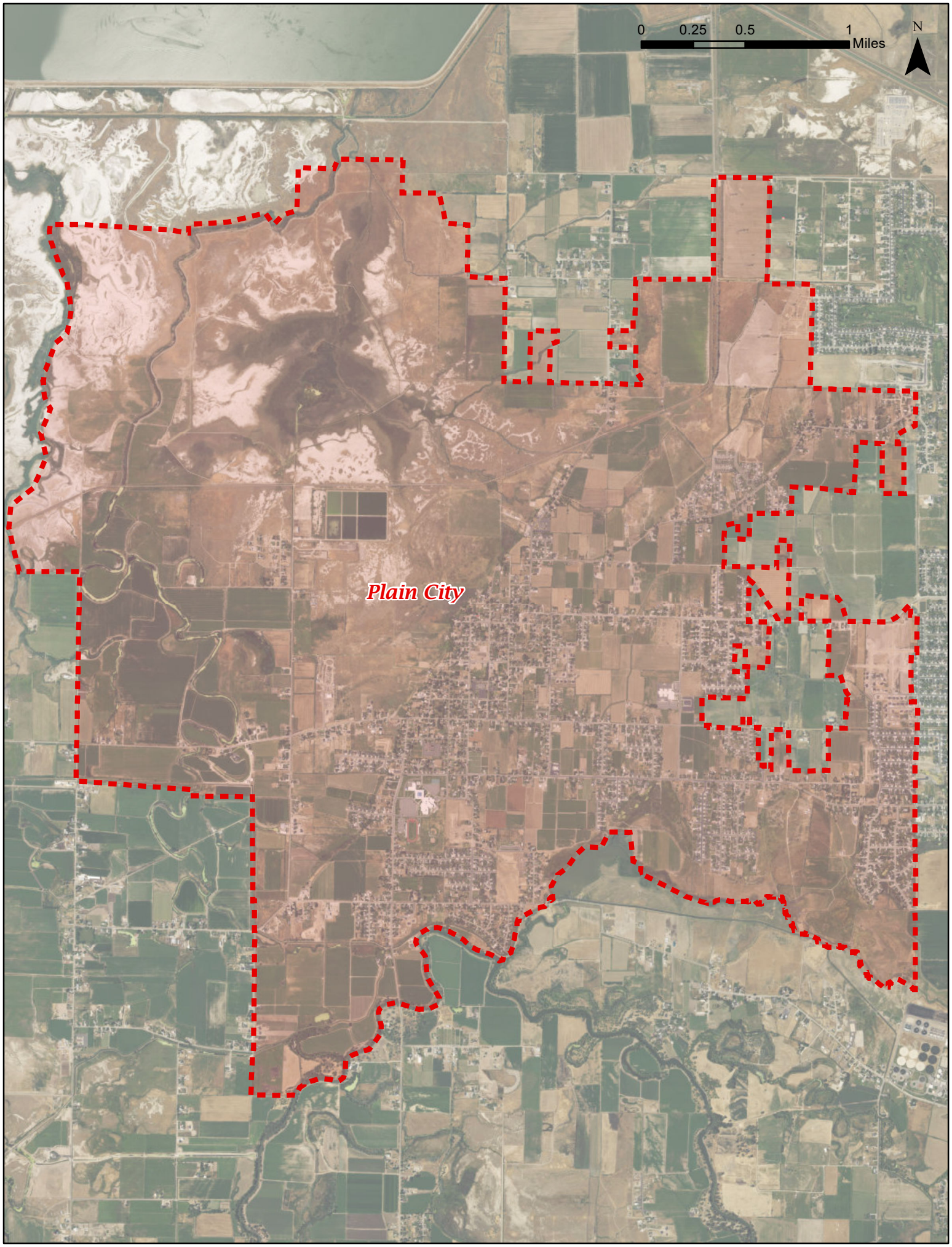
A detailed assessment of environmental resources present is not part of the scope of this report, but may be required in the event the City seeks state or federal funding for projects. The City should be aware when planning potential wastewater treatment projects that environmental resources will likely need to be addressed, including the following:

- The presence of jurisdictional wetlands in the lower areas of the City, mostly along the Weber River corridor;
- The presence of floodplains along the Weber River; and
- The potential presence of candidates for the Federal Endangered Species list in Weber County including yellow-billed cuckoo, and gray wolf.
- The potential presence of species in Weber County with Conservation Agreements in place in order to preclude the need for Federal listing including Bluehead Sucker, Bonneville Cutthroat Trout, Columbia Spotted Frog, and Northern Goshawk.

Although not always the case, wastewater improvements are often constructed in existing rights-of-way that have limited impact on the environment (e.g., on the edge of a road or at an existing treatment site). In the event the City seeks state or federal funding, they should consult with potential funding partners relative to the scope of the environmental review required. A less extensive review under a Categorical Exclusion (Cat-Ex) may be feasible. Appendix A is reserved for maps, figures, or analysis that may be needed for a more detailed environmental assessment.

c) Population Trends

Utah Division of Water Quality requires that a 20-year treatment solution be developed during the facility planning process. Therefore, an essential aspect of treatment facility planning is future population projections. Census data indicates the City has experienced moderate population growth until the year 2000 and robust growth since then. Since 2000 the average annual growth rate has been over 3 percent. The City's 2010 population according to the U.S. Census Bureau was 5,476 people.


0
0.25
0.5
1
Miles
N
Plain City

The trend of rapid population growth is expected to continue into the future, as shown below in Table 1-1. The population projection is based on estimates from the U.S. Census Bureau providing the average number of people per household, the number of residential connections in Plain City provided by Bona Vista Water Company, and estimates of how many new homes are anticipated to be constructed through the year 2027 provided by city officials. This analysis predicts an average growth rate of 3.32% from 2010 through 2040. As shown in Table 1-1, the projections result in a residential population of 13,768 in the year 2037. This is the population that will be used when planning 20-year treatment facilities.

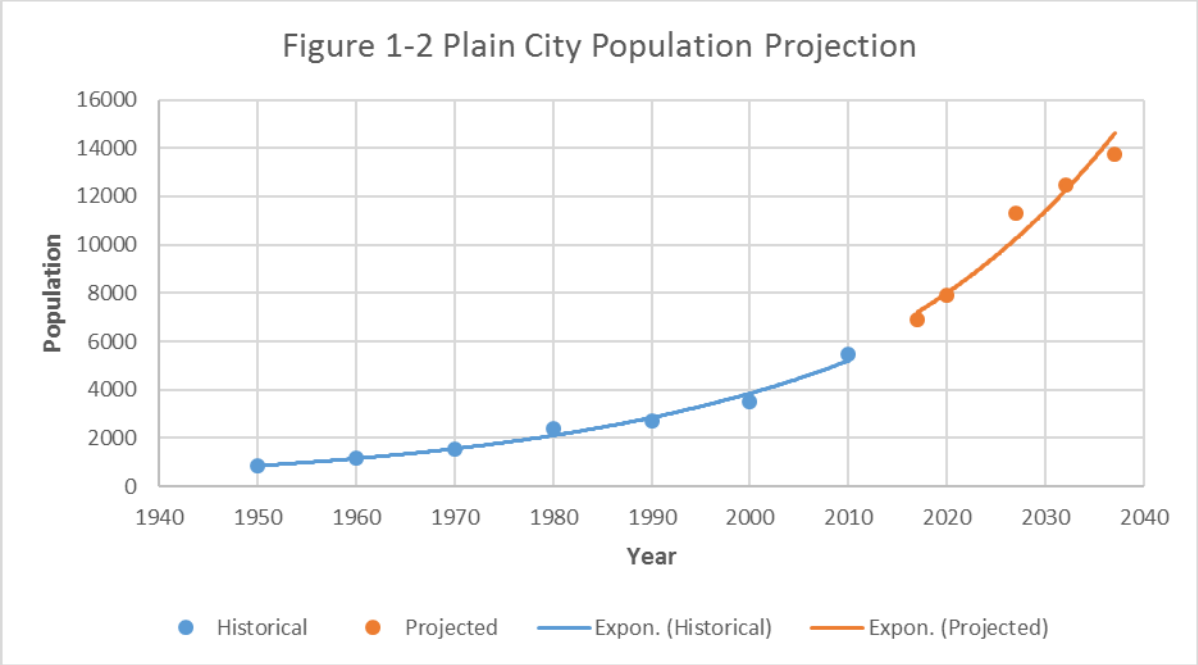
Table 1-1. Plain City Design Population Estimates (Planning Period is 2017 to 2037)

Year	Published Population Data or Published Estimates[1,2]	AARC Between Reporting Periods For Published and Proposed Population for Wastewater Master Plan[3]
1950	829	-
1960	1,152	3.34%
1970	1,543	2.97%
1980	2,379	4.42%
1990	2,722	1.36%
2000	3,489	2.51%
2010	5,476	4.61%
2017	**6,922** [4]	**3.40%**
2020	7,895 [5]	4.48%
2027	11,295 [6]	5.25%
2032	12,470	2.00% [7]
2037	**13,768**	**2.00%** [7]
2040	14,611	2.00% [7]

1. Population numbers for 1950 to 2010 are from the U.S. Census data.
2. Population projections for 2010 to 2040 are from the U.S. Census Bureau that provided number of people per home, Bona Vista Water that provided number of connections for Plain City, and anticipated number of new homes provided by city officials.
3. Annual Average Rate of Change (AARC) is 3.20% from 1950 to 2010 and the AARC is 3.32% from 2010 to 2040.
4. 2,036 connections from Bona Vista Water that flow to Plain City lagoons, 3.4 people per household per US Census data.
5. 286 lots already approved that will be constructed through 2019 (from city officials).
6. 1,000 additional lots anticipated to be developed between 2020-2027 (from city officials).
7. Assumed 2.0% growth rate from 2027-2037.

Table 1-1 is illustrated graphically on the following page in Figure 1-2. The red line in the figure shows the population projections using the U.S. Census, Bona Vista Water, and information from city officials.

It should be noted that Plain City is almost entirely a residential/bedroom community. At this time, the only commercial entities in the City are a gas station and a grocery store. Modest commercial growth is anticipated in the future.



d) Community Engagement

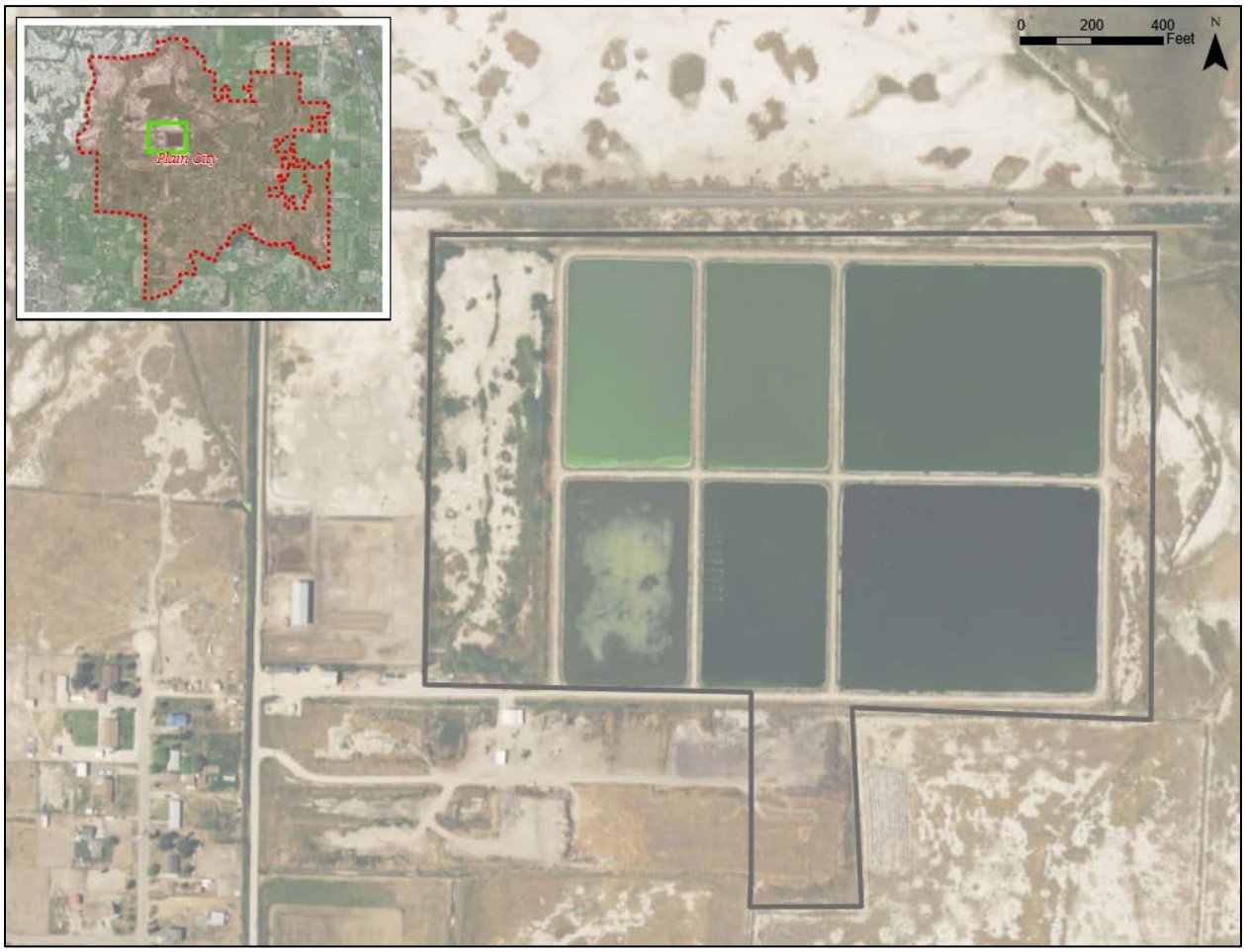
The following approach is proposed for community engagement during the wastewater treatment facility master planning process:

- Engineer will conduct one project kickoff meeting and two interim meetings to coordinate findings, questions, and provide project status updates.
- Engineer will coordinate by phone, email, or in person with City staff including progress meetings to review each chapter of the Master Plan report;
- Engineer and City staff will meet with Utah Division of Water Quality staff to introduce the planning effort and seek early feedback from DWQ as the plan is developed;
- Engineer will give a presentation to the City Council at a project junction when the assumptions are fully developed; the presentation will identify existing system deficiencies and will describe the alternatives being considered and their costs. All City Council sessions are open to the public;
- Engineer will work with Public Works and the City Council and staff to score and rank the proposed alternatives and determine a recommended alternative;
- Engineer will give a second presentation to the City council which will be an executive summary describing the recommended alternative in detail;
- Once there is a recommended alternative, the City will host an open house for the public showing the deficiencies, alternatives, recommended alternative, likely funding sources, and possible impact to user rates. Public comments will be received;
- In the event the City does seek funding sources, the City will hold the requisite public hearings as required by the funding or bonding agencies. Some of the funding agencies may require that an environmental document be completed and submitted to the agency.

2.0 EXISTING FACILITIES

a) Location Map

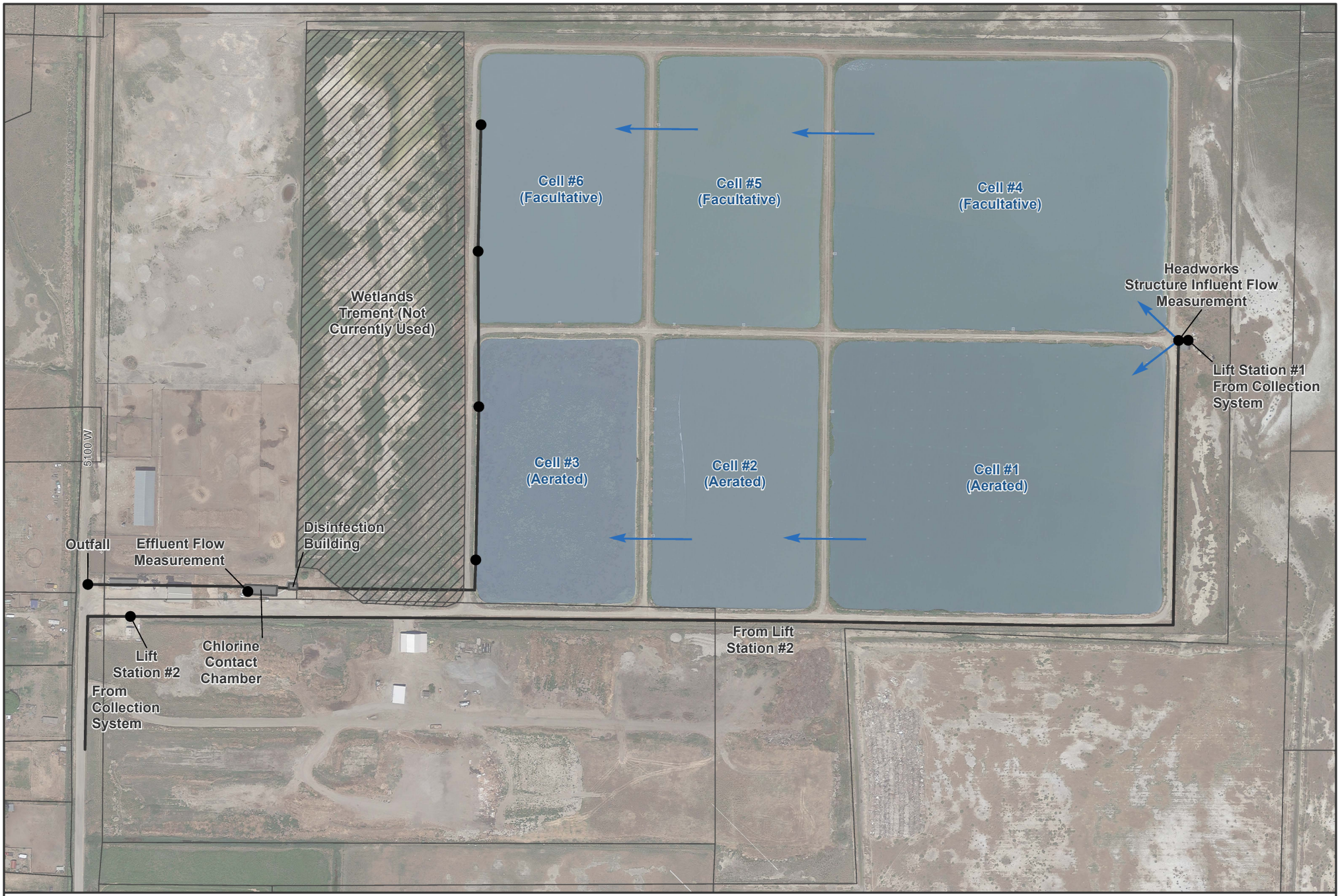
Figure 2-1 Location Map



b) History

Plain City has undergone rapid growth in recent years and this pace of growth is expected to continue for the foreseeable future. This growth has taxed the City's infrastructure, particularly the sewer collection and treatment systems.

The treatment facility consists of a six cell facultative lagoon system that was originally constructed in 1970. After nearly 50 years of service the facility is in need of improvements. The system has undergone minor improvements over the years and generally operates well but has occasional challenges meeting permit limits. The biggest modification was the installation of a new chlorine contact chamber and numerous submerged/aerated bioreactors in the south treatment train approximately 10 years ago.



Plain City Wastewater Treatment Facilities Plan

N

0 200 400 Feet

J-U-B ENGINEERS, INC.

THE LANGDON GROUP a J-U-B Company

GATEWAY MAPPING INC. a J-U-B Company

OTHER J-U-B COMPANIES

The current average day flow to the facility is 0.455 MGD with a maximum month flow of 0.699 MGD. The current average discharge rate is 0.406 MGD. The facility is permitted to discharge 0.6 MGD per day.

Collection System

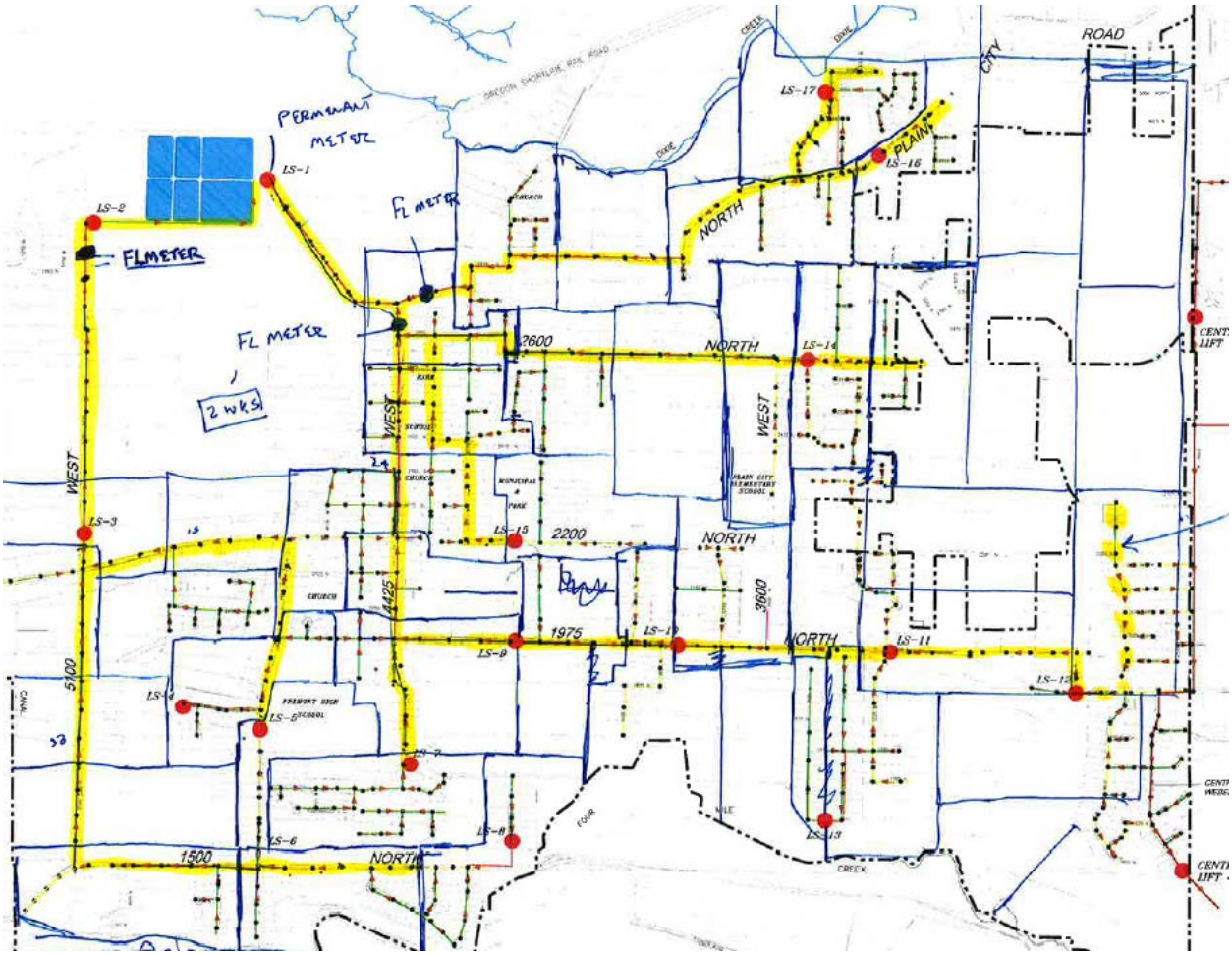
Expansion of the collection system has occurred with limited planning and bottlenecks in the system are becoming apparent. The area's flat topography requires numerous pumping stations (18 in total) and in many instances double or triple pumping of wastewater occur.

The condition of the sewer is also in question since peak flows seem to be excessive during periods of wet weather. The City routinely videos and cleans their collection system and have proactively been trying to repair problematic areas as money becomes available. In addition, it appears that much of the inflow during wet weather can be attributed to basement sump pumps that were illegally connected to the sewer system. The City is actively working to remove these connections.

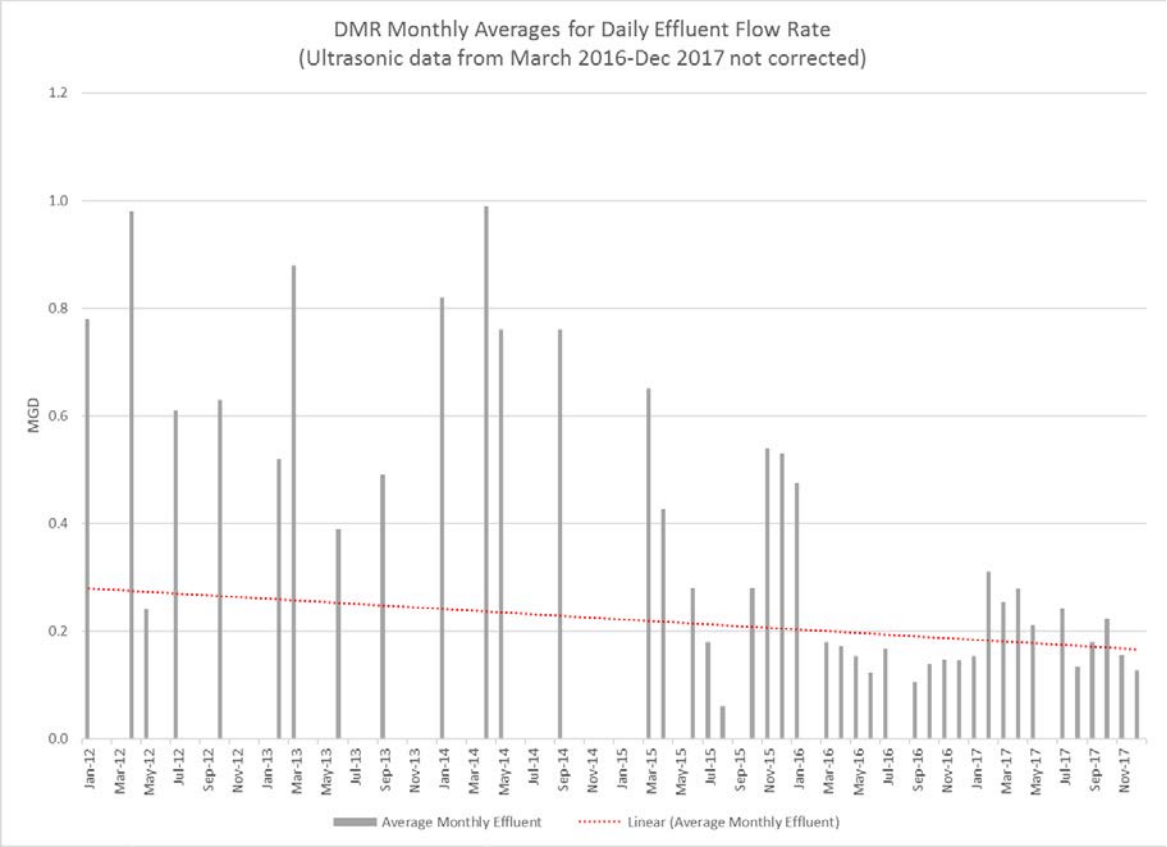
This report includes a cursory evaluation of infiltration and inflow on a system-wide basis. Due to budget constraints, the treatment facility will be evaluated first followed by the collection system under a different contract. As part of this report, collection system survey, rim elevations, and flow line data was gathered that will be used to develop a future comprehensive Collection System Model and Master Plan (as denoted by the yellow lines in the following figure). This data is included in the appendix. The future Collection System Model and Master Plan will allow for a thorough and targeted analysis of specific areas in the system with I&I problems and flow bottlenecks, including flow monitoring as required. The City also has 18 lift stations that will be evaluated as part of the Collection System Master Plan.

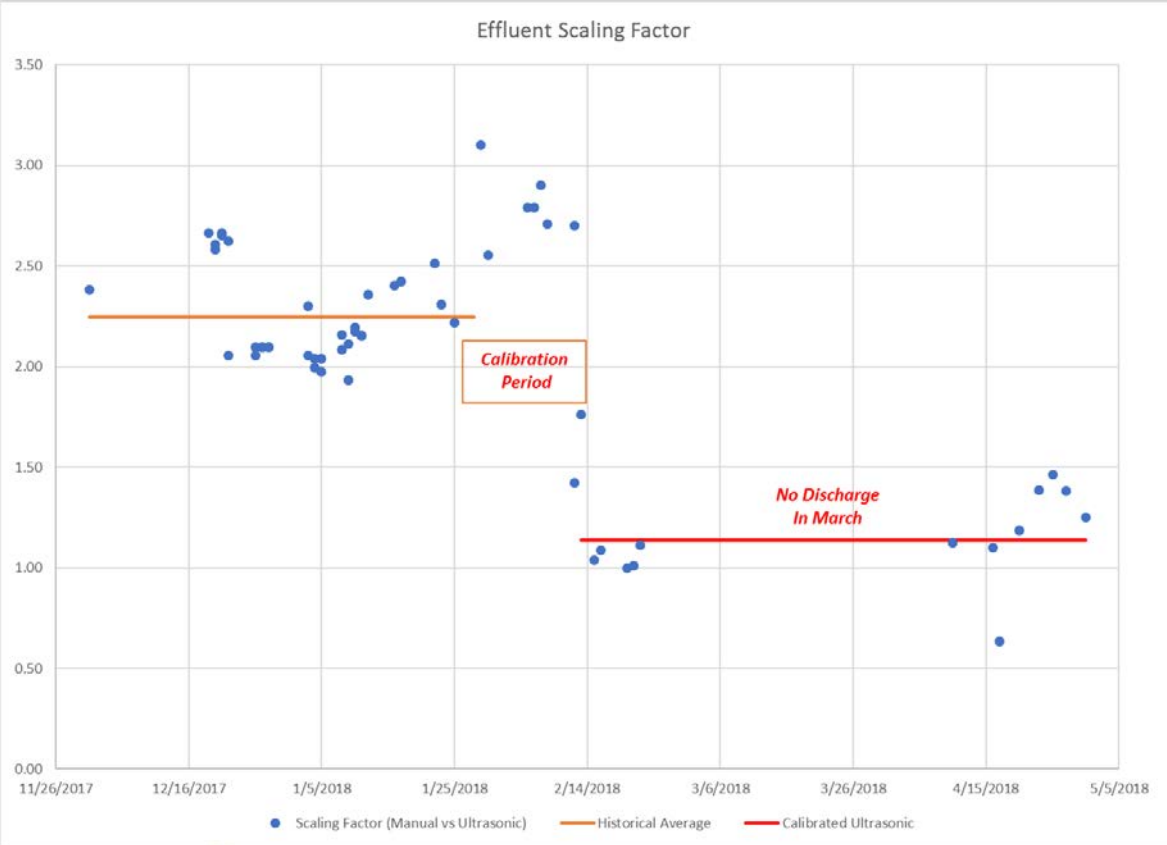
Influent and Effluent Flow Inconsistencies

During the data validation process, we discovered some inconsistencies with the flow monitoring data at the Plain City lagoons. The effluent flow data reported during the load cap monitoring period (March 2016-July 2017) was abnormally low compared to data collected from previous years. Prior to installation of the continuous ultrasonic flow meter in early 2016, the effluent flow rates were read daily using a manual gauge at the v-notch weir located in the chlorine contact tank. Figure 2-x below shows the monthly average effluent flow data as reported in the City's DMRs. It should be noted that in the past the City would hold effluent for several months at a time and now they continuously discharge; this is reflected in the figure below.



Upon reviewing the flow data and considering the growth that has occurred in the community, it became apparent there was an issue with the calibration of the ultrasonic flow meter. From December 2017 through February 2018 the City simultaneously read the flow meter and compared it to manual readings of the head over the weir. As can be seen in Figure 2-X, the ultrasonic was consistently lower by a factor of 2.25. There is a little bit of noise associated with the data because even a change of 0.25 inches on the manual gage results in a significantly different flow rate calculation. Also, there were several different operators recording the data.

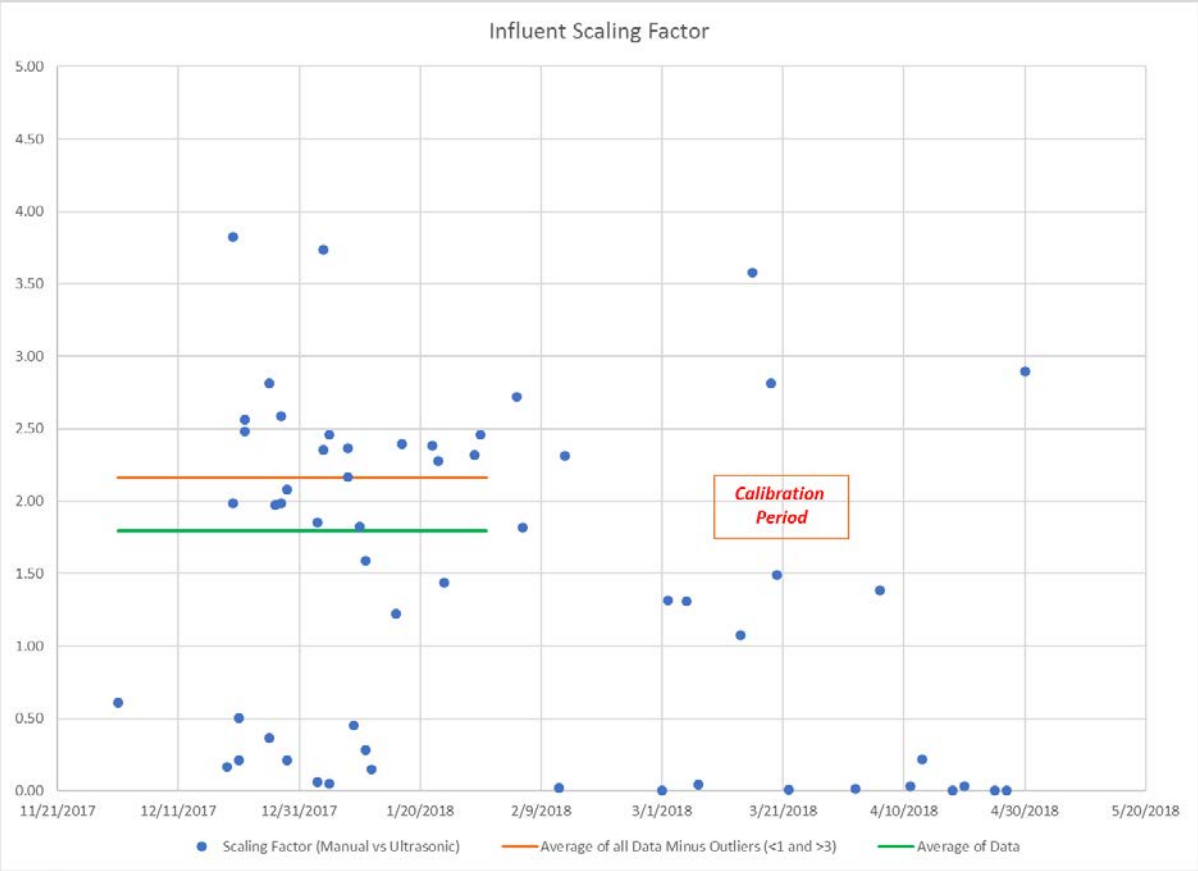

DMR Monthly Averages for Daily Effluent Flow Rate
(Ultrasonic data from March 2016-Dec 2017 not corrected)
MGD
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Average Monthly Effluent
Linear (Average Monthly Effluent)


Effluent Scaling Factor
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
11/26/2017
12/16/2017
1/5/2018
1/25/2018
2/14/2018
3/6/2018
3/26/2018
4/15/2018
5/5/2018
Calibration Period
No Discharge In March
Scaling Factor (Manual vs Ultrasonic)
Historical Average
Calibrated Ultrasonic

In February of this year, the City moved the effluent ultrasonic so it is located as recommended in the equipment O&M manual. This required a new, longer cable from the supplier and a new mounting bracket. In addition, City staff evaluated the programming of the unit and determined the flow rate was calculating off a 22.5 degree v-notch weir instead of the 90 degree v-notch weir that is actually installed. The City reprogrammed and calibrated the ultrasonic flow meter so its reported flow rates match what is read at the manual gauge. As can be seen in the chart above, it appears that successful calibration of the unit was achieved in mid-February.

All of this troubleshooting required continuous discharge for many months, which resulted in the water level in the ponds being very low. As such, the City needed to hold water through March and not discharge to allow the water levels to come back up. The City resumed discharging in April. The April data verifies the unit has been successfully calibrated moving forward. The noise at the end of the month is likely due to 4 different operators reading the manual gauge versus one person primarily reading the gauge in February.

The City is still working to resolve the influent flow rate data. The two months of comparing the ultrasonic flow data to the manual read at the gauge indicates the flows as measured by the ultrasonic are lower than actual by a factor of approximately 2.0. However, it is difficult to get consistent reads because the pumps are constantly cycling on and off from two different lift stations at various flow rates depending on water level in the wet well. As such, there are a number of outliers in the data set.



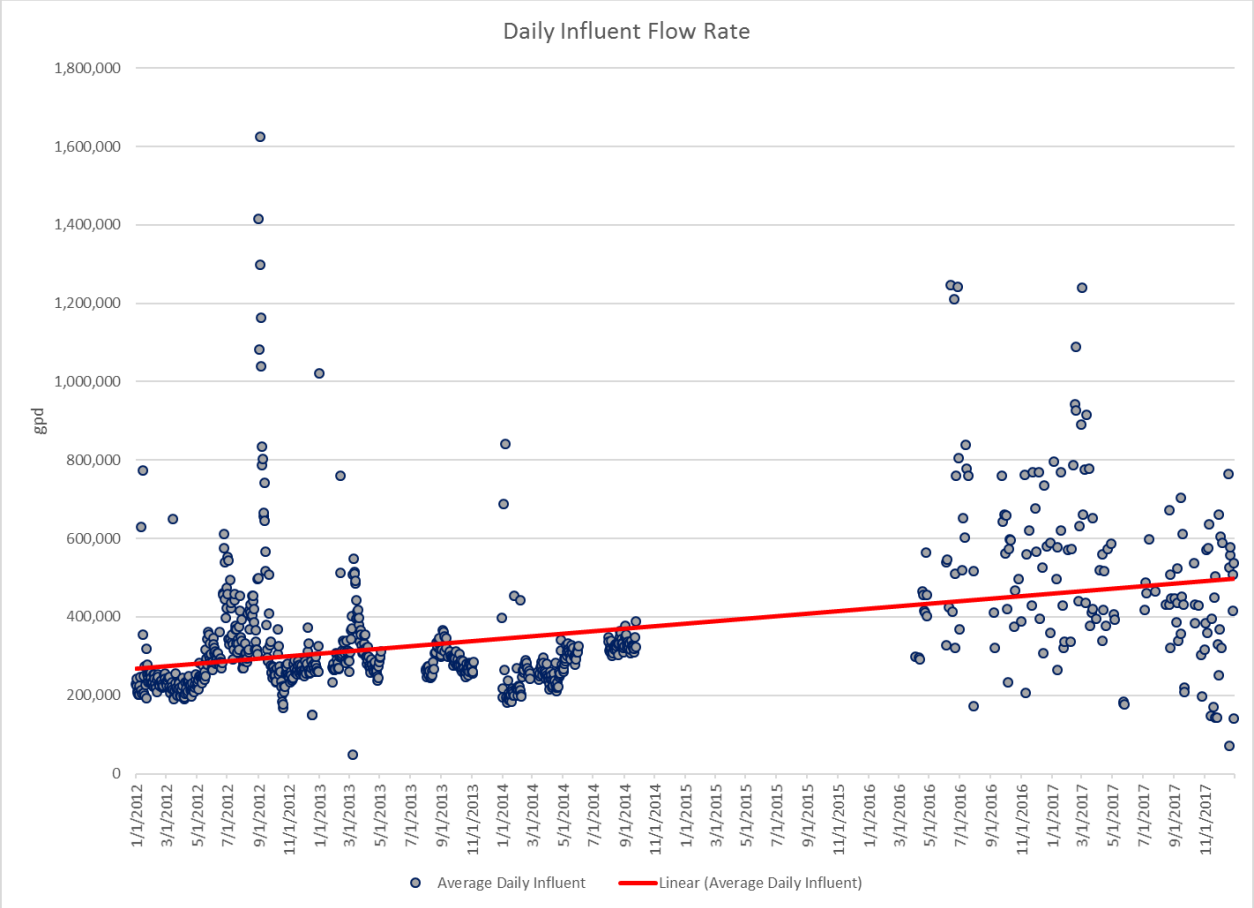
One reason the scaling factor is only 2.0 for the influent versus 2.3 for the effluent may be due to the influent weir's construction. As seen in the image below, the influent weir is made up of two pieces of plywood and is not truly a sharp crested v-notch weir like the effluent weir. Because of this, its hydraulic properties are likely something different than a true v-notch weir, making it difficult to achieve comparable results.

Influent V-Notch Weir

The City is still working to calibrate the influent ultrasonic so it matches the manual measurements moving forward. However, this has proven to be difficult due to the intermittent and varying discharge flow rates of the pumps. Although the City made the same programming changes that were made to the effluent ultrasonic, the influent flow meter is still reading lower than the manual read. It is understood that influent flow metering needs to be improved and this is one of the first projects that is recommended as part of improvements at the lagoon facilities.

Existing Influent Flows and Loads

As described above, the influent flow meter is not currently calibrated correctly. The influent ultrasonic was installed many years ago and appeared to be calibrated and working properly from 2012-2014. However, in September 2014 the unit was damaged and stopped recording data. In March 2016 the City began to troubleshoot the unit and eventually replaced it in June 2016. At this time, the ultrasonic was not calibrated correctly, and the data from June 2016 to the end of 2017 was corrected using the scaling factor of 2.0 as described above. All of the analysis below uses the corrected flow data from 2016-2017.

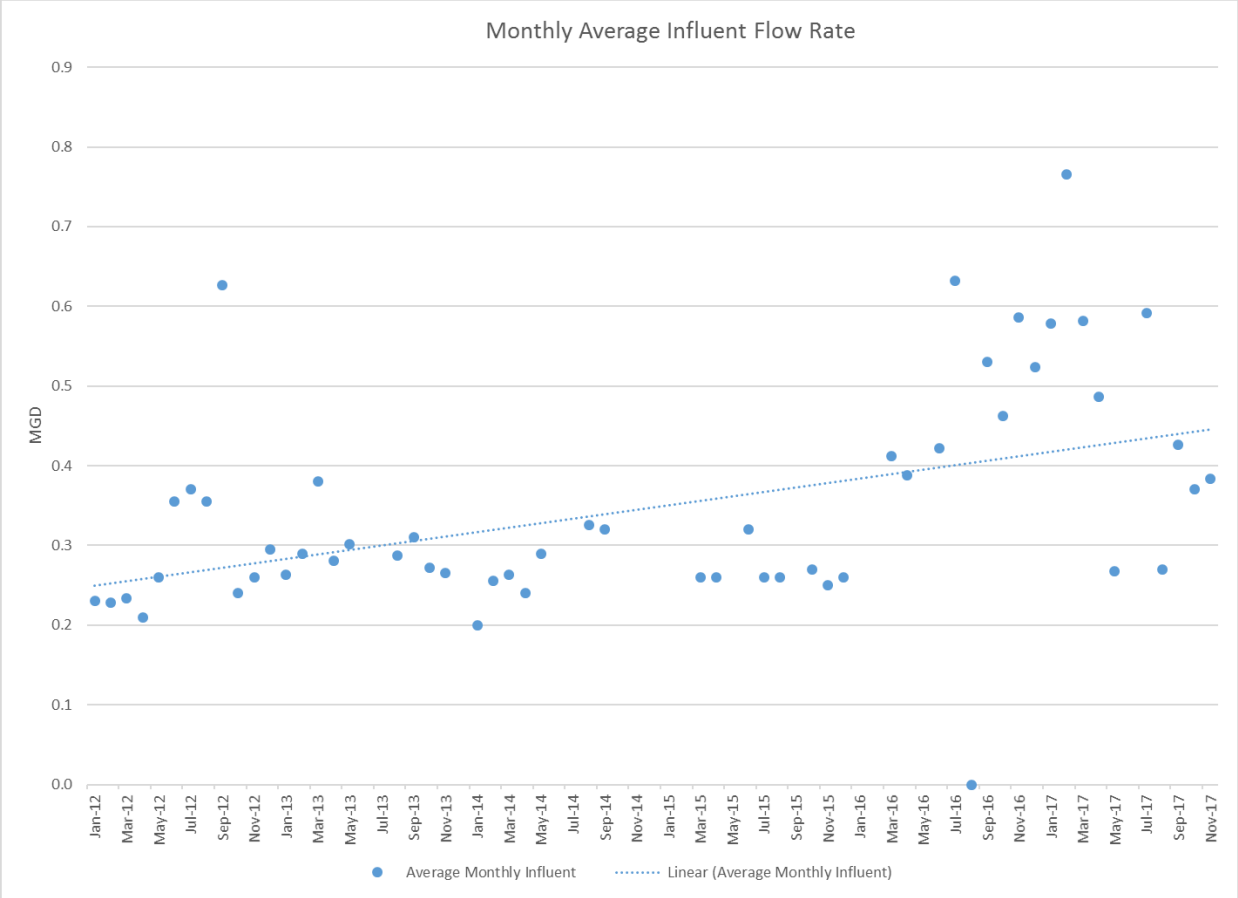


Due to continued growth in the community, one can see in the chart that influent flows are continuing to increase.

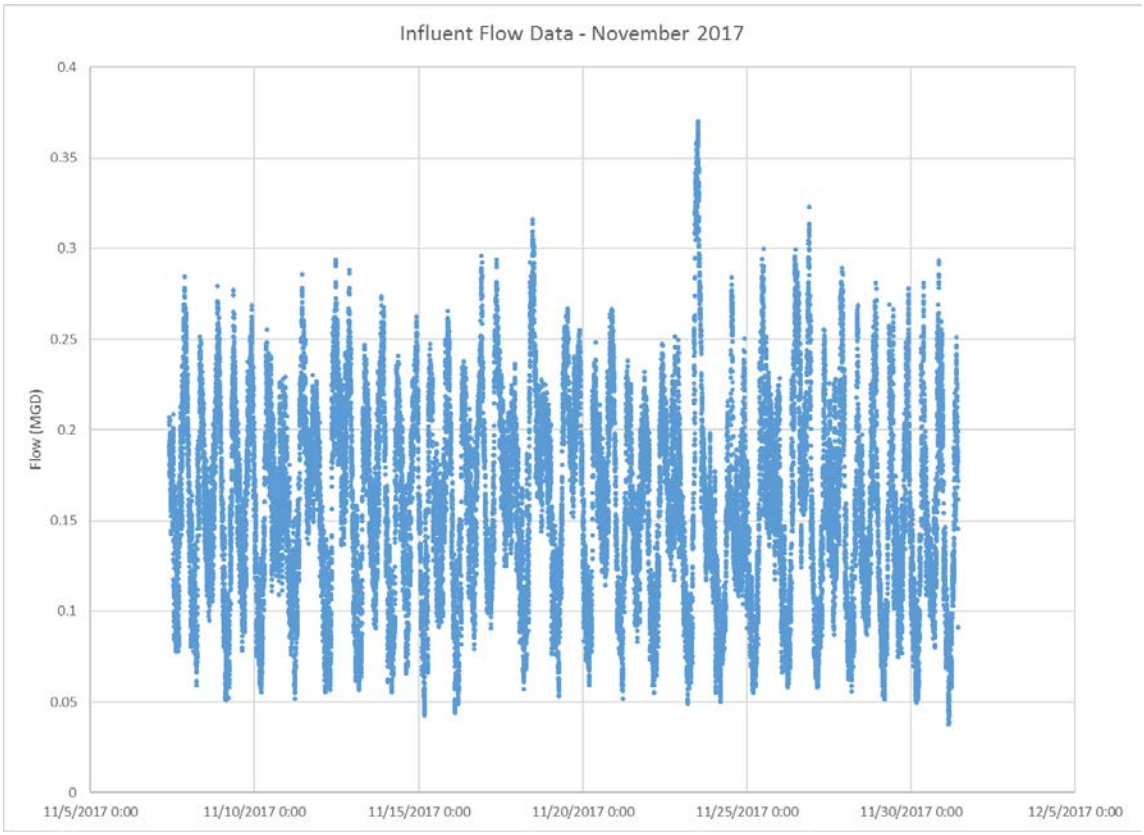
Table 2-1. Influent Flow Rates

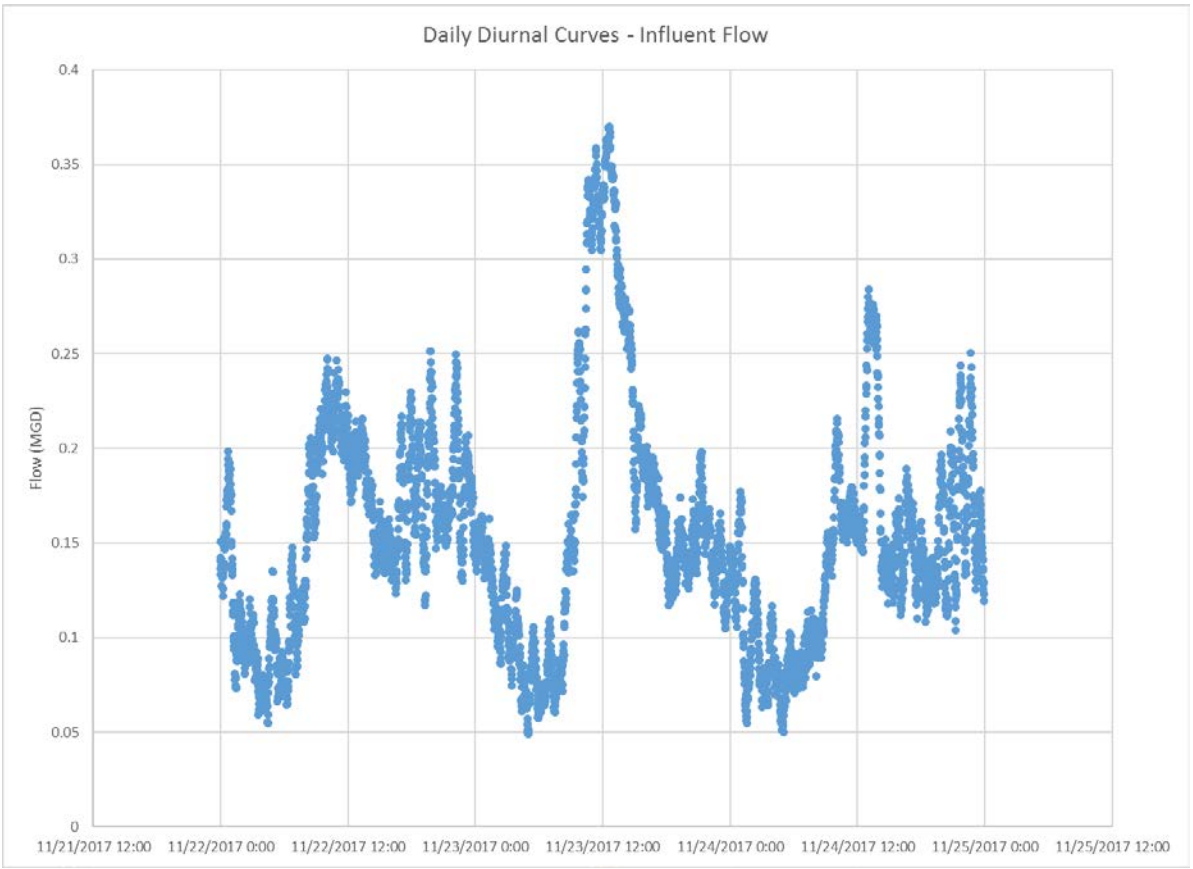
Year	Average Influent Flow (MGD)	Maximum Month (MGD)
2012	0.305	0.627
2013	0.294	0.380
2014	0.271	0.326
2015	0.268	0.320
2016	0.440 [1]	0.632 [1]
2017	0.470 [1]	0.766 [1]
AVERAGE (2012-2017)	0.341	0.509
AVERAGE (2016-2017)	**0.455**	**0.699**

1. Corrected flow rates beginning June 2016 from the influent flow meter which was not properly calibrated



One can see in the charts below that the flow rates fluctuate greatly throughout each day, depending on the time of day and how many pumps are discharging to the lagoons. The diurnal curves are typical of a "bedroom" community with limited industrial/commercial development, where flow spikes occur in the late morning and during the evening. Many of the residents spend the bulk of their day in a different community at work, school, running errands, etc.


Influent Flow Data - November 2017
Flow (MGD)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
11/5/2017 0:00
11/10/2017 0:00
11/15/2017 0:00
11/20/2017 0:00
11/25/2017 0:00
11/30/2017 0:00
12/5/2017 0:00


Daily Diurnal Curves - Influent Flow
Flow (MGD)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
11/21/2017 12:00
11/22/2017 0:00
11/22/2017 12:00
11/23/2017 0:00
11/23/2017 12:00
11/24/2017 0:00
11/24/2017 12:00
11/25/2017 0:00
11/25/2017 12:00

Existing average day, maximum month, peak day, and peak hour flow rates are shown below in Table 2-2. The flows are an average of the corrected flow data from 2016-2017.

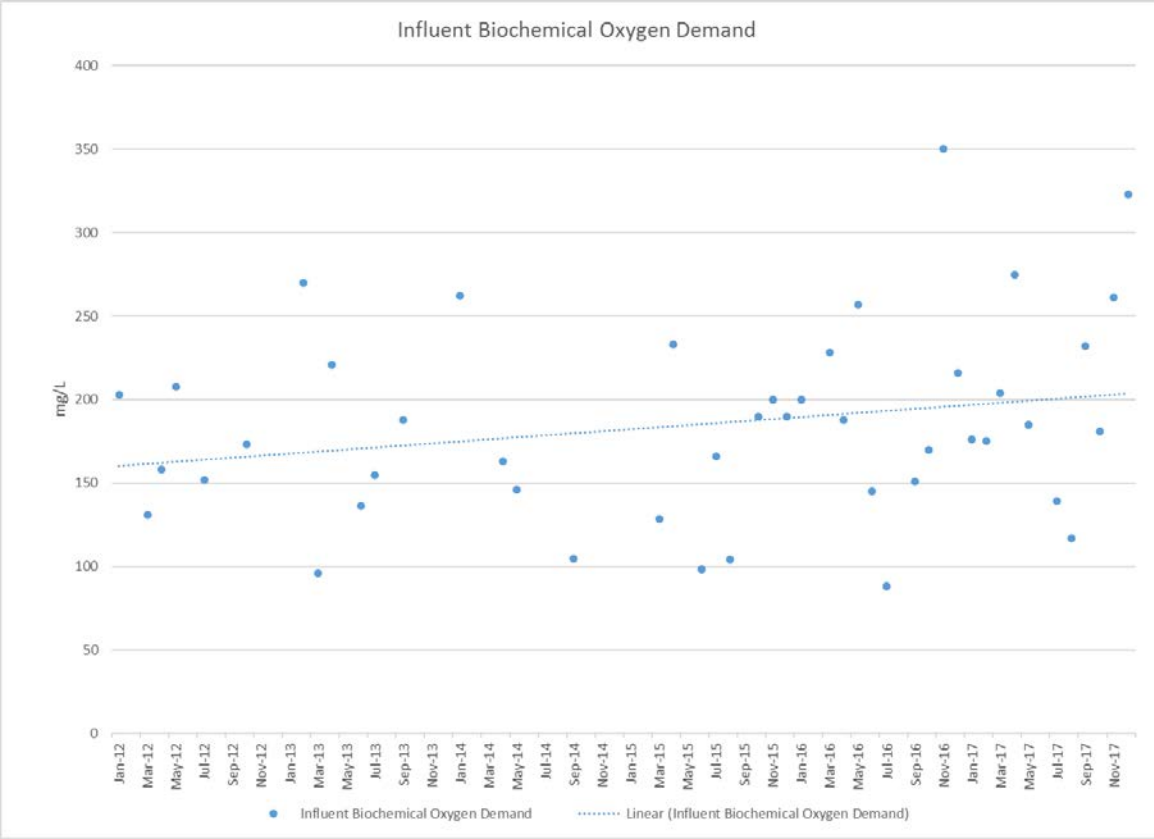
Table 2-2. Influent Flow Peaking Factors

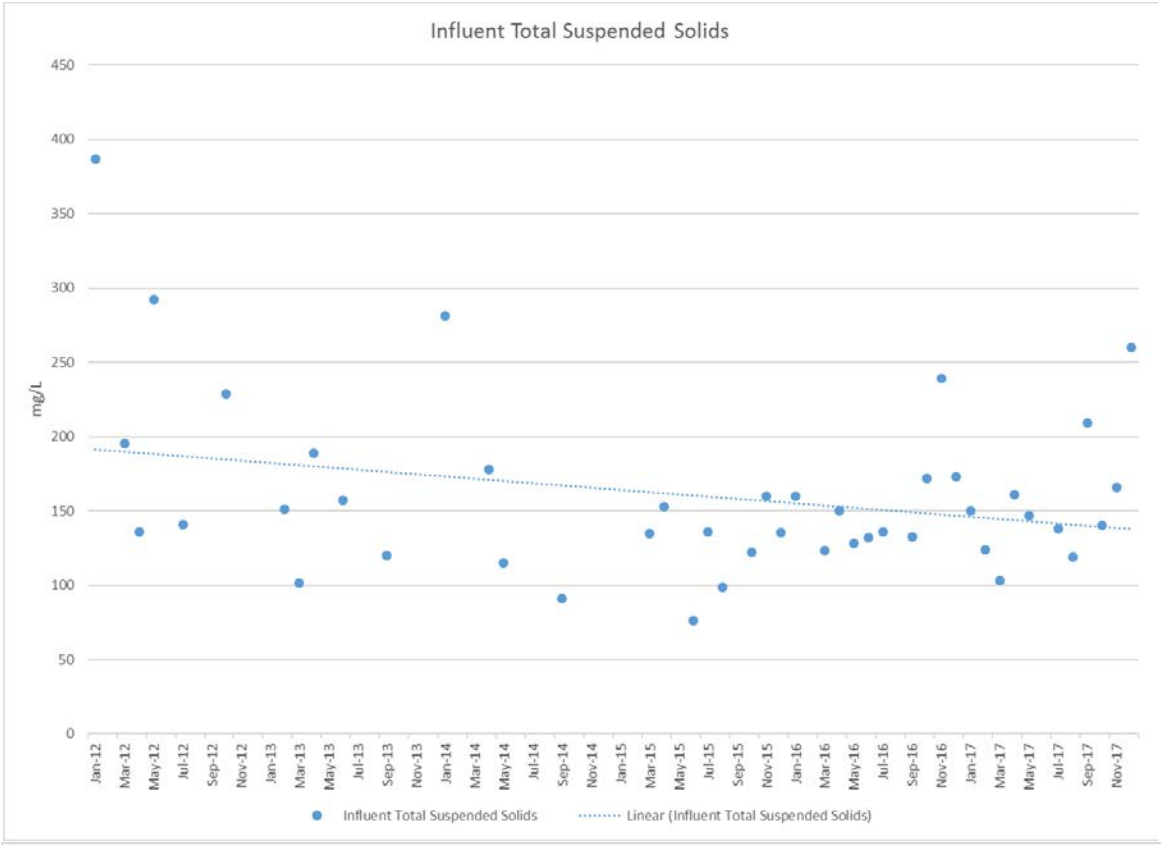
Flow Parameter	Influent Flow Rate (MGD)	Peaking Factor	Basis
AVERAGE	0.455	--	Average day flow rate (2016-2017)
MAXIMUM MONTH	0.699	1.54	Maximum month flow rate (2016-2017)
PEAK DAY	1.243	2.73	Peak day flow rate (2016-2017)
PEAK HOUR	1.415	3.11	10 States Standards peak hour factor [1]
PEAK INSTANTANEOUS	1.988	4.37	Handwritten flow data during 2/10/17 flooding

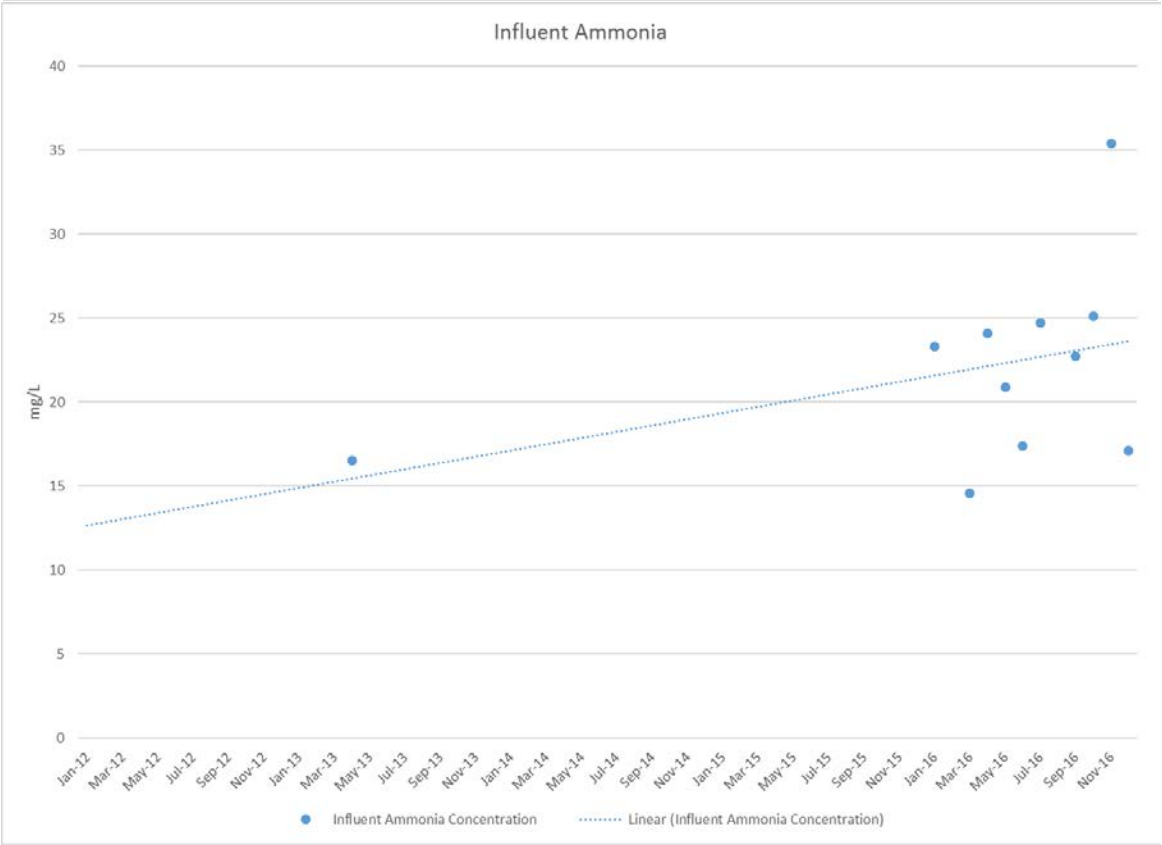
1. Peak Hour Factor $= \frac{18+\sqrt{P}}{4+\sqrt{P}}$

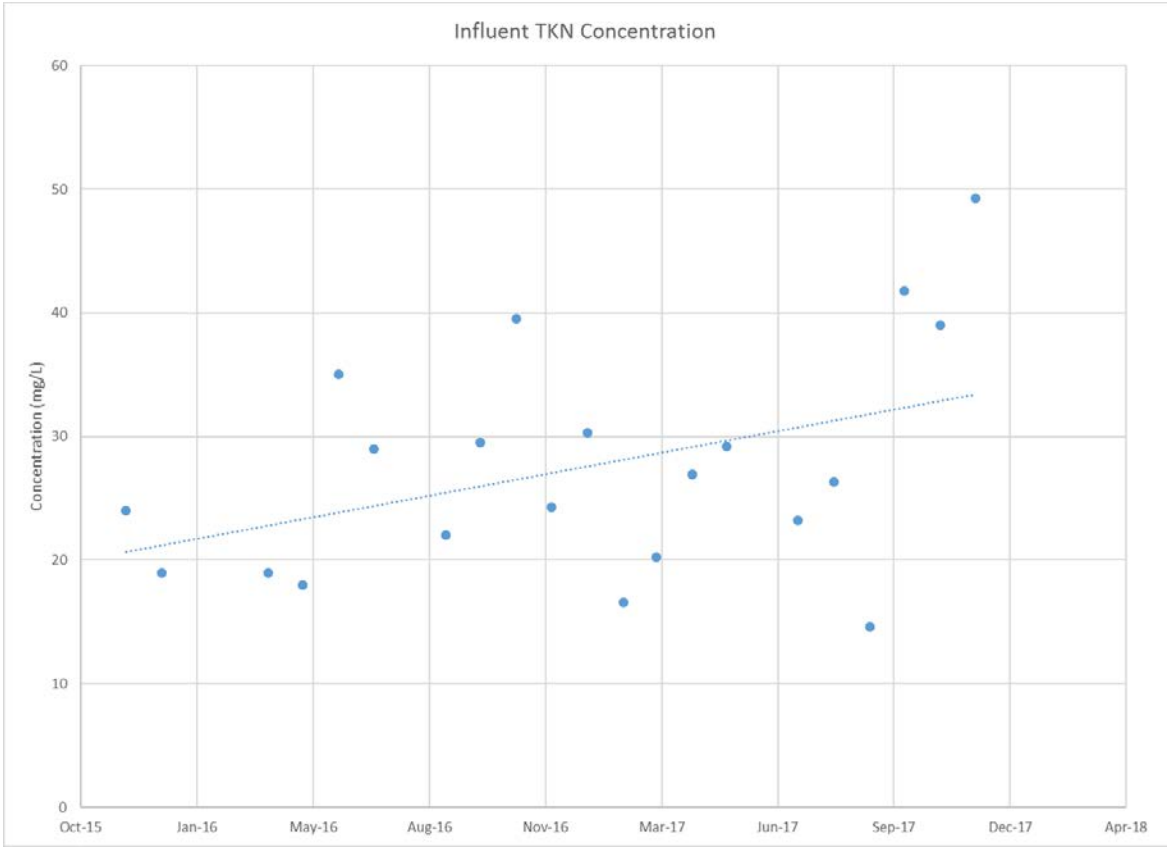
   P = population in thousands

Influent wastewater strength appears to be slightly increasing. This is likely due to I&I repairs and generally drier conditions over the past several years (with the exception of winter 2016-2017). BOD, TSS, ammonia, total Kjeldahl nitrogen, and phosphorus influent concentrations over time are shown below in Figures 2-3, 2-4, and 2-5.




Influent Total Suspended Solids
mg/L
450
400
350
300
250
200
150
100
50
0
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Influent Total Suspended Solids
Linear (Influent Total Suspended Solids)


Influent Ammonia
mg/L
40
35
30
25
20
15
10
5
0
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Influent Ammonia Concentration
Linear (Influent Ammonia Concentration)


Influent TKN Concentration
Concentration (mg/L)
60
50
40
30
20
10
0
Oct-15
Jan-16
May-16
Aug-16
Nov-16
Mar-17
Jun-17
Sep-17
Dec-17
Apr-18

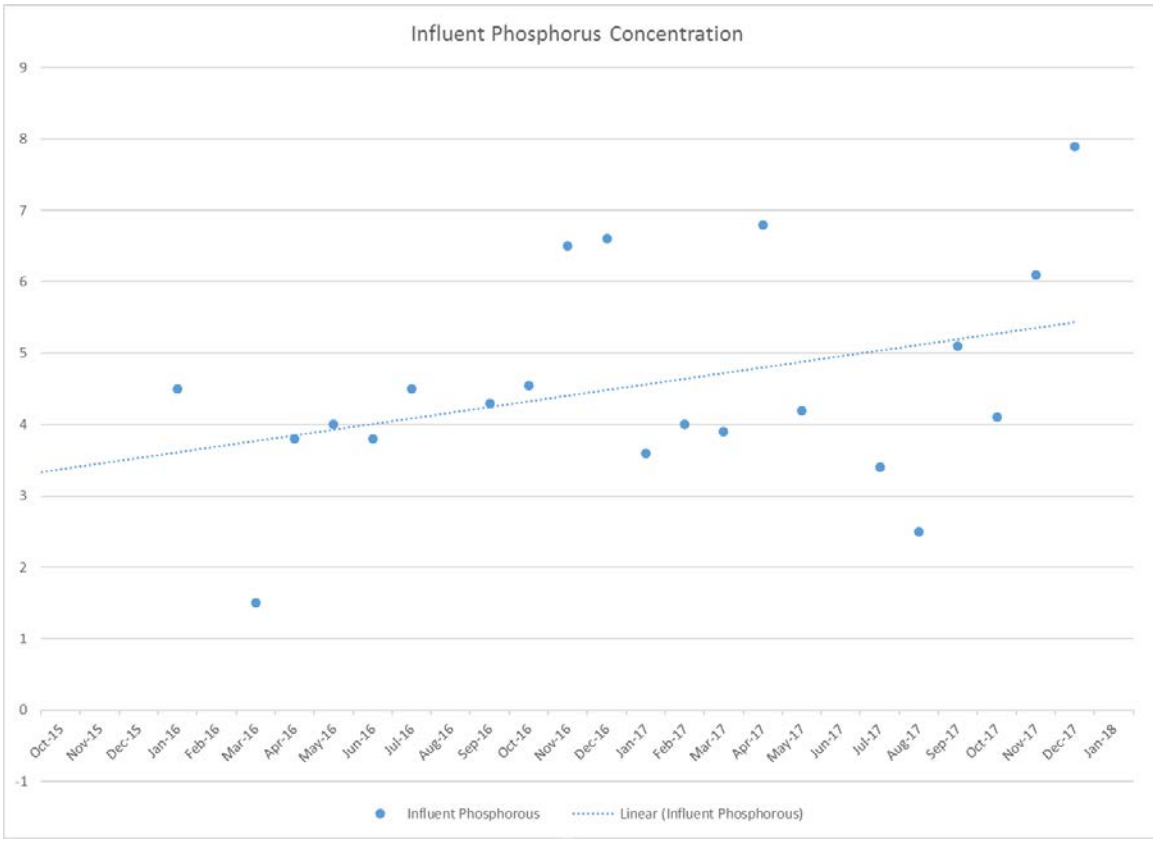

Influent Phosphorus Concentration
9
8
7
6
5
4
3
2
1
0
-1
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
May-16
Jun-16
Jul-16
Aug-16
Sep-16
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Influent Phosphorous
Linear (Influent Phosphorous)

Table 2-3 below shows influent BOD, TSS, ammonia and Total Phosphorus concentrations for the past five years.

Table 2-3. Influent Concentrations and Loadings

Year	Ave Influent BOD (mg/L)	Ave Influent TSS (mg/L)	Ave Influent NH_3 (mg/L)	Ave Influent TP (mg/L)
2012	171	230	N/A	N/A
2013	178	144	17	N/A
2014	169	166	N/A	N/A
2015	164	127	N/A	N/A
2016	199	155	23	4.4
2017	206	156	N/A	4.7
AVERAGE (2012-2017)	**181**	**163**	**20**	**4.5**

Plain City's wastewater is almost entirely of residential origin; there is very little commercial and no industrial contributions to the sewer system. As a result, Plain City's wastewater is generally considered to be a low to medium strength municipal influent as shown in Table 2-4 below.

Table 2-4. Influent Wastewater Strength

Wastewater Influent	Influent BOD (mg/L)	Influent TSS (mg/L)	Influent NH3 (mg/L)	Influent P (mg/L)
Low Strength [1]	110	120	12	4
Medium Strength [1]	190	210	25	7
High Strength [1]	350	400	45	12
PLAIN CITY	**181**	**163**	**20**	**4.5**

1. As defined by Metcalf and Eddy, Wastewater Engineering (2003). Table 3-15.

ERU Analysis

It is estimated that there are 6,922 people currently living in Plain City (see Table 1-1). The City's billing data indicates there are 2,017 active single family residential sewer connections connected to the City's/lagoon collection system. There are an additional 90 sewer connections that are served by Central Weber Sewer Improvement District.

It is estimated that commercial and industrial flows are equivalent to 19 residential connections (gas station/convenience store, schools, etc.), as can be seen in Table 2-6 below. Therefore, there are currently 2,036 equivalent residential units (ERUs) discharging to the sewer system.

Table 2-6. ERU Analysis

Total Wastewater Flow	455,000 gal/day
Active Single Family Residential Connections (ERUs)	2,017
Wastewater from Individual Residences	450,000 gal/day
Wastewater Generated per ERU	223 gal/day
Wastewater from Commercial, Industrial, Schools	5,000 gal/day
Commercial and Industrial ERUs	19
Total ERUs	2,036

It should be noted that 223 gallons/ERU is slightly lower than expected for a community like Plain City, but it is a reasonable number. Prior to correcting the influent data the flows were unrealistically low. After correcting the flow data, the wastewater generation rate is 66 gallons per person per day, which is also lower than expected but a more reasonable number for a bedroom community like Plain City, which has a significant proportion of newer infrastructure.

Table 2-7, below, summarizes the influent flows and loads per ERU. This information will be used to project future flows and loads in Chapter 3. Waste loads (pounds per day) were calculated for each of the parameters by taking the concentration multiplied by either the average day flow or maximum month flow rate.

Parameter	Load Condition	Existing Concentration/ Loading	Units
BOD	Average Day	181	mg/L
		687	lbs/d
		0.337	lbs/ERU/d
	Maximum Month	1056	lbs/d
TSS	Average Day	163	mg/L
		618	lbs/d
		0.304	lbs/ERU/d
	Maximum Month	949	lbs/d
Ammonia	Average Day	20	mg/L
		74	lbs/d
		0.036	lbs/ERU/d
	Maximum Month	114	lbs/d
Total Phosphorus	Average Day	4.5	mg/L
		17	lbs/d
		0.008	lbs/ERU/d
	Maximum Month	26	lbs/d

Existing Permit Limits

The existing UPDES permit limits are shown below in Table 2-8. The permit expires in 2020.

Table 2-8. Effluent Limitations

Parameter	Effluent Limitations			
	Maximum Monthly Avg	Maximum Weekly Avg	Daily Minimum	Daily Maximum
Flow, MGD	0.6	NA	NA	0.9
BOD_5, mg/L	45	65	NA	NA
BOD_5 Min. % Removal	85	NA	NA	NA
TSS, mg/L	45	65	NA	NA
TSS Min. % Removal	85	NA	NA	NA
E-Coll, No./100mL	126	158	NA	NA
TRC, mg/L				
Winter (Jan-March)	NA	NA	NA	0.3
Spring (April-June)	NA	NA	NA	0.5
Summer (July-Sept.)	NA	NA	NA	1.5
Fall (Oct. –Dec.)	NA	NA	NA	0.5
DO, mg/L	NA	NA	5.0	NA
Oil & Grease, mg/L	NA	NA	NA	Visual/10
pH, Standard Units	NA	NA	6.5	9.0
Total Phosphorous, mg/L	NA	NA	NA	Report
Total Kjeldahl Nitrogen, mg/L	NA	NA	NA	Report
Orthophosphate, mg/L	NA	NA	NA	Report
Ammonia, mg/L	NA	NA	NA	Report
Nitrate-Nitrite, mg/L	NA	NA	NA	Report

c) Condition of Existing Facilities

Lift Station #1 and Lift Station #16 both pump sewage from the community to the same headworks structure prior to the flow entering the lagoon treatment system. This structure records flow from a v-notch weir using an ultrasonic flow meter. The treatment system consists of six relatively shallow facultative lagoon cells. The total surface area of the treatment ponds is 35 acres. When wastewater is discharged, the treated sewage enters a chlorine contact chamber for disinfection. The effluent flow rate is measured at a v-notch weir at the end of the chlorine contact chamber. The system has one discharge point named Outfall 001. This is where all effluent samples are taken for monitoring requirements.

From Outfall 001, the discharge flows into an unnamed drainage ditch, then into Dix Creek, and follows a series of other areas to eventually flow into the Harold S. Crane Waterfowl Management Area and Willard Spur of the Great Salt Lake.

Influent Lift Station (Lift Station #1)

The influent lift station was originally constructed in 1970. The majority of the City's sewage passes through this lift station, which is located at the lagoon site. Although it has served the City well over the years, the lift station has exceeded its design life.

There are a number of deficiencies associated with this lift station. As can be seen in the photo below, all metallic components inside the wet well structure are severely corroded. The ductile iron piping and the access hatch need to be replaced. There is a bar rack near the gravity sewer invert but it appears the inflow has been modified so the bar rack is bypassed. It is recommended some type of screening be installed to minimize debris accumulation in the ponds, but it would be more accessible at grade at the headworks structure (after pump discharge) where the v-notch weir is located. Alternatively, a grinder could be installed inside the wet well or at the headworks structure. There is a backup generator located in the building adjacent to the lift station, but the generator is not functional. Due to the critical function of this lift station it is recommended that a backup generator be added. In addition, when both pumps kick on at the same time (which is relatively common), a breaker trips and the aerators in the pond shut down and need to be manually restarted. The lift station operates off single phase power and it is recommended any future improvements include bringing 3-phase power to the site.

Lift Station #1 – Corrosion Inside Wet Well

Despite its age, the concrete appears to be in decent condition. If this is the case, the structure could be gutted and reused. Tnemec, Spectrashield, or another kind of protective liner could be applied to protect the concrete inside the wet well and extend its design life. Alternatively, considering the age of the concrete, it may be advisable to abandon the existing wet well and construct a new one adjacent to the existing structure. A larger wet well could accommodate a triplex pump arrangement to increase the reliability and pumping capacity of the system to meet future growth requirements. Alternatively a more operator-friendly wet pit / dry pit lift station could be constructed. This type of lift station houses the pumps on the “dry” side so they are easily accessible. A wet pit / dry pit lift station costs more money but maintenance is improved and they are easily expandable.

The biggest deficiency and concern with this lift station is it's pumping capacity is not adequate to keep up during high flow conditions. There are currently 2 x 10 HP Flygt submersible pumps inside the wet well. These pumps had new motors installed in 2017 and one of the impellers was changed out. They are in good condition and work well; however, they are not large enough to meet the needs of this growing community. On average, in August and September 2017, at least one pump was operating approximately 51 hours over a 48 hour period. This means that one pump was operating nearly constantly even at nighttime and two pumps were required occasionally. State rules require complete pump redundancy at the peak hour flow condition so the lift station can keep up even if one pump is down. A true, redundant duty/standby condition does not currently exist. During the flood event of February 2017 not even both pumps simultaneously could keep up. A third trailer-mounted suction lift pump had to be brought in to keep the lift station from backing up and overflowing. As part of the lift station improvements, the existing pumps need to be replaced with larger pumps, or a 3rd pump could be added for redundancy. There are old dry pit Smith and Loveless pumps located adjacent to the wet well but it is unclear if these are still operational.

Lift Station #1

Lift Station #16

Lift Station #16 is relatively new (constructed in 2006) and pumps a small portion of the City's sewage directly to the headworks structure downstream of Lift Station #1. This lift station collects flows from the west side of town. The pumps are in good condition but due to the long force main and resulting increase in discharge pressure their capacity is reduced compared to other identical pumps in the system. Because of this, the pumps operate quite frequently. This should be monitored as development occurs on the west side of town to determine if these pumps need to be upsized. But at this time there are no deficiencies associated with Lift Station #16 and no improvements are necessary.

The City plans to install SCADA at this lift station in 2018.

Lift Station #16

Headworks

The influent lift station pumps up to a headworks structure that is located adjacent to the ponds. The headworks structure receives flow directly from the nearby Lift Station #1 and also from Lift Station #16. The flow passes through a v-notch weir where it is measured using an ultrasonic level transmitter and converted to an influent flow rate. This flow information is recorded and utilized for the DMRs. As discussed previously in this chapter there was an issue with the calibration of this flow meter (recorded data was lower than manual reads at the gauge). Flow data from past years has been adjusted to reflect this inconsistency. However, the meter is still not reading correctly as of June 2018.

The influent weir consists of a broad-crested plywood material with an imperfect opening angle, as discussed previously. The plywood may be "dampening" the weir crest and reducing the accuracy of the flow measurement. It is recommended the existing plywood weir be replaced with a sheet metal sharp crested weir cut at an exact 90 degree angle. Alternatively, a magnetic flow meter could be installed as part of the future lift station improvements. Also, as discussed above, it would be beneficial to add some kind of screening or grinding capability as part of the headworks structure improvements. This will reduce the amount of debris and solids loading into the lagoons.

The splitter box diverts flow to the various cells. The concrete is failing and this splitter box needs to be replaced.

Treatment Lagoons

Lagoons are relatively low maintenance and low energy treatment systems that utilize aeration and detention time to reduce BOD and TSS. The aeration system, BOD loading, hydraulic retention time, and other treatment performance parameters are evaluated in the following sections.

The treatment system in Plain City utilizes six lagoon cells, each with a design water depth of 6 feet. Sewage flows through the ponds in parallel starting with Cells #1 and #4, see figure below for flow schematic. The north track is completely facultative as per the original design and no aeration is added. Cell #2 in the south train was retrofit with 50 "Poo-Gloos" approximately 10 years ago. These are submerged attached growth modules that are aerated and are designed to enhance biological activity to improve the removal of ammonia, BOD, and TSS. After the Poo-Gloos were installed, the operator installed 154 "aerated culverts" in Cell #1 and 13 "aerated culverts" in Cell #3. These culverts are similar in size and function to the Poo-Gloos. They were fabricated by city staff and not purchased from a manufacturer in order to reduce costs. The additional aeration in the south train improves mixing and elevates the oxygen content, thereby stimulating the consumption of organic wastes by aerobic microorganisms.

Each month, the City samples from the end of each "track" and discharges from the side that has the best effluent quality. Although data is limited (less than 10 data points leaving each cell) it appears that generally the aerated train perfoms better than the facultative train, especially for BOD removal and DO concentration. This is to be expected considering the aeration and infrastructure that has been installed in the south train.

	BOD (mg/L)	TSS (mg/L)	pH	DO	Phosphorous	Ammonia
SOUTH TRAIN						
Cell 1 (aerated)	64	61	9	10	3	8
Cell 2 (aerated)	NA	38	NA	NA	NA	NA
Cell 3 (aerated)	30	35	9	16	NA	2
NORTH TRAIN						
Cell 4 (facultative)	92	117	9	22	3	12
Cell 5 (facultative)	NA	26.4	NA	NA	NA	2.2
Cell 6 (facultative)	57	29	9	9	NA	7

Facultative Cell

Aerated Cell

Hydraulic Capacity

The treatment performance of the lagoons partially depends on providing an adequate HRT, which is a function of the influent flow rate and cell operating volume. During cold weather conditions, microbial activity is reduced by approximately one-half for every 10˚C decrease in water temperature. As a result, a longer HRT is generally required to maintain a removal efficiency equivalent to that observed during warm weather conditions. The lagoons have the following hydraulic retention time based on the existing maximum month flow of 0.699 MGD.

Table 2-9. Lagoon Characteristics and Existing Hydraulic Retention Time

	Lagoon Volume (MGal)	Sludge Volume (MGal)	Effective Operating Volume (MGal)	2017 Maximum Month HRT (Days)
Cell #1	14.5	4.1[1]	10.4	15
Cell #2	6.8	1.0 [2]	5.9	8
Cell #3	6.8	0.5 [2]	6.3	9
Cell #4	14.5	4.0 [1]	10.5	15
Cell #5	6.8	1.0 [2]	5.9	8
Cell #6	6.8	0.4 [2]	6.4	9
TOTAL	56.3	11.0	45.4	65
EACH TRAIN	28.2	5.5	22.7	32.5

1. Sludge volume estimated by Rural Water to be 28% of Cell #1 and Cell #4 capacity (September 2017). Average measured sludge depths in Cell #1 and Cell #4 was 17".
2. Only Cells #1 and #4 were measured for sludge depths, Cells #2 and #5 are assumed to have 50% less sludge than Cells #1 and #4, Cells #3 and #6 are assumed to have 50% less sludge than Cells #2 and #5.

For facultative lagoons, Utah R317 rules require "120 days of hydraulic retention time based on winter flow and the maximum operating depth of the entire system or 60 days based on summer flow and peak monthly infiltration/inflow". The lagoons do not currently meet this required retention time. That said, the guidance above is for facultative lagoons and only one train is facultative. Aeration reduces the required hydraulic retention time requirements.

Aerated lagoons are defined in Utah R317 as having a "design water depth ranging from 10 to 15 feet" deep. The Plain City lagoons are only 6 feet deep so they don't meet this design requirement. Nevertheless, one train is aerated, which reduces the required retention time from the numbers shown above for facultative lagoons. For aerated lagoons, Utah code R317 recommends the use of the following equation to determine the hydraulic retention time required for adequate BOD removal.

$$\frac{S}{S_O} = \frac{1}{1 + 2.3 \cdot k \cdot t}$$

S = BOD_5 leaving the lagoon, mg/l

S_O = BOD_5 entering the lagoon

k = Reaction coefficient (0.06 d for winter, 0.12 d for summer)

t = Lagoon hydraulic detention time, day

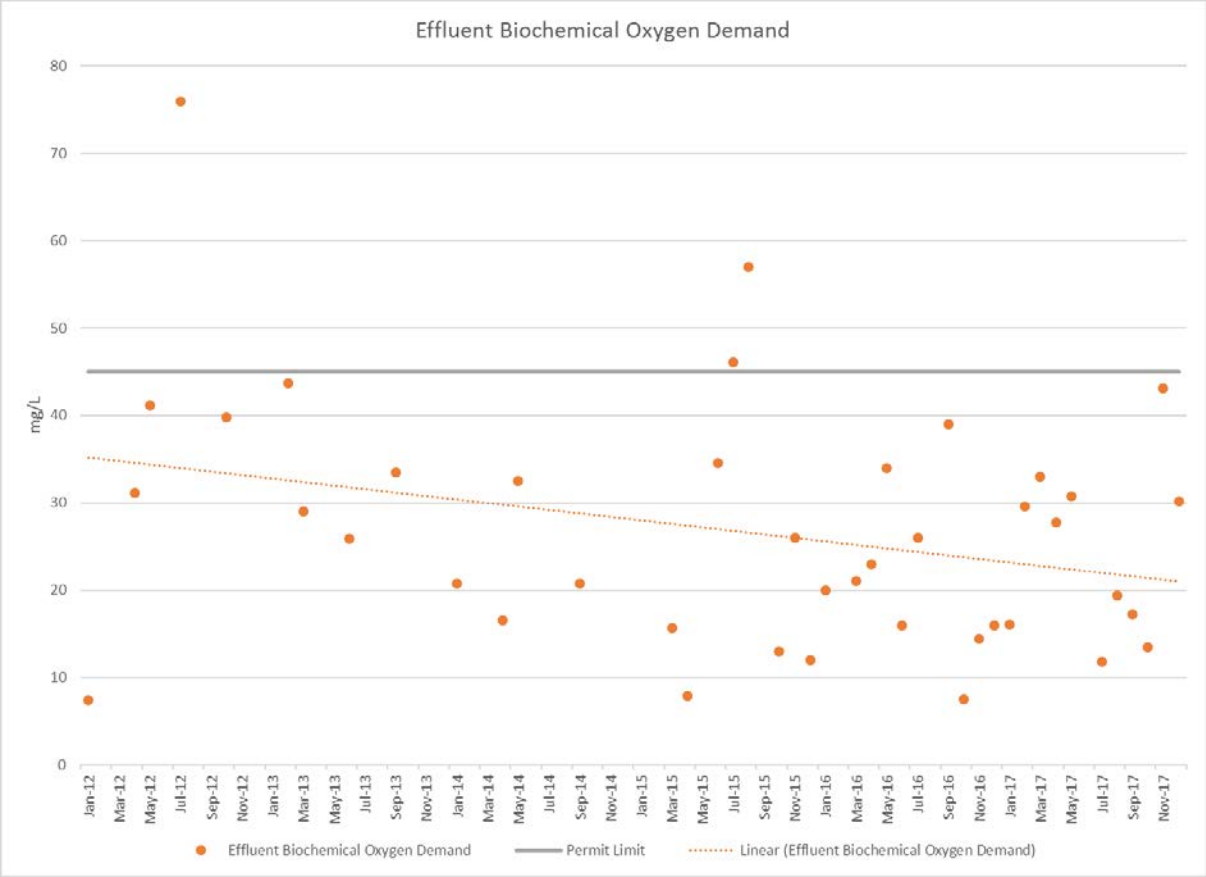
Assuming an influent BOD strength of 181 mg/L and using the effluent permit limit concentration of 45 mg/L results in the required retention times shown below in Table 2-10. It can be seen that adequate hydraulic capacity is available. This is reflected in Figure 2-13 which shows that generally the lagoons perform well for BOD removal and meet the permit limit.

Table 2-10. Hydraulic Retention Time Requirements

Parameter	Existing Conditions
Influent BOD (So)	181 mg/L
Effluent BOD (S) Permit Limit	45 mg/L
HRT Required (Summer)	11 days
HRT Required (Winter)	22 days
HRT Available (Maximum Month)	65 days

One concern with long retention times is it can create prime conditions for algae and duckweed growth. That said, as the community grows, the excess hydraulic capacity will eventually be used up. In addition, a future permit could have a more stringent BOD limit. For example, if the allowable effluent BOD concentration were decreased to 25 mg/L in the future, a hydraulic retention time of 45 days would be required during the winter months. This is still below the existing HRT of 65 days at the current maximum month flow condition.

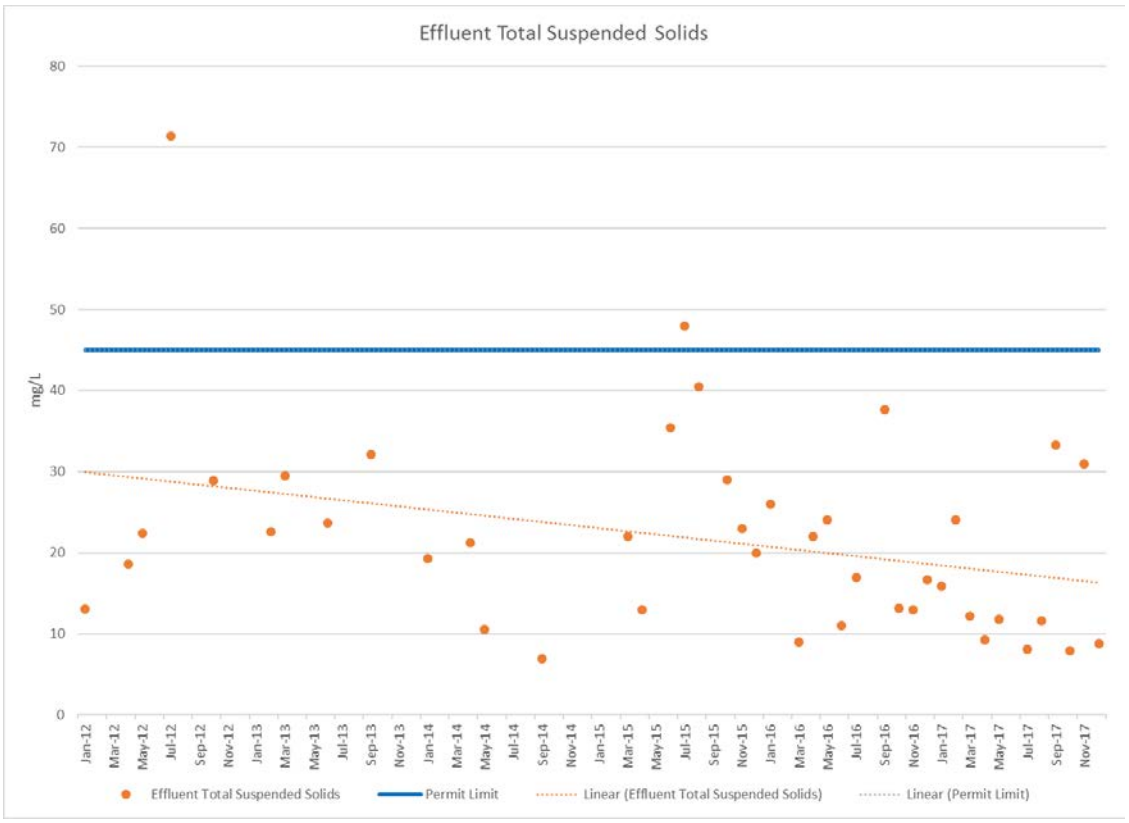
As shown in Figures 2-14, 2-15 and 2-16, the ponds occasionally suffer from “pond turnover” and algae blooms in the spring which can result in occasional violations of the UPDES permit for TSS and pH. Algae and duckweed growth can be a concern, particularly in Cell 3.

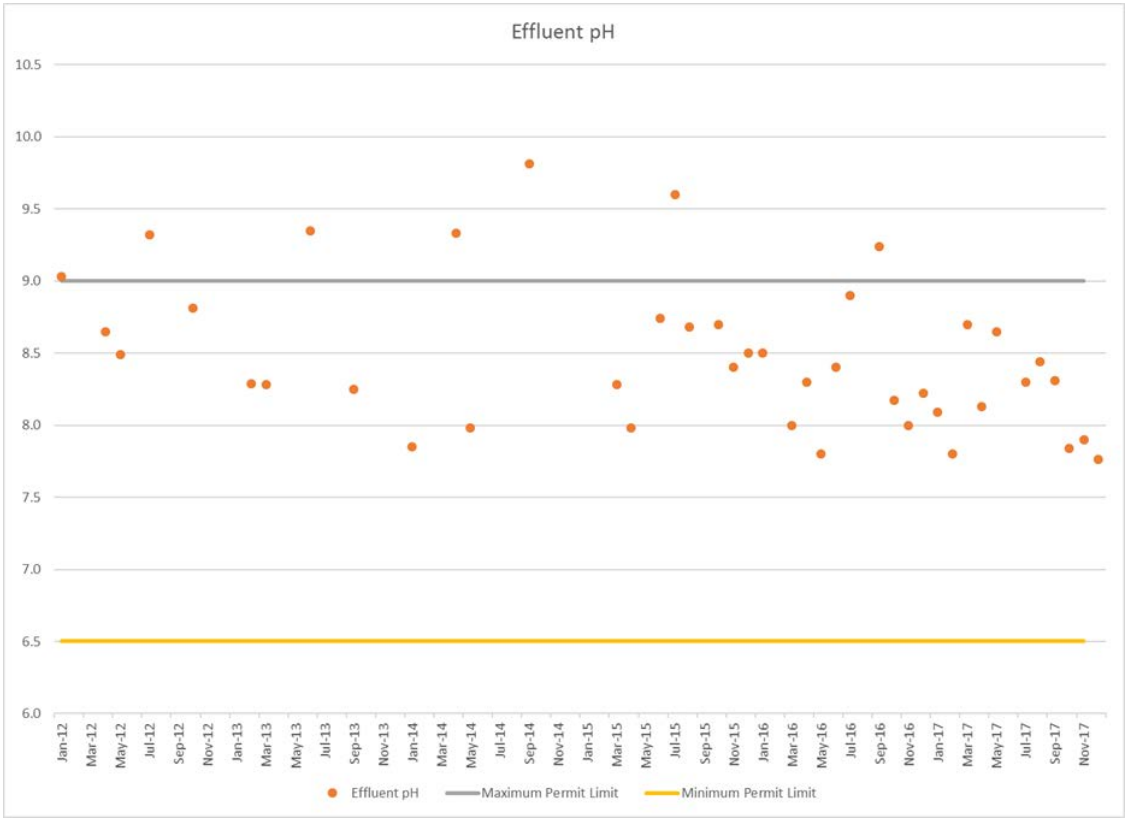


Duckweed Growth

Algae Growth

Transfer Structure


Effluent Total Suspended Solids
mg/L
80
70
60
50
40
30
20
10
0
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Effluent Total Suspended Solids
Permit Limit
Linear (Effluent Total Suspended Solids)
Linear (Permit Limit)

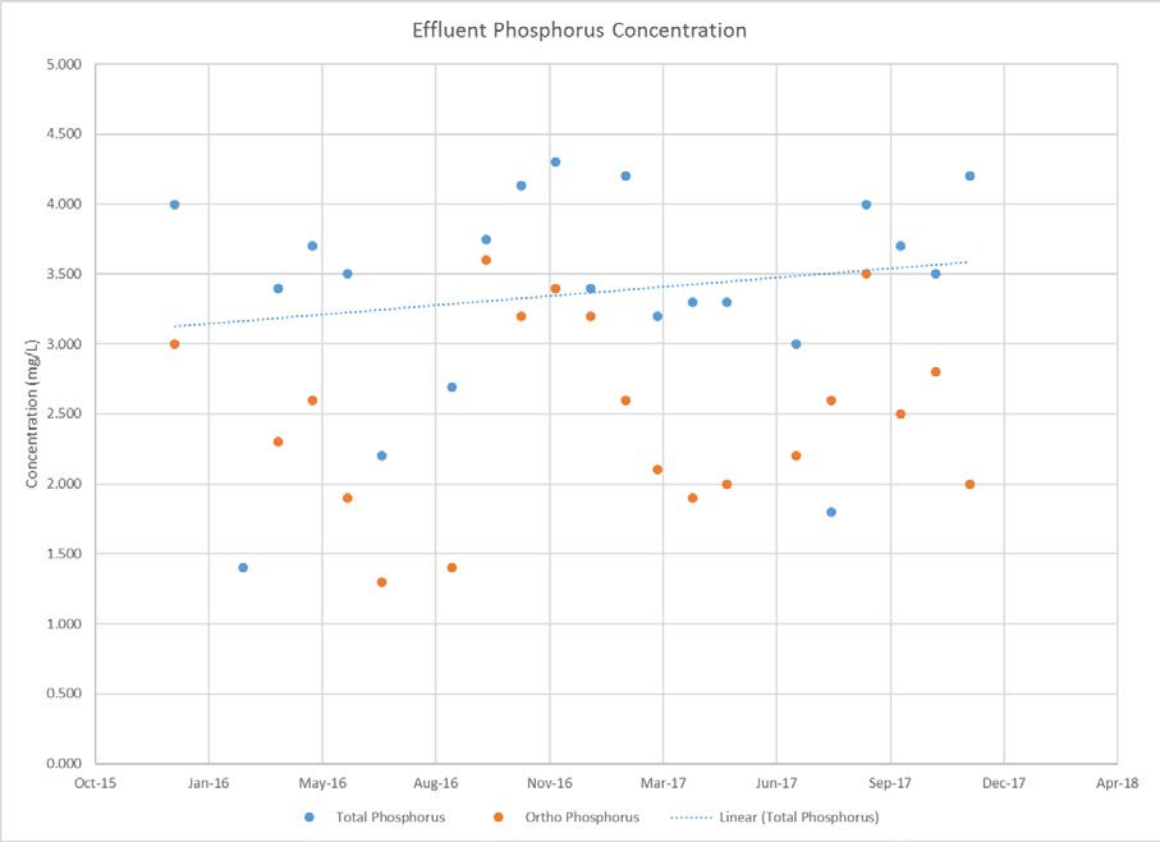

Effluent pH
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Effluent pH
Maximum Permit Limit
Minimum Permit Limit

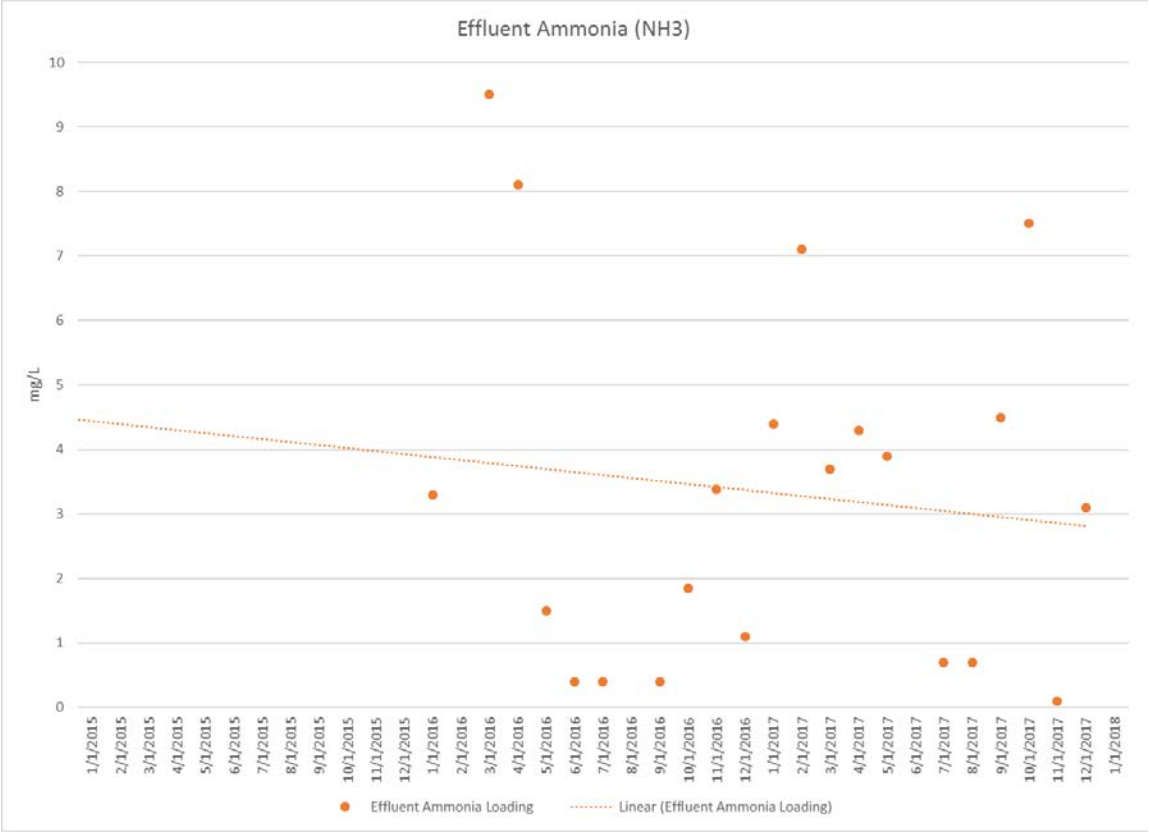
As discussed in Chapter 3, a phosphorus load cap has been implemented for Plain City by the Utah Division of Water Quality with compliance beginning in 2020. The load cap calculations are as follows:

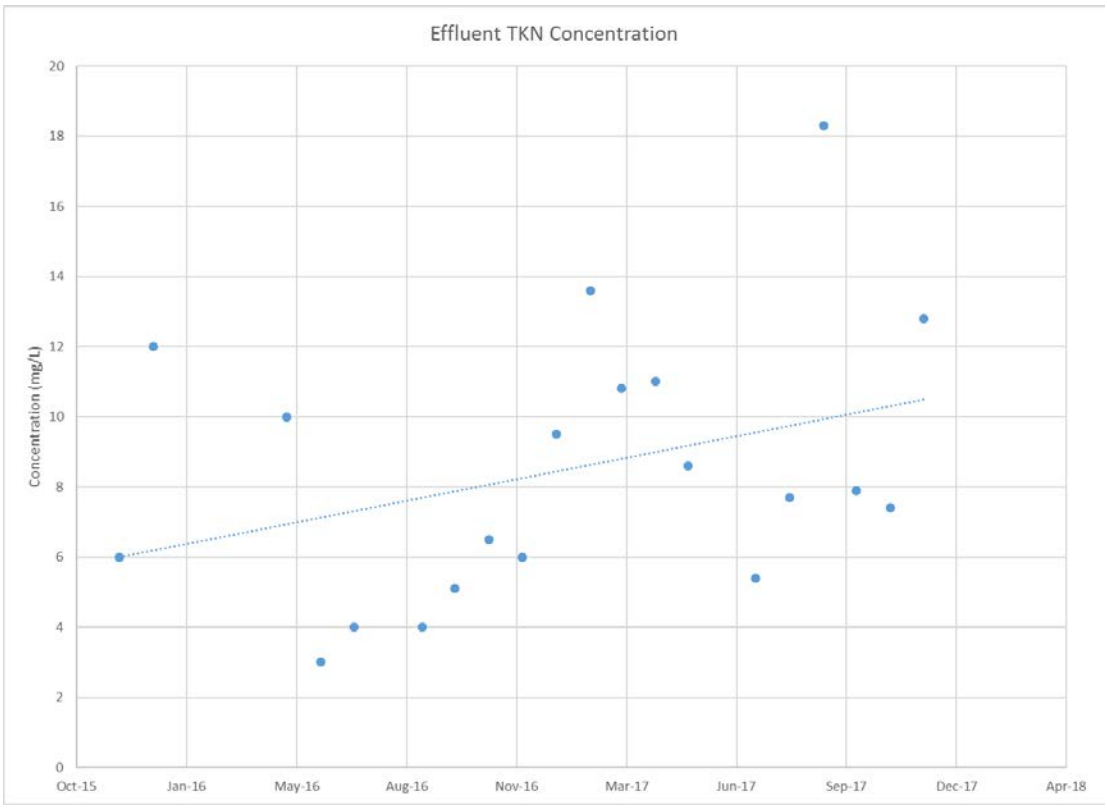
Date	Ave Day Flow from DMR (MGD)	Scaling Factor	Adjusted Ave Day Flow (MGD)	TP (mg/L)	TP (lbs/d)	Monthly TP (lbs/month)	Cumulative 12 month TP (lbs/yr)
Jan-16	0.475	2.25	1.069	4.0	35.7	1105	1,105
Feb-16	NO DISCHARGE	2.25	NO DISCHARGE				1,105
Mar-16	0.18	2.25	0.405	1.4	4.7	147	1,252
Apr-16	0.172	2.25	0.387	3.4	11.0	329	1,581
May-16	0.153	2.25	0.344	3.7	10.6	329	1,910
Jun-16	0.123	2.25	0.277	3.5	8.1	242	2,153
Jul-16	0.168	2.25	0.378	2.2	6.9	215	2,368
Aug-16	NO DISCHARGE	2.25	NO DISCHARGE				2,368
Sep-16	0.104	2.25	0.234	2.69	5.2	157	2,525
Oct-16	0.139	2.25	0.313	3.75	9.8	303	2,828
Nov-16	0.147	2.25	0.331	4.13	11.4	342	3,170
Dec-16	0.146	2.25	0.329	4.3	11.8	365	3,535
Jan-17	0.154	2.25	0.347	3.4	9.8	305	2,735
Feb-17	0.311	2.25	0.700	4.2	24.5	686	3,421
Mar-17	0.254	2.25	0.572	3.2	15.3	473	3,747
Apr-17	0.279	2.25	0.628	3.3	17.3	518	3,936
May-17	0.212	2.25	0.477	3.3	13.1	407	**4,014**
Jun-17	NO DISCHARGE	2.25	NO DISCHARGE				3,772

The original phosphorus load cap assigned to the City based on the incorrect effluent flow data was set at 1,784 lbs/year. Adjusting the data using the 2.25 correction factor increases the load cap to 4,014 lbs/year. The total phosphorus load cap would be set at 125% of this value or 5,017 lbs/year. The figure below shows the effluent Total Phosphorus concentration and the Ortho-Phosphorus concentration.

Ammonia is not currently in the City's UPDES permit, but it could be in the future. Effluent concentrations for ammonia and Total Kjeldahl Nitrogen are shown below.


Effluent Phosphorus Concentration
Concentration (mg/L)
5.000
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Oct-15
Jan-16
May-16
Aug-16
Nov-16
Mar-17
Jun-17
Sep-17
Dec-17
Apr-18
Total Phosphorus
Ortho Phosphorus
Linear (Total Phosphorus)


Effluent Ammonia (NH3)
mg/L
10
9
8
7
6
5
4
3
2
1
0
1/1/2015
2/1/2015
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
9/1/2015
10/1/2015
11/1/2015
12/1/2015
1/1/2016
2/1/2016
3/1/2016
4/1/2016
5/1/2016
6/1/2016
7/1/2016
8/1/2016
9/1/2016
10/1/2016
11/1/2016
12/1/2016
1/1/2017
2/1/2017
3/1/2017
4/1/2017
5/1/2017
6/1/2017
7/1/2017
8/1/2017
9/1/2017
10/1/2017
11/1/2017
12/1/2017
1/1/2018
Effluent Ammonia Loading
Linear (Effluent Ammonia Loading)



BOD Loading

At the maximum month flow condition, the primary cell is currently being loaded at 117 lbs/acre-d and the entire system is being loaded at 30 lbs/acre-d. DWQ guidance (R317-10.3-A.1) recommends a loading of 15-35 pounds per acre per day for the entire system, so the lagoons are currently within the design recommendations. This regulation is based on the 10 States Standards recommendation which is applicable to the north train / facultative lagoons. The aerated lagoons (south train) can handle higher BOD loadings than facultative lagoons because they utilize oxygen and mixing to promote waste degradation. Other sources indicate that aerated lagoons are commonly designed to accept BOD loadings of 50-100 lbs/acre-d across the entire system (Environmental Engineering Reference Manual, 2003). Under this criteria the lagoons have adequate capacity for both existing and future conditions. This conclusion is reinforced by the data shown in Figure XX, which indicates that BOD treatment is not deteriorating. If BOD removal performance is impacted in the future, the City could elect to send more flow through the aerated train, install aeration in the north train, or operate the lagoons in series so all 6 cells are utilized.

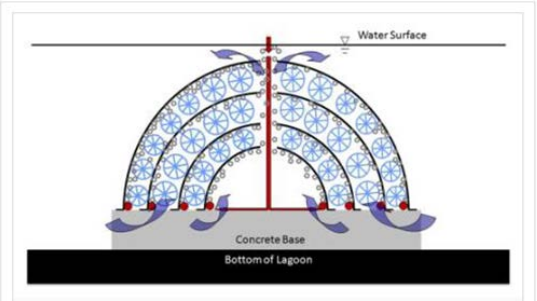
Utah does not specifically provide design guidance for BOD loading to the primary aerated cell. However, other sources such as the Illinois Administrative Code for Environmental Protection recommend that the organic loading for aerated lagoons should not exceed 0.5 pounds of BOD per 1,000 cubic feet in the first cell. This results in an allowable BOD loading of 972 lbs/d which equates to 108 lbs/acre-d. With the flow split running parallel trains, the current loading is 59 lbs/acre-d which indicates that the primary ponds are adequately sized. In addition to the size of the primary pond, the

capacity of the aeration system to treat the incoming organic load is also an important parameter for predicting lagoon performance, as will be discussed in the following section.

Aeration Capacity

As discussed previously, the north train is facultative with no supplemental aeration. The south train has numerous submerged bioreactors designed to enhance biological activity and provide aeration. Approximately 10 years ago, 50 "Poo-Gloos" were installed in Cell 2. Each "Poo-Gloo" is five feet high and six feet in diameter and shaped similar to an igloo. These structures use a combination of air, a dark environment, and a large enough surface area to promote bacterial growth that consumes wastewater pollutants. Air is released from tubes at the base of each "Poo-Gloo" through the structure and exits a hole in the top. As air moves through, it draws wastewater through the dome and out the top.

"Poo Gloo" Design



Poo Gloo Installation

Submerged Poo Gloos and Flow Baffle

Approximately 5 years ago, the city installed 154 “aerated culverts” in Cell #1 and 13 “aerated culverts” in Cell #3. These culverts are similar in size and function to the Poo-Gloos. Aerobic microorganisms predominate in the aerated ponds and utilize soluble organics and oxygen to produce CO_2 and more aerobic microorganisms.

“Aerated Culverts” at Low Water Level

Submerged Aerated Culverts

Aeration requirements generally depend on the BOD loading, the degree of treatment required, and the concentration of suspended solids in the wastewater. Design guidance exists for calculating the horsepower requirements for oxygen transfer and mixing in the aerated lagoon cell. In addition, Wastewater Compliance Systems (the manufacturer of the Poo-Gloo) was contacted to obtain their standard oxygen transfer rate. This analysis assumes that the "aerated culverts" have the same SOTR, which may not be the case since they were manufactured, assembled, and installed by city staff. To be conservative, the mass of BOD removed was calculated assuming a maximum month loading condition. The table indicates that the 25 HP of installed aerators does not provide adequate horsepower to meet the existing oxygen transfer requirements in the treatment ponds. That said, the aeration does improve the performance of the south train versus the facultative north train. If BOD treatment begins to deteriorate, it is recommended to install additional aeration in Cell #1 to target the bulk of the incoming load.

Table 2-11. Aeration Requirements for Oxygen Transfer

	2018 Maximum Month Condition	
	Summer	**Winter**
Oxygen Transfer Requirement [1]	1,794 lbs O_2/d	1,794 lbs O_2/d
Oxygen Transfer Power Requirement [2]	56 HP	50 HP
Installed Aeration	25 HP	

1. Assuming 2 lbs oxygen required per lb of BOD consumed
2. Based on 3.7 lbs O_2 transferred/hp-hr (from Wastewater Compliance Solutions)

The mixing horsepower requirement is based on typical design recommendations for providing 5 HP of aeration per million gallons of treatment volume in the primary pond. Currently there are 154 aerated culverts operating off a 15 HP blower. The mixing horsepower requirements are shown below in Table 2-12.

Table 2-12. Mixing Horsepower Requirements

Horsepower installed in primary cell	15 HP
Existing volumetric mixing	1.0 HP/Mgal
Recommended volumetric mixing	4.0 HP/Mgal
Horsepower required for fully mixed primary cell	60 HP

The installed aerators do not meet design recommendations for keeping the pond fully mixed. As a result, most of the solids entering the lagoons are settling out in the primary cell. This conclusion is confirmed through visual analysis of solids accumulation in the first cell and also the sludge judge results. Additional aeration would keep the solids in suspension and reduce sludge deposition in the aerated pond. That said, it is not common for lagoon cells to be fully mixed. Traditionally, debris and trash settles in the primary cell and it is not desired for solids to pass through to the effluent. Every 20-30 years, the primary cell is dredged to remove and dispose of the solids.

Lagoon Seepage

Currently the City is averaging 455,000 gal/day of influent flow and discharging an average of 406,000 gal/day. This indicates that approximately 11% of the wastewater is lost to evaporation and seepage, which is on the low end for a lagoon system of this size. Preliminary calculations, incorporating precipitation and evaporation as measured at the Ogden Sugar Factory, indicate that the seepage rate is 29,000 gallons per day which equates to only 820 gal/acre/day. This is significantly less than the Utah R317 requirement of 6,500 gal/acre/day. These calculations are included in the Appendix.

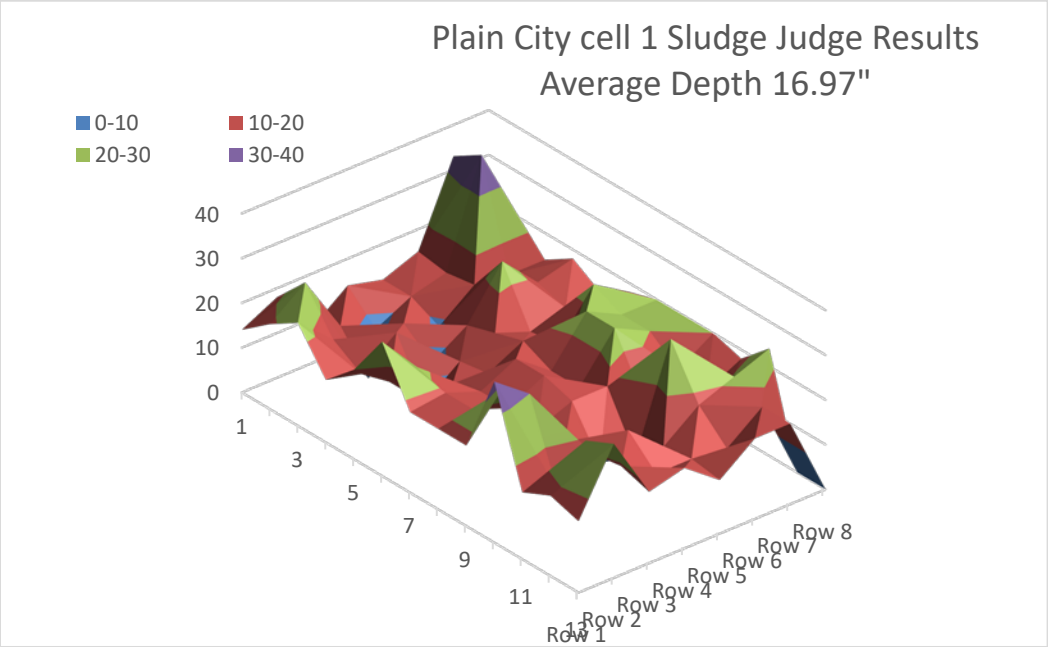
Sludge Accumulation

As solids settle to the bottom of the lagoons, they form a biosolids, or “sludge”, layer. A portion of these biosolids slowly undergo anaerobic degradation and are released back into the wastewater as various gases, solids and soluble organics. Typically the biosolids are accumulated faster than they degrade. In addition, a fraction of solid matter is inert and cannot degrade.

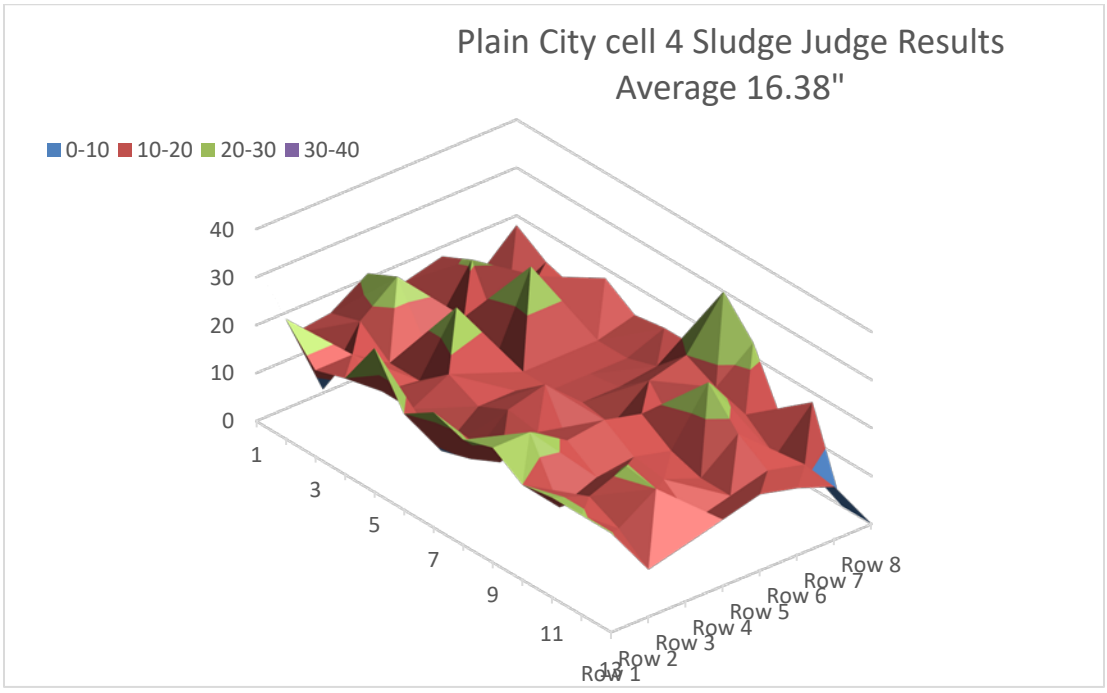
It is believed that sludge has been removed from the lagoons intermittently since they were constructed nearly 50 years ago. Rural Water measured the sludge depths in Cells #1 and #4 using a “Sludge Judge” in August 2017. The results are shown below in Figure 2-18. Sludge depths in the majority of the pond appeared to be between 1 and 2 feet deep, with a maximum measurement of 37” at the inlet pipe. It was estimated by Rural Water that approximately 28% of Cells #1 and #4 are full of sludge. This quantity of sludge will eventually impact the overall performance of the lagoons. As sludge builds up, the volume available for treatment is reduced. Eventually the lagoons will reach a tipping point and the ponds may

go septic/anaerobic. It is recommended that the sludge in the two primary cells be removed to avoid an irreversible process upset.

Sludge Judge Results for Cell #1



Sludge Judge Results for Cell #4



In typical lagoon applications, the majority of the suspended solids in the influent settle out in the primary cell. Therefore, most lagoon systems have significantly less sludge accumulation in their subsequent cells. For this reason, Rural Water did not measure the sludge depths in cells #2, #3, #5, and #6. The following sludge depths were assumed for the cells that were not measured.

Table 2-13 – Sludge Depths in Lagoon Cells

Cell	Average Sludge Depth	Maximum Sludge Depth
#1[1]	~1.5 feet	~3 feet
#2[2]	~0.7 feet	~1.5 feet
#3	~0.4 feet	~0.7 feet
#4	~1.5 feet	~3 feet
#5	~0.7 feet	~1.5 feet
#6	~0.4 feet	~0.7 feet

1. Only Cells #1 and #4 were measured for sludge depths, Cells #2 and #5 are assumed to have 50% less sludge than Cells #1 and #4, Cells #3 and #6 are assumed to have 50% less sludge than Cells #2 and #5.

Effluent Discharge

The operator has the ability to discharge from any of the lagoon cells. As mentioned previously, typically the city samples from all of the lagoon cells and then discharges from the cell with the highest quality water. This is accomplished by opening a gate. The water flows from the selected cell at a near constant discharge rate 24 hours per day, 7 days per week. The ponds are all hydraulically connected and as the overall water level goes down, the effluent flow decreases.

In the past, the operator would hold water in the ponds as long as possible, and then discharge at a high rate to get the water level back down. While this strategy does increase the retention time of the wastewater inside the lagoons, it often would surpass the maximum permitted effluent flow rate of 0.6 MGD. This approach requires a high dose of sodium hypochlorite and reduces the chlorine contact time to below acceptable levels, so is difficult to chlorinate effectively at these high effluent flow rates.

The past few years the City has changed their approach so they are discharging near continuously. This is the preferred approached for Utah DWQ. After many months of discharge, sometimes the operator holds water for a month to build water levels back up for effective treatment.

Wetlands Tertiary Treatment System

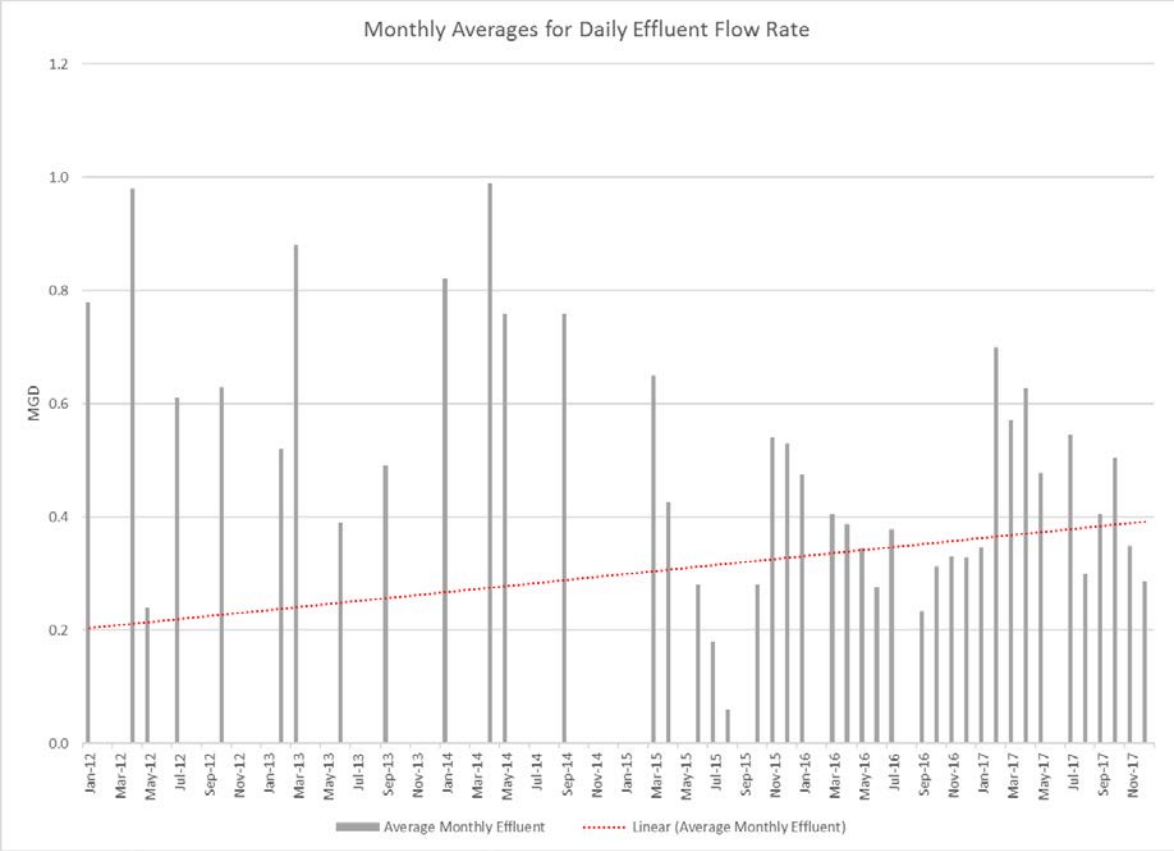
In 2012, a wetlands tertiary treatment system was constructed to provide additional treatment between the final lagoon cell and the chlorine contact tank. However, short circuiting and inadvertent flooding of an adjacent property owner occurred when this was in use, and the wetlands treatment system was abandoned in 2015. Repairs were made and the wetlands tertiary treatment system temporarily became operational again in September 2017. However, the same short circuiting issues occurred and the system was again abandoned shortly thereafter.

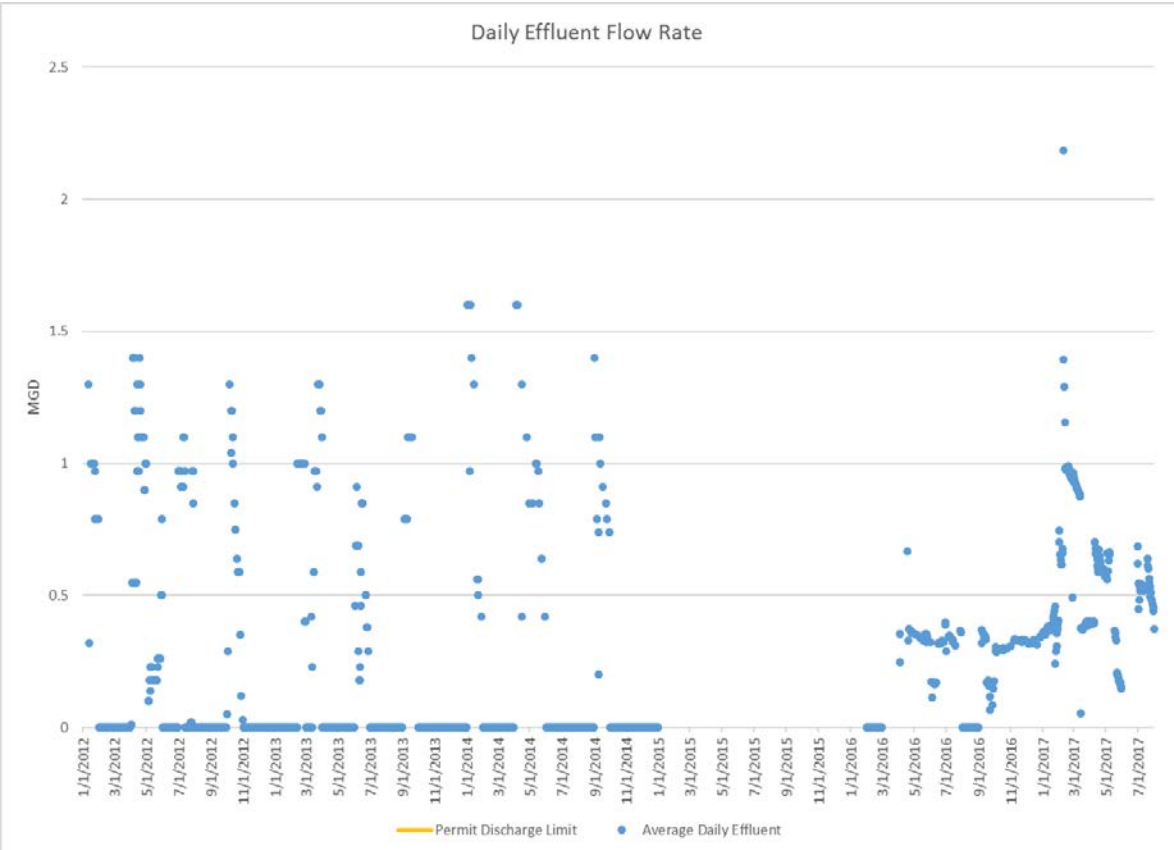
Wetlands Tertiary Treatment System

Effluent Flow Measurement

The effluent flow rate is measured at a v-notch weir at the end of the chlorine contact chamber. The effluent ultrasonic was installed in early 2016 and became operational in March 2016. Prior to that, the effluent was manually read using a gauge located inside the chlorine contact chamber. As discussed previously, during development of this Facilities Plan it became apparent that the effluent ultrasonic flow meter was not properly calibrated and was reading lower than the manual gauge by a factor of approximately 2.25. In February of 2018, The City moved the effluent ultrasonic so it is located as recommended in the equipment O&M manual. In addition, City staff evaluated the programming of the unit and determined the flow rate was calculating off a 22.5 degree v-notch weir instead of the 90 degree v-notch weir that is actually installed. City staff reprogrammed and calibrated the ultrasonic flow meter so its reported flow rates match what is read at the manual gauge. Successful calibration of the unit was achieved in mid-February. All future readings and DMR submittals of the effluent flow rate are correct and prior DMRs will be amended and resubmitted with the corrected flow data.

In the analysis below, all of the effluent flow data from March 2016 through the end of 2017 was corrected using the scaling factor of 2.25. The correction factor was not applied to any of the data prior to March 2016 because that data was recorded using the manual gauge.


Monthly Averages for Daily Effluent Flow Rate
MGD
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Average Monthly Effluent
Linear (Average Monthly Effluent)


Daily Effluent Flow Rate
MGD
2.5
2
1.5
1
0.5
0
1/1/2012
3/1/2012
5/1/2012
7/1/2012
9/1/2012
11/1/2012
1/1/2013
3/1/2013
5/1/2013
7/1/2013
9/1/2013
11/1/2013
1/1/2014
3/1/2014
5/1/2014
7/1/2014
9/1/2014
11/1/2014
1/1/2015
3/1/2015
5/1/2015
7/1/2015
9/1/2015
11/1/2015
1/1/2016
3/1/2016
5/1/2016
7/1/2016
9/1/2016
11/1/2016
1/1/2017
3/1/2017
5/1/2017
7/1/2017
Permit Discharge Limit
Average Daily Effluent

Effluent V-Notch Weir

Chlorination System

When wastewater is discharged, the treated sewage enters a chlorine contact chamber for disinfection. The effluent is disinfected using liquid sodium hypochlorite, which is housed in tanks inside the chlorination building. The chemical metering pump and effluent flow meter transmitter are also located in this building. It is recommended that safety equipment for dealing with sodium hypochlorite be purchased and housed in this building.

Per Utah Administrative Code (UAC) requirements, "dosage control based on effluent flow rate should be provided because of the diurnal variations in the disinfectant demand of the wastewater." However, the City's existing system is manually controlled with a set chlorine dose, which makes it difficult to achieve a consistent dosage/residual. In addition, UAC states that "duplicate disinfection systems shall be provided." The existing system has redundant sodium hypochlorite feed tanks but not a backup chemical metering pump.

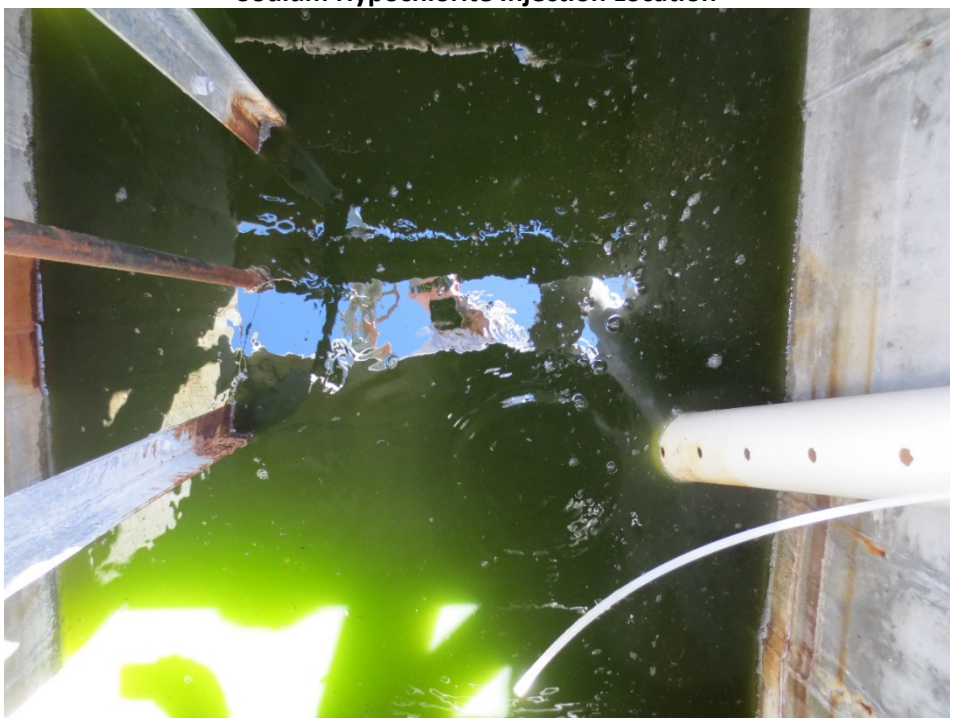
Currently the city stores 4-6 months of sodium hypochlorite on-site at a time. Sodium hypochlorite begins degrading and becomes less effective after approximately one month of storage. To improve disinfection performance, City staff should try to time smaller, more frequent deliveries that correspond better with usage rates.

Chlorination Building

Sodium Hypochlorite Tanks

Chemical Metering Pump

Sodium Hypochlorite Injection Location



The chlorine contact chamber, flow metering station, and two new flow control structures were constructed in 2009 so the back end infrastructure it is relatively new. The purpose of the chlorine contact tank is to allow adequate time for the chlorine to disinfect the water. The baffles ensure adequate detention time by preventing short-circuiting. According to the DWQ-approved chlorine contact basin drawings from Five Star Engineers, the design average daily flow rate of the chamber to achieve 60 minutes of contact time is 0.61 MGD. The water level is set by the elevation of the v-notch weir at the outlet of the chamber.

Chlorine Contact Chamber

Utah Administrative Code requires chlorine disinfection contact times of 60 minutes at average daily flow and 30 minutes for peak daily flow. The following table shows the calculated maximum average daily and peak daily flows based on the required minimum disinfection contact times.

Table 2-14. Chlorine Contact Time

Required Minimum Contact Time (min)	Maximum Allowable Effluent Flowrate (mgd)	Current Influent Flowrate (mgd)	Current Effluent Flowrate (mgd)
60 (average day flow)	0.610	0.455	0.406
30 (peak day flow)	1.22	1.24	0.990 [1]

1. Largest reported effluent flow rate submitted in DMR (April 2014)

The flowrates in the above table are generally within the range of typical influent flows to the lagoons. However, the flow that needs to be disinfected is the effluent flow rate. Sometimes the City holds water and doesn't continuously discharge. This means that when they do discharge the effluent flows can be greater than the influent flow rate. In 2015, the city modified their operation to near-continuous discharge and the contact times have stayed within the recommended values.

Generally speaking, the existing chlorine contact tank is adequately sized for the current flow rates, the concrete is in good condition, and the effluent v-notch weir and meter has been repaired so it is reading accurately. As such, no improvements are required for this structure.

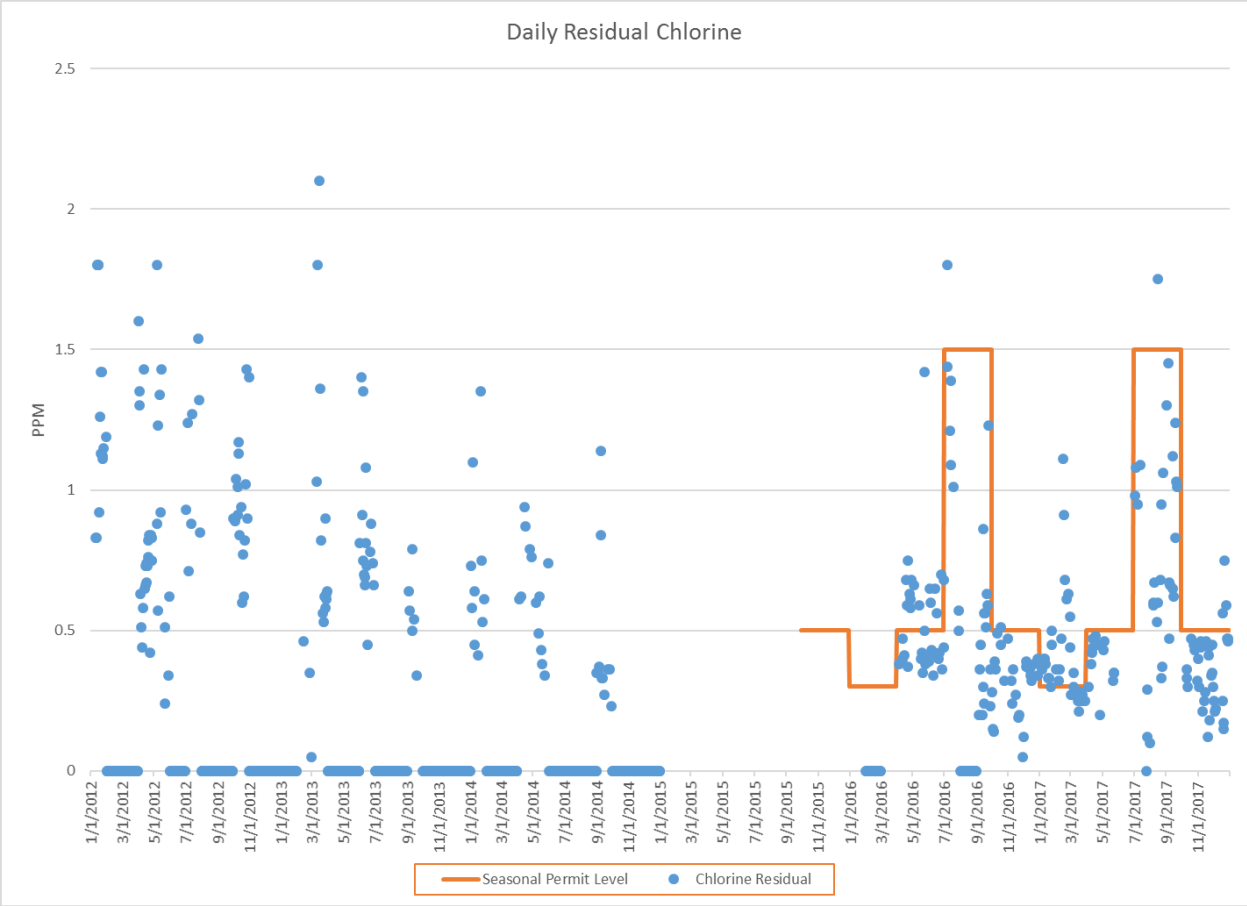
In 2015, seasonally varying total residual chlorine (TRC) limits were added to the City's UPDES permit. These are shown below in Table 2-15.

Table 2-15. Effluent Total Residual Chlorine Permit Limits

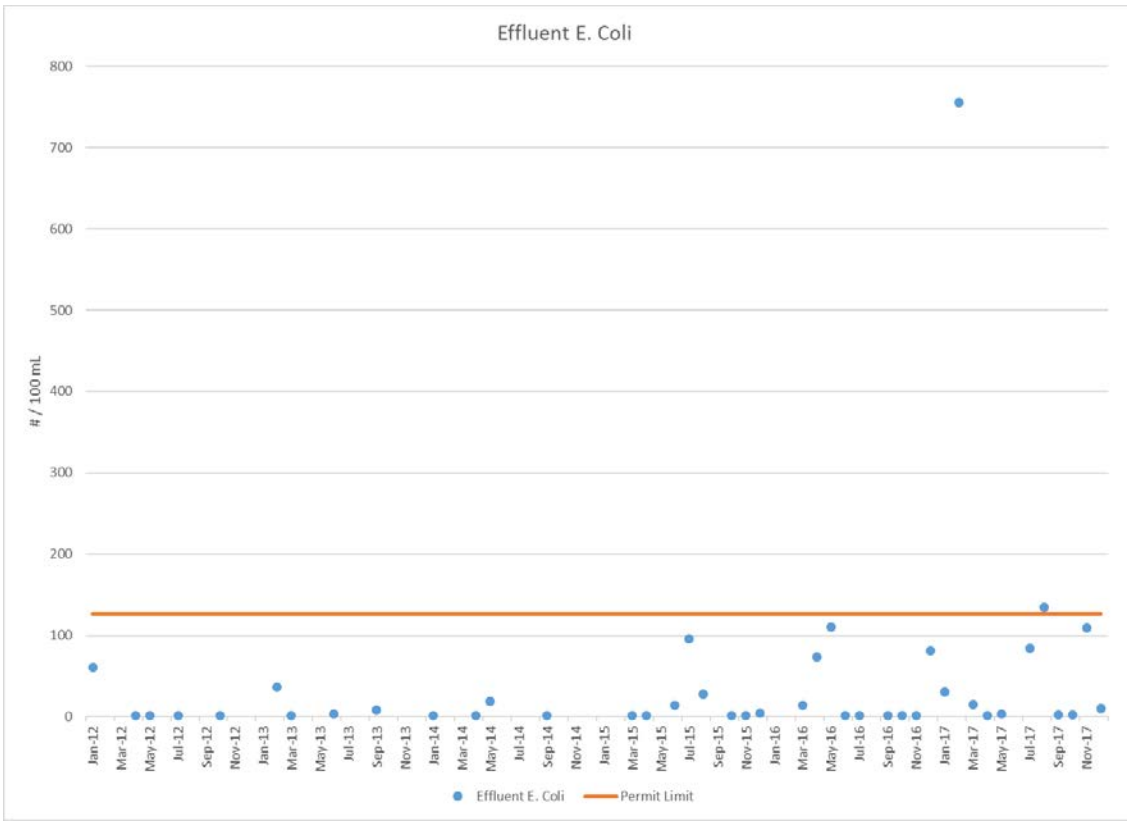
Time of Year	Months	Daily Maximum (mg/L)
Winter	January – March	0.3
Spring	April – June	0.5
Summer	July – September	1.5
Fall	October - December	0.5

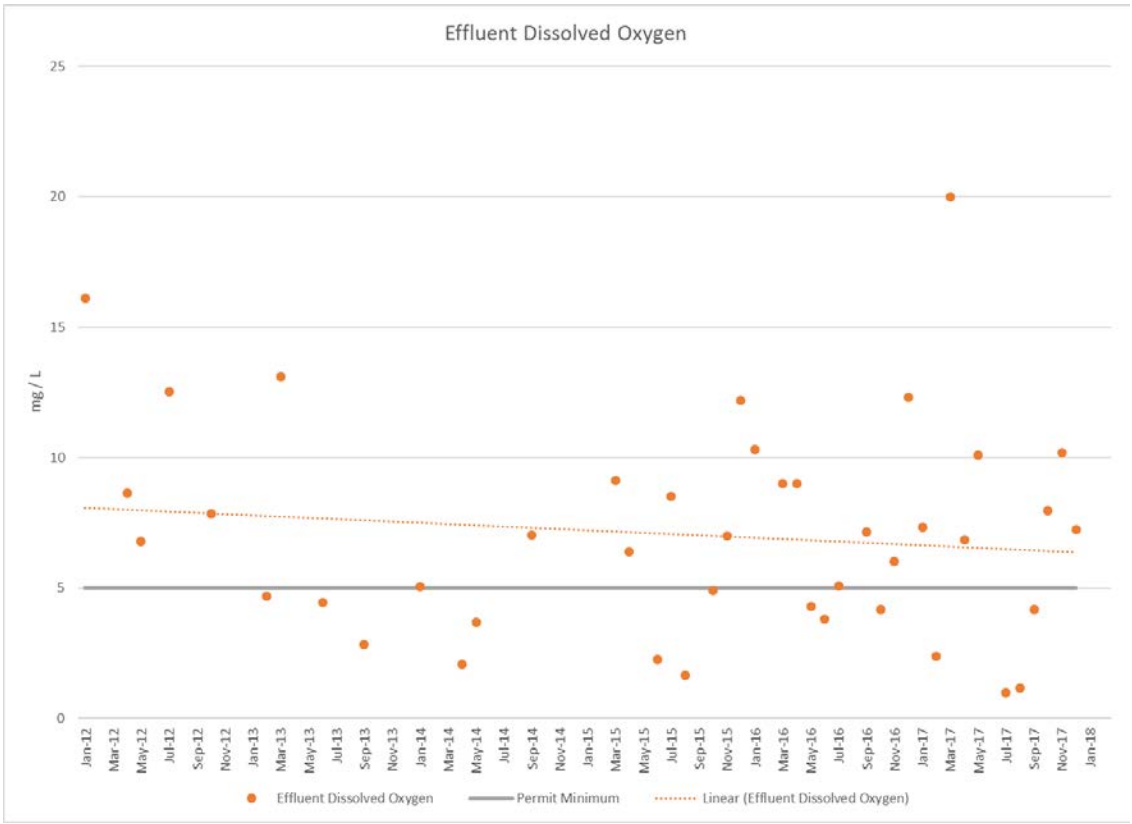
As can be seen in the chart below, the City has difficulty complying with these new chlorine residual permit limits. In addition, the effluent has also had some E-Coli spikes in recent years. City staff have been forced to reduce the chlorine dose rate in order to comply with the permitted chlorine residual which has had a negative impact on the E-Coli kill rate. Many communities have dealt with this same problem by adding a dechlorination chemical (such as sodium bisulfite or sulfur dioxide) after the chlorine contact time to drop the chlorine residual down to acceptable levels. In this manner, the E-Coli kill is achieved using a high dose of chlorine and then the residual is quenched with the dechlorination chemical.

The selected dechlorination chemical would be introduced to the effluent downstream of the v-notch weir (the cascade at this location will promote thorough mixing). Contact time for dechlorination is relatively short compared to chlorination. It is recommended the dechlorination chemical and pumping equipment be located inside a building.



One disadvantage of dechlorination chemicals is they scavenge dissolved oxygen. The City already cannot reliably comply with the dissolved oxygen requirement in the UPDES permit as shown in the figure below. Adding a dechlorination chemical will make this worse. Typically, a reaeration system is utilized to bring the dissolved oxygen back up to permit limits when dechlorination is utilized. Cascade aeration is the preferred method, but there is not adequate head/fall available to achieve this in Plain City. The alternative is diffused aeration in a basin that is deep enough and has ample volume/detention time to allow for sufficient oxygen transfer. The aeration system would need to be powered by a small blower.


Effluent E. Coli
800
700
600
500
400
300
200
100
0
/ 100 mL
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Effluent E. Coli
Permit Limit


Effluent Dissolved Oxygen
25
20
15
10
5
0
mg / L
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Jan-18
Effluent Dissolved Oxygen
Permit Minimum
Linear (Effluent Dissolved Oxygen)

Outfall

The system has one discharge point named Outfall 001. This is where all effluent samples are taken for monitoring requirements.

The City's permit requires that many of the samples "be 24 hour composites collected by use of an automatic sampler or minimum of four grab samples collected a minimum of two hours apart." It is recommended the City purchase and install a refrigerated automatic sampler at the effluent compliance location to facilitate sample collection and comply with permit requirements.

From Outfall 001, the discharge flows into an unnamed drainage ditch.

Effluent Outfall into "Unnamed Drainage Ditch"

From the unnamed drainage ditch, the effluent flows into Dix Creek and eventually discharges into the Harold S. Crane Waterfowl Management Area and Willard Spur of the Great Salt Lake.

Effluent Flow Path

RipRap on Embankments for Erosion Protection

Utah R317 regulations require riprap to be placed from one foot above the high water mark to two feet below the low water mark (measured on the vertical) for erosion protection from wave action. The riprap needs to be placed on the interior of the dikes at a minimum thickness of 8 inches. In some areas the riprap is adequate but in other areas it is deficient. It is recommended to install additional riprap in deficient areas to protect the dikes from erosion.

Lack of Riprap on Lagoon Embankments

Site Fencing

The entire lagoon property boundary is fenced and site security is adequate. No improvements are required.

SCADA System

The City recently installed a SCADA system to monitor and provide alarms at four of the most critical sewer lift stations. The City anticipates budgeting to add an additional 2 lift stations each year to the SCADA system. There is no SCADA at the lagoons at this time.

d) Financial Status of any Existing Facilities

Plain City charges residential and commercial users a monthly fee for the use of the sanitary sewer system and an impact fee when a new connection is established. The current fees for sewer service are shown below in Table 2-16.

Table 2-16. Sewer Fees

Category of Fee	Residential
Monthly Sewer Rate	$23.00/ERU
New Sewer Connection Fee	$300
Sewer Impact Fee	$3,075

The City has an outstanding debt of $1.71 million for the $3 million 5100 West sewer project in 2005. A detailed budget for the wastewater treatment and collection system is included in the Appendix.

e) Water/Energy/Waste Audits

There have not been any energy or waste audits conducted on the sanitary sewer system. In general, lagoons are highly energy efficient and use much less energy than other more advanced methods of mechanical treatment. Waste accumulates in the lagoon system and excess sludge needs to be removed occasionally. Typically the material dredged from the lagoons is put to beneficial use by land applying on nearby fields.

3.0 NEED FOR PROJECT

a) Health, Sanitation, and Security

Plain City is projected to experience robust population growth in the coming years due to its desirable location and available land for development. Unfortunately, the City's aging lagoon treatment system needs to be upgraded in order to accommodate this growth.

As described in Chapter 2, the lagoon treatment system has a number of deficiencies that need to be addressed. These deficiencies include the following:

- Aging infrastructure and inadequate pumping capacity at Lift Station 1, the primary influent lift station to the lagoons. It is recommended this lift station be replaced with a triplex lift station with larger pumps. A backup generator needs to be installed and 3-phase power needs to be brought to this lift station.
- There is no screen or bar rack to capture debris, which has resulted in trash buildup inside the lagoons. It is recommended a mechanical screen or grinder be installed to protect the lagoons during the planning period.
- The flow splitter box is in disrepair and needs to be replaced. The existing v-notch weir and ultrasonic for influent flow measurement is not reading correctly. It is recommended this structure be abandoned and a new magnetic flow meter be incorporated into the Lift Station 1 improvements (the Lift Station 16 force main can be tied into this same magmeter).
- There is excessive sludge accumulation in the 2 primary cells, up to 37" deep in places. This sludge buildup reduces the available treatment volume and anaerobic digestion of this sludge can cause septic conditions to occur. If the City's long term vision is to continue using the lagoons, it is recommended these 2 cells be dredged to reduce the potential of a process upset.
- TSS and pH limits are occasionally exceeded due to algal growth and duckweed.
- The City has difficulty complying with the new chlorine residual permit limits. The chlorine dose rate has been decreased in order to comply with the permitted chlorine residual, which has had a negative impact on the E-Coli kill rate. It is recommended to add a dechlorination chemical following disinfection to reduce the chlorine residual down to acceptable levels.
- The City cannot reliably maintain 5 mg/L of dissolved oxygen in the effluent as required by the UPDES permit. It is recommended a reaeration system be added after dechlorination to bring the dissolved oxygen back up prior to discharge.
- Wastewater flows are excessive during periods of wet weather, which indicates there are concerns with infiltration and inflow. Some of this is due to basement sump pumps that are connected to the sewer system; the city is actively working to remove these connections. Expansion of the collection system has occurred with limited planning and bottlenecks in the system are becoming apparent. The area's flat topography requires numerous pumping stations (19 in total) and in many instances double or triple pumping of wastewater. It is recommended

a comprehensive Collection System Model and Master Plan be developed which will analyze problematic areas in the system and provide recommendations for improvements.

In addition to meeting the existing permit limits, the City also needs to comply with future regulations. Compared to mechanical plants, lagoons are not effective at removing nutrients and it will be increasingly difficult to comply with new permit limits that incorporate nutrient removal. In 2015, a new phosphorus regulation was promulgated by DWQ. The rule implements technology-based phosphorus effluent limits (TBPEL) for mechanical treatment facilities and a nutrient load cap for discharging lagoons. The text of the rule is as follows:

> All non-lagoon treatment works discharging wastewater to surface waters of the state shall provide treatment processes which will produce effluent less than or equal to an annual mean of 1.0 mg/L for total phosphorus. The TBPEL shall be achieved by January 1, 2020. No TBPEL will be instituted for discharging treatment lagoons. Instead, each discharging lagoon will be evaluated to determine the current annual average total phosphorus load based on average flows and concentrations. A cap of 125% times the current average annual total phosphorus load will be established and referred to as phosphorus loading cap. Once the lagoon's phosphorus loading cap has been reached, the owner of the facility will have five years to construct treatment processes or implement treatment alternatives to prevent the total phosphorus loading cap from being exceeded.

As discussed in Chapter 2, the total phosphorus load cap has been set for the City at 5,017 lbs/year. By definition, the phosphorus "load cap" will eventually result in a moratorium on growth in the city if nothing is done. Only a finite number of houses can be added to the system before the load cap is exceeded. The City is facing development pressure and needs to implement a solution that will allow for continued growth while meeting discharge regulations for the foreseeable future.

The state has also indicated they intend to implement total inorganic nitrogen discharge limits in the future. Negotiations between DWQ and the treatment districts are still ongoing regarding the timing and magnitude of future nitrogen requirements. It is likely that the new nitrogen limits will be water body specific and at first will be focused on the larger mechanical plants. Eventually, Plain City may have nitrogen limits but they likely will be 15+ years out or even longer.

The state has also been mandated by EPA to implement ammonia limits where required to protect sensitive and endangered freshwater aquatic snails. Plain City currently does not have a discharge limit for ammonia. In some cases, this will result in an ammonia limit that is difficult to achieve using lagoon technology. J-U-B will continue to monitor any potential ammonia limits and keep the city informed.

b) Aging Infrastructure

The treatment facility consists of a six cell facultative lagoon system that was originally constructed in 1970. After nearly 50 years of service some elements of the facility are in need of rehabilitation, especially Lift Station #1. All metallic components inside the wet well structure are severely corroded. The concrete may need to be sand blasted and coated to extend its design life or a new wet well

installed. There are some issues with the electrical components at Lift Station #1 and a backup generator is required.

c) Reasonable Growth

It is projected that there are 6,922 people currently living in Plain City (see Table 1-1). Based on a combination of discussions with City staff and data from the Governor's Office of Planning and Budget, it is projected the population in 20 years will be 13,768. This equates to 4,012 single family residential ERUs and 38 other ERUs (commercial, industrial, schools, manufacturing, etc.) as shown in Table 3-1 below. The resulting 4,050 ERUs in 2037 is an increase of 2,014 ERUs over existing.

Table 3-1. ERU and Flow Projections

Year	Single family residential units	Other ERUs (commercial, industrial, schools, etc.)	Total ERUs [1]	gal/ERU/d	Average Day gal/day	Maximum Month gal/day	Peak Hour gal/day
2017	2017	19	2036	223	455,000	699,000	1,415,000
2018	2107	20	2128	223	476,000	731,000	1,481,000
2019	2202	21	2223	223	497,000	764,000	1,546,000
2020	2300	22	2322	223	519,000	798,000	1,615,000
2021	2421	23	2444	223	546,000	839,000	1,699,000
2022	2548	24	2573	223	575,000	884,000	1,789,000
2023	2682	25	2708	223	605,000	930,000	1,882,000
2024	2823	27	2850	223	637,000	979,000	1,982,000
2025	2971	28	2999	223	670,000	1,030,000	2,085,000
2026	3127	29	3157	223	706,000	1,085,000	2,197,000
2027	3291	31	3323	223	743,000	1,142,000	2,312,000
2028	3357	32	3389	223	757,000	1,163,000	2,355,000
2029	3424	32	3457	223	773,000	1,188,000	2,405,000
2030	3493	33	3526	223	788,000	1,211,000	2,452,000
2031	3563	34	3596	223	804,000	1,236,000	2,501,000
2032	3634	34	3668	223	820,000	1,260,000	2,551,000
2033	3706	35	3741	223	836,000	1,285,000	2,601,000
2034	3781	36	3816	223	853,000	1,311,000	2,654,000
2035	3856	36	3893	223	870,000	1,337,000	2,707,000
2036	3933	37	3970	223	887,000	1,363,000	2,760,000
2037	4012	38	4050	223	905,000	1,391,000	2,816,000

1. Growth rates based on U.S Census Bureau that provided number of people per home, Bona Vista Water that provided number of connections, and city officials that provided number of homes.

The State requires that the treatment facilities be evaluated over a 20-year planning horizon. Therefore, the facilities need to be sized to accommodate an average day flow of 905,000 gallons/day and a

maximum month flow of 1,391,000 gallons/day. Influent loadings to the facility are shown below in Table 3-2.

Table 3-2. BOD, TSS, Ammonia, and Total Phosphorus Load Projections

Year	Total ERUs	Influent BOD		Influent TSS		Influent Ammonia		Influent Total Phosphorus	
		Conc'n mg/L	Ave Day lbs/d	Conc'n mg/L	Ave Day lbs/d	Conc'n mg/L	Ave Day lbs/d	Conc'n mg/L	Ave Day lbs/d
2017	2036	181	687	163	618	20	74	4.5	17.3
2018	2128	181	718	163	646	20	77	4.5	18.0
2019	2223	181	750	163	675	20	81	4.5	18.8
2020	2322	181	783	163	705	20	84	4.5	19.7
2021	2444	181	825	163	742	20	89	4.5	20.7
2022	2573	181	868	163	781	20	94	4.5	21.8
2023	2708	181	914	163	822	20	98	4.5	22.9
2024	2850	181	962	163	865	20	104	4.5	24.2
2025	2999	181	1012	163	910	20	109	4.5	25.4
2026	3157	181	1065	163	958	20	115	4.5	26.8
2027	3323	181	1121	163	1009	20	121	4.5	28.2
2028	3389	181	1144	163	1029	20	123	4.5	28.7
2029	3457	181	1166	163	1049	20	126	4.5	29.3
2030	3526	181	1190	163	1070	20	128	4.5	29.9
2031	3596	181	1213	163	1092	20	131	4.5	30.5
2032	3668	181	1238	163	1114	20	133	4.5	31.1
2033	3741	181	1262	163	1136	20	136	4.5	31.7
2034	3816	181	1288	163	1158	20	139	4.5	32.3
2035	3893	181	1314	163	1182	20	142	4.5	33.0
2036	3970	181	1340	163	1205	20	144	4.5	33.6
2037	4050	181	1367	163	1229	20	147	4.5	34.3

1. Projections based on loadings previously calculated in Chapter 2: BOD = 0.337 lbs/ERU/d, TSS = 0.304 lbs/ERU/d, Ammonia = 0.036 lbs/ERU/d, Total Phosphorus = 0.008 lbs/ERU/d.

Table 3-3, below, summarizes the existing and future influent flow and loads to the treatment facility.

Table 3-3. Existing and Future Flows and Loads

	2017		2037	
Parameter	**Average Day**	**Max Month**	**Average Day**	**Max Month**
Flow	455,000 gal/d	699,000 gal/d	905,000 gal/d	1,391,000 gal/d
BOD	687 lbs/d	1,056 lbs/d	1,367 lbs/d	2,100 lbs/d
TSS	618 lbs/d	949 lbs/d	1,229 lbs/d	1,888 lbs/d
Ammonia	74 lbs/d	114 lbs/d	147 lbs/d	226 lbs/d
Total Phosphorus	17 lbs/d	26 lbs/d	34 lbs/d	53 lbs/d

A capacity assessment of all of the major components of the lagoon treatment system is included below in Table 3-4. It is standard engineering practice to evaluate the capacity of unit processes at the maximum month flow and loading conditions. Typically, DWQ encourages cities to begin planning/designing for expansion when the treatment facilities have reached 80% of their design capacity. Components highlighted in orange indicate an immediate need, while those highlighted in cream indicate an upgrade is required during the planning period.

Table 3-4. Lagoon Treatment Capacity Analysis

Parameter	Capacity Evaluation	Upgrades Required
Lift Station #1	This lift station pumps most of the City's sewage into the lagoons for treatment. The existing pumping capacity is not adequate as the pumps cycle frequently and have high run times. In addition, this lift station could not keep up during the flooding event in February 2017. The lift station is nearly 50 years old and is showing signs of severe corrosion. The piping and access hatch need to be replaced and the wet well should be rehabilitated with a protective coating or replaced. A backup generator needs to be installed and electrical components need to be updated. 3-phase power needs to be brought to this lift station.	Immediate upgrades are required due to inadequate pumping capacity and aging infrastructure.
Lift Station #16	This lift station is relatively new (2006) and pumps a small portion of the City's sewage directly to the lagoons. The pumps are adequately sized and are in good condition.	No upgrades required during planning period except for typical pump maintenance
Influent Flow Metering	The influent ultrasonic is not properly calibrated and the flow conditions are not ideal. The recorded flow measurements are approximately 50% of the actual flow rate. It is recommended this ultrasonic be replaced with a magnetic flow meter as part of the Lift Station #1 improvements. Also, the influent splitter box is in disrepair and should be replaced.	Immediate upgrades are required.
Headworks	There currently is no screening structure at the lagoons. It is recommended a screen, bar rack, or grinder be installed to minimize debris accumulation in the lagoons.	Upgrades required to protect existing lagoon infrastructure.
Lagoon Design Capacity	From the UPDES permit, DWQ considers the design capacity of the lagoons to be 0.60 MGD. This capacity has already been surpassed on a maximum month basis and would be reached at 2,700 ERUs on an average day flow condition. If the facility is still	The design capacity has already been exceeded on a maximum month flow condition, and will be

	performing well when the design capacity is reached we may be able to get DWQ to re-rate the facility for a higher allowable flow rate.	exceeded in 2023 on an average day flow condition.
Sludge Removal	Sludge has been removed sporadically from the lagoons since they were originally constructed nearly 50 years ago. Sludge depths in the majority of the primary cells appeared to be between 1 and 2 feet deep, with maximum measurement of 37". It was estimated by Rural Water that approximately 28% of Cells #1 and #4 are full of sludge. Excessive sludge depths may be hindering aeration in the south train.	Remove sludge from Cells #1 and #4 to increase treatment volume, improve overall performance, and prevent the ponds from going septic/anaerobic.
Hydraulic Retention Time	There is not currently adequate retention time on the facultative (non-aerated) north train. It is recommended aeration be added to the north train as the required retention time for aerated lagoons is significantly less than for facultative lagoons. For the south train which is already aerated, there is adequate hydraulic retention time available the for the entire 20-year planning period assuming the effluent BOD limit of 45 mg/L is not reduced in the future.	Aeration should be added to the north train to reduce retention time requirements.
BOD Loading to Entire System	Once the sludge is removed, capacity exists to treat BOD loads over the entire system until 3,600 ERUs on an average day loading condition and 2,350 ERUs on a maximum month loading condition. This is applicable to the facultative train, as the aerated train can handle additional loadings. Aeration should be added on the facultative side to address this future deficiency.	BOD loading to the entire system will reach design guidelines for facultative lagoons (35 lbs/acre/day) in 2020 on a maximum month basis and 2031 on an average day basis.
BOD Loading to Primary Pond	Typical design guidance suggests that the primary ponds are adequately sized to accommodate existing BOD loadings until 3,800 ERUs on a maximum month loading condition and beyond the 20-year planning period for the average day loading condition. It is likely the primary pond can be "overloaded" and still operate effectively as long as adequate aeration capacity is installed to treat the incoming load.	BOD loading to primary pond is within design recommendations until 2033 on a maximum month basis and for the entire planning period on an average day basis.
Aeration Capacity – Oxygen Transfer	The installed aeration capacity does not currently meet design recommendations for existing oxygen transfer requirements. Additional aeration will improve treatment of the organic load and increase nitrification to meet potential future ammonia limits.	Additional aeration is recommended (particularly in the primary pond) when the treatment performance for BOD begins to degrade or if an ammonia limit is

		added. It is also recommended to add aeration to the facultative train.
Aeration Capacity - Mixing	It is not critical to keep the pond fully mixed. However, additional aeration/mixing in the primary pond will reduce settling while at the same time improving treatment performance.	The primary pond currently does not have adequate aeration installed to keep the pond fully mixed.
Nutrient Load Cap – Phosphorus	The phosphorus load cap for the City has been set at 5,017 lbs/year (125% of the existing load of 4,014 lbs/year). The load cap has already been exceeded on a maximum month basis and will be exceeded at 2,500 ERUs on an average day basis.	The phosphorus load cap will be exceeded in 2022 on an average day basis. See Chapter 4 for alternatives for dealing with phosphorus.
Total Inorganic Nitrogen Limits	The state has indicated they intend to implement total inorganic nitrogen discharge limits in the future. It is likely that the new nitrogen limits will be water body specific and at first will be focused on the larger mechanical plants.	Plain City may receive nitrogen limits in the future but they are likely 15+ years out. It is recommended any upgrades include the ability to retrofit/expand to deal with nitrogen in the future.
Ammonia Limits	The state has been mandated by EPA to implement ammonia limits where required to protect sensitive and endangered freshwater aquatic snails. DWQ is currently implementing site-specific ammonia limits. In some cases, this can result in ammonia limits that are difficult to achieve using lagoon technologies.	J-U-B will continue to monitor any potential ammonia limits for Plain City and keep the city informed.
Chlorination System	Duplicate disinfection systems are required per DWQ rules, but the city only has one sodium hypochlorite metering pump. Install redundant/backup metering pump.	The chlorination system is in need of relatively minor improvements.
Chlorine Contact Chamber	The chlorine contact chamber was constructed in 2009 and is rated for 0.61 MGD at average day flow (this will occur at 3,000 ERUs) and 1.22 MGD on a peak day flow basis (this will occur at 2,500 ERUs).	The chlorine contact chamber capacity will be exceeded in 2025 on an average day basis and in 2022 on a peak day basis.
Dechlorination System	Currently there is no dechlorination system and the city has difficulty maintaining compliance with the permitted chlorine residual. The effluent needs to be dechlorinated downstream of the v-notch weir.	This is a compliance issue and needs to be addressed immediately as required by DWQ.

Reaeration System	The City cannot reliably comply with the effluent dissolved oxygen requirement in their UPDES permit. A reaeration system needs to be added downstream of the dechlorination system.	This is a compliance issue and needs to be addressed immediately as required by DWQ.
Effluent Sampling	DWQ requires composite samples for many of the parameters in the UPDES permit. It is recommended the city install an automatic refrigerated composite sampler.	Installation of a composite sampler will facilitate sample collection and comply with permit requirements.
Clay Liner	Influent versus effluent calculations indicate that seepage through the lagoons is well below the maximum allowable rate (taking into account evaporation and precipitation). This suggests the clay liners are still in good condition.	No upgrades required during the planning period.
Riprap on Lagoon Embankments	Some of the lagoon cells appear to have minimal to no riprap on the dike interiors. Utah R317 regulations require a minimum thickness of 8" for erosion protection.	Install riprap on dike interiors of all cells in accordance with R317 regulations.
Collection System	Wastewater flows are excessive during periods of wet weather, which indicates there are concerns with infiltration and inflow. Expansion of the collection system has occurred with limited planning and bottlenecks in the system are becoming apparent. The area's flat topography requires numerous pumping stations (19 in total) and in many instances double or triple pumping of wastewater.	It is recommended a comprehensive Collection System Model and Master Plan be developed which will analyze problematic areas in the system and provide recommendations for improvements.

4.0 ALTERNATIVES CONSIDERED

Prior to looking at feasible expansion alternatives, the challenges and concerns associated with the future of wastewater treatment in Plain City were identified. The primary challenges as discussed in Chapter 3 include:

- Struggle to maintain consistent permit compliance
- The capacity and age of the existing treatment facilities
- Newly enacted nutrient regulations

The Alternatives considered include:

- Alternative 1: No Action
- Immediate Needs – Projects that are Required for All Subsequent Alternatives
- Alternative 2: Upgrade Lagoons and Land Apply Seasonally
- Alternative 3: Divert Some Flow to Central Weber Sewer Improvement District for Treatment
- Alternative 4: Hybrid Lagoon System with Mechanical Components
- Alternative 5: Mechanical Treatment – Conventional Activated Sludge with Nutrient Removal
- Alternative 6: Mechanical Treatment – Sequencing Batch Reactor (SBR)

4.1 ALTERNATIVE 1 – NO ACTION ALTERNATIVE

A. Description
Under the no action alternative, the lagoon treatment system would be maintained in its current state and no improvements would be implemented.

B. Design Criteria
For this alternative, the City would not implement any improvements to the wastewater treatment facilities. Due to existing deficiencies and the recently implemented phosphorus load cap rule, future residential and commercial growth would need to be restricted when the load cap is exceeded around the year 2021. Lagoons generally remove approximately 25 percent of influent phosphorus and the process cannot be modified to reliably remove additional phosphorus. Existing deficiencies on the back end (chlor/dechlor/reaeration) will remain and the City could face fines for non-compliance. In addition, high flow rates during periods of infiltration and inflow could overwhelm Lift Station #1 as has occurred in the past. Sludge would continue to accumulate in the ponds, eventually causing a process upset and septic conditions. Lagoon performance will begin to degrade as flows increase resulting in inadequate aeration capacity and hydraulic retention time in future years. The existing system design values presented in Chapter 2 would be maintained as the design criteria.

C. Map
A map of the current facility to be maintained is presented in Figure 2-1.

D. Environmental Impacts
Since no changes are proposed there will not be any environmental impacts from construction. Effluent quality would degrade as the population grows and the lagoons become overloaded. There is a risk of raw sewage spills if the improvements and increased capacity at Lift Station #1 aren't implemented.

E. Land Requirements
The City owns approximately 82 acres at the existing lagoon treatment facilities. No additional land would be acquired as part of this alternative.

F. Potential Construction Problems
No construction will occur under this alternative.

G. Sustainability Considerations
Lagoons cannot remove nutrients and other contaminants as effectively as a mechanical treatment facility. However, power and chemical demands at lagoon facilities are significantly less than mechanical facilities. Since no changes are proposed there will not be any sustainability impacts. Effluent quality would continue to degrade due to aging infrastructure and growth in the community.

H. Cost Estimates
There will be no additional capital costs for this alternative. Annual operating costs for labor and utilities would increase incrementally with growth and inflation. Equipment replacement costs are expected to increase substantially during the 20-year planning period due to aging infrastructure at the lagoons and lift stations. The City could receive fines of up to $10,000 per day from DWQ if they cannot maintain compliance with their UDPES permit.

I. Advantages/Disadvantages
As the plant approaches capacity, the City could petition DWQ to increase the rating of the facility based on operational observations. It is unlikely DWQ would grant additional capacity without some modifications. Since lagoons are not effective at removing nutrients, the required capacity improvements would not resolve issues with the effluent phosphorus load cap.

The City could elect to stop growth with a moratorium in order to cap wastewater flow and/or loads at their limits. Moratoria on development suspends the right of property owners to obtain development approvals while the community takes time to consider, draft, and adopt land use plans or rules to respond to new or changing circumstances. They are also used to prevent development for a time while the government agency decides whether or not to acquire land for public use or until capital improvements are made. A moratorium can be seen as the most extreme land use action because it suspends completely the rights of all affected owners to use their property. Within Utah code (Land Use Development and Management Act (LUDMA) 10-9a-504) a moratorium can only be in effect for six months.

Eventually all growth would have to stop under this alternative; this alternative is not feasible to meet the future wastewater treatment needs of the community. Based on the issues described above, this alternative is not recommended and is not considered any further in this report.

4.2 IMMEDIATE NEEDS – PROJECTS THAT ARE NEEDED FOR ALL SUBSEQUENT ALTERNATIVES

The following table summarizes the immediate needs that are required at the existing lagoon treatment system. The projects at the back-end of the facility are compliance issues identified by Utah DWQ that need to be addressed immediately. These projects are required for any alternative that is selected.

Table 4-2. Design Criteria – Immediate Needs

Element	Design Criteria
Lift Station #1	This lift station pumps most of the City's sewage into the lagoons for treatment. The existing pumping capacity is not adequate to meet current needs, especially during peak flow periods. This lift station is nearly 50 years old and is showing signs of severe corrosion. The lift station needs to be replaced and 3-phase power and a backup generator need to be provided. Various lift station configurations are available and are discussed below. If a portion of the flow is routed to Central Weber Sewer Improvement District, the new lift station could be made smaller than required by the other alternatives.
Influent Flow Metering	The flow meter is not configured properly to provide reliable and accurate readings. It is recommended this flow meter be replaced with a magnetic flow meter as part of the Lift Station #1 improvements.
Chlorination System	Duplicate disinfection systems are required per DWQ rules, but the city only has one sodium hypochlorite metering pump. Install redundant/backup chemical metering pump.
Dechlorination System	Currently there is no dechlorination system and the city has difficulty maintaining compliance with the permitted chlorine residual. The effluent needs to be dechlorinated downstream of the v-notch weir.
Reaeration System	The City cannot reliably comply with the effluent dissolved oxygen requirement in their UPDES permit. A reaeration system needs to be added downstream of the dechlorination system.
Effluent Sampling	DWQ requires composite samples for many of the parameters in the UPDES permit. It is recommended the city install an automatic refrigerated composite sampler.

Lift Station #1 Replacement

This alternative investigates replacing the existing lift station due to concerns regarding its condition, capacity, and long-term reliability. This option includes the following components:

- Abandon the existing lift station and its components.
- Construct a new wet-well and/or dry-well.
- Per Utah DWQ rules, the lift station needs to be able to pump the peak hour flow rate with the largest pump out of service. The projected peak hour flow rate in 20 years is 1,955 gpm. If a portion of the city's flow is diverted to Central Weber for treatment the pump sizing at Lift Station #1 would decrease.
- Install a magnetic flow meter for influent flow measurement.

Plain City Wastewater Treatment Facilities Plan

Immediate Needs—
Common for All Alternatives

N

0 200 400 Feet

J-U-B ENGINEERS, INC.

THE LANGDON GROUP a J-U-B Company

GATEWAY MAPPING INC. a J-U-B Company

OTHER J-U-B COMPANIES

- Provide 3-phase power to the lift station.
- Install a permanent generator to provide a back-up power supply to the lift station.
- New building to house control panels and generator.

There are numerous configurations commonly used for sewer lift stations. Due to the depth of the lift station, a suction lift station was not considered for this application. The following section describes the characteristics of submersible lift stations and wet well / dry pit lift stations. Due to the large flow rates it is recommended a triplex pumping system be installed (i.e., 3 pumps at approximately 1,000 gpm each).

Triplex Submersible Lift Station

A submersible lift station generally consists of a wet well, a valve vault, and an above-grade control panel. The pumps and motors are submerged in sewage inside the wet well and are installed or removed using a permanent railing system. A jib crane or overhead crane is provided for pump removal. The control panel and backup generator would be installed inside a new CMU building that is located adjacent to the lift station. The wet well can be pre-cast concrete, cast-in-place concrete, or a pre-manufactured reinforced fiberglass package structure.

Some advantages of a submersible lift station relative to the dry pit option include a lower capital cost and smaller footprint. However, submersible pumps typically are not maintained as well as dry pit pumps because they are more difficult to access. Repairs tend to be more complicated and the pumps are typically shipped to the manufacturer for repair or overhaul.

OPINION OF PROBABLE CAPITAL COSTS FOR TRIPLEX SUBMERSIBLE LIFT STATION					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$40,000	$50,000
2	Demo existing lift station and infrastructure	1	LS	$20,000	$20,000
3	Site work including excavation and dewatering	1	LS	$100,000	$100,000
4	Triplex sumbersible wet well and valve vault	1	LS	$125,000	$125,000
5	Existing structure improvements for generator and pump controls	1	LS	$30,000	$30,000
6	Install equipment: 3 pumps, 1 flow meter, generator, controls	1	LS	$150,000	$150,000
7	Piping and Valves	1	LS	$20,000	$20,000
8	New CMU building for controls and generator	400	SF	$150	$60,000
9	Electrical and HVAC	1	LS	$75,000	$75,000
				Construction Subtotal	$630,000
NON-CONSTRUCTION					
10	Construction Contingency	1	EA	25%	$158,000
11	3-Phase Power to Site	City to Negotiate Costs with RMP			
12	Design, bidding	1	EA	9%	$57,000
13	Construction adminstration services	1	EA	7%	$44,000
14	Materials testing	1	EA	0.5%	$3,000
15	Legal	1	EA	0.5%	$3,000
16	Bond Origination Fees	1	EA	0.5%	$3,000
17	One year of escalation	1	/yr	2%	$25,000
				Non-Construction Subtotal	$293,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$923,000

As an option, a grinder can be installed at the gravity line invert into the wet well to protect the pumps from clogging and minimize trash and debris accumulation in the lagoons.

Triplex Wet Well / Dry Pit Lift Station

This type of lift station consists of a wet well that contains the raw sewage and a dry pit that is located underground adjacent to the wet well. This alternative differs from the submersible option in that the only items located in the raw sewage are the level controls and suction piping. The dry pit houses the pumps, valves, magnetic flow meter, etc. which makes these items more accessible for routine maintenance. Stairs are installed to access the pumps in the lower level. The controls are typically located at grade inside a building. An overhead crane can be installed to assist with pump removal. The backup generator is located inside or adjacent to the building. The wet well / dry pit structure is typically cast-in-place concrete construction, although there are some pre-manufactured package lift station options available as well.

Some advantages of a wet well / dry pit lift station include easier access to pumps, valves, and instruments for operations and maintenance, resulting in a longer service life for this equipment. It is also possible to incorporate customized design elements into the dry pit layout to meet specific city needs, including spare slots for future pumps and expansion. The disadvantage of the dry pit arrangement is it costs more than the submersible lift station alternative.

As an option, a grinder can be installed at the gravity line invert into the wet well to protect the pumps from clogging and minimize trash and debris accumulation in the lagoons.

OPINION OF PROBABLE CAPITAL COSTS FOR TRIPLEX WET PIT / DRY PIT LIFT STATION					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$100,000	$100,000
2	Demo existing lift station and infrastructure	1	LS	$20,000	$20,000
3	Site work including excavation and dewatering	1	LS	$200,000	$200,000
4	Wet well and triplex dry pit structure	1	LS	$400,000	$400,000
5	CMU building over dry pit	1225	SF	$150	$180,000
6	Install equipment: 3 pumps, 1 flow meter, generator, controls	1	LS	$150,000	$150,000
7	Piping and Valves	1	LS	$40,000	$40,000
8	Electrical and HVAC	1	LS	$150,000	$150,000
				Construction Subtotal	$1,240,000
NON-CONSTRUCTION					
8	Construction Contingency	1	EA	25%	$310,000
9	3-Phase Power to Site	City to Negotiate Costs with RMP			
10	NEPA	1	EA	0.7%	$9,000
11	Design, bidding	1	EA	9%	$112,000
12	Construction adminstration services	1	EA	7%	$87,000
13	Materials testing	1	EA	0.5%	$6,000
14	Legal	1	EA	0.5%	$6,000
15	Bond Origination Fees	1	EA	0.5%	$6,000
16	One year of escalation	1	/yr	2%	$50,000
				Non-Construction Subtotal	$586,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$1,826,000

Triplex Submersible Lift Station

Triplex Wet Well / Dry Pit Lift Station

Operation and maintenance costs associated with a new sewer lift station are assumed to remain approximately the same with the recommended improvements. Although power costs may increase slightly due to the larger pumps, a more reliable lift station with sufficient capacity will reduce maintenance costs.

Influent Flow Metering

The existing influent flow meter is not calibrated correctly and the flow conditions are not ideal. It is recommended the existing influent ultrasonic transmitter and v-notch weir be replaced as part of the lift station improvements. A magnetic flow meter would be installed on the discharge piping of the pumps at Lift Station #1. The force main from Lift Station #16 could be reconfigured to also pass through this same magnetic flow meter, or a separate flow meter could be installed to improve monitoring and diagnostics at LS#16.

The costs for influent flow metering are incorporated into the lift station costs shown above.

Back End Improvements

Currently the city stores 4-6 months of sodium hypochlorite onsite at a time. Sodium hypochlorite solution strength degrades and becomes less effective after approximately one month of storage. To improve disinfection performance, City staff may want to consider smaller and more frequent deliveries that correspond better with usage rates.

Utah Administrative Code (UAC) states that “duplicate disinfection systems shall be provided.” The existing system has redundant sodium hypochlorite feed tanks but not a backup chemical metering pump. It is recommended a redundant/backup chemical metering pump be installed.

It is recommended a dechlorination chemical (such as sodium bisulfite or sulfur dioxide) be added after the chlorine contact tank to drop the chlorine residual down to permitted levels. In this manner, the E-Coli kill is achieved using a high dose of chlorine and then the residual is quenched with the dechlorination chemical. The selected dechlorination chemical would be introduced to the effluent downstream of the v-notch weir (the cascade at this location would improve mixing). Contact time for dechlorination is relatively short compared to chlorination. It is recommended the dechlorination chemical and metering equipment be located inside a building. Preliminarily, the City has indicated that the existing building could be expanded for this purpose.

It is recommended the effluent be reaerated prior to discharge so the effluent can reliably meet permit requirements for dissolved oxygen. Dechlorination chemicals scavenge oxygen which will make compliance even more difficult to achieve. The effluent pipe will be bisected downstream of the chlorine contact chamber and a precast vault with floor-mounted fine bubble diffuser discs will be installed. The reaeration vault will be deep enough and have ample contact time to allow for sufficient oxygen transfer. The effluent will be passed beneath a baffle wall to prevent short-circuiting. The aeration system would be powered by a small blower located inside the same building as the dechlorination chemical.

The UPDES permit requires that many of the samples “be 24 hour composites collected by use of an automatic sampler or minimum of four grab samples collected a minimum of two hours apart.” It is recommended the City purchase and install a refrigerated automatic sampler at the effluent compliance location to facilitate sample collection and comply with permit requirements.

Per the DWQ compliance schedule, the above improvements (except the lift station) need to be designed and out to bid by November 2018 with the construction completed and the system operating in compliance by April 2019.

Opinion of Probable Capital Costs for Back-End Improvements

OPINION OF PROBABLE CAPITAL COSTS FOR BACK END IMPROVEMENTS					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$7,500	$7,500
2	Backup Sodium Hypochlorite Metering Pump	1	LS	$1,000	$1,000
3	Dechlorination System - Metering Pumps and Associat	1	LS	$10,000	$10,000
4	Reaeration System - Blower, Diffusers, and Associated	1	LS	$10,000	$10,000
5	Refrigerated Automatic Composite Sampler	1	LS	$5,000	$5,000
6	Precast Vault - Installed Cost Assuming Groundwater	1	LS	$35,000	$35,000
7	Building - By Plain City	1	LS	$40,000	$40,000
8	Electrical	1	LS	$15,000	$15,000
				Construction Subtotal	$123,500
NON-CONSTRUCTION					
9	Construction Contingency	1	EA	25%	$31,000
10	Design, bidding	1	EA	9%	$11,000
11	Construction adminstration services	1	EA	7%	$9,000
12	Materials testing	1	EA	0.5%	$1,000
13	Legal	1	EA	0.5%	$1,000
14	Bond Origination Fees	1	EA	0.5%	$1,000
				Non-Construction Subtotal	$54,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$177,500

4.2 ALTERNATIVE 2 - UPGRADE THE LAGOONS AND DISPOSE OF EFFLUENT PART OF YEAR USING LAND APPLICATION

A. Description

Alternative 2 includes upgrading the lagoons for continued wastewater treatment during the 20-year planning period. It is projected that the phosphorus load cap (125% of existing load) will be reached around 2,500 ERUs, this will occur around the year 2021 at current growth rates. Approaching the 125% load cap will trigger the need for an alternative method of effluent disposal. Lagoons cannot reliably and effectively treat phosphorus (or nitrogen, which is proposed to be regulated on a site-specific basis in the future) so the only way to continue using the lagoons would be to limit or eliminate effluent discharge to the drainage ditch for at least part of the year. There are three alternative effluent disposal methods available:

Table 4-1. Alternative Effluent Disposal Methods

Method of Disposal	Description	Feasibility
Rapid Infiltration Basins	Dispose of effluent below the surface by allowing it to be filtered through soils/gravels and infiltrate into the groundwater.	This is unlikely to be feasible in Plain City due to the high groundwater table and local soil conditions which are not suitable for infiltration. In addition, RI basins typically have nitrogen limits that may not be achievable utilizing the existing lagoons.

		This effluent disposal method is not investigated further in this report.
Winter Storage and 100% Land Application	Effluent is pulled from the ditch entirely and disposed of using land application. This includes construction of a large winter storage pond since effluent cannot be land applied during the winter months. This requires a very large land application area since 100% of the year's effluent needs to be disposed of during the growing season. Supplemental irrigation water is typically not required since the effluent is stored for future use.	This alternative is very costly due to construction of the winter storage pond and the need to have such a large application area. Pulling from the ditch entirely is not required by the nutrient load caps; they are based on annual loads. This alternative is not investigated further in this report. If a TMDL is implemented in the future that sets stringent maximum daily concentration limits for phosphorus, nitrogen, or another parameter, this effluent disposal alternative may be considered at that time.
Land Apply during Growing Season	Continue discharging to the ditch during the winter months and land apply during the growing season. Effluent that is land applied will allow the city to meet the phosphorus load cap rule by reducing effluent loads that are discharged to the receiving ditch on an annual basis. As the City continues to grow, additional land would be required to meet hydraulic loading rates and more effluent would need to be land applied to meet the phosphorus load cap. This allows for a phased approach. Supplemental irrigation water may be required during the summer months when crop hydraulic demand exceeds effluent flow rates.	This effluent disposal alternative allows the city to keep the lagoons in operation while still complying with the phosphorus load cap. This alterative is described further below as Alternative 2.

In Alternative 2, the lagoon system would need to be upgraded to accommodate future growth in the community. The capacity of the lagoons would be increased to accommodate the 2037 projected flow rates (annual average daily flow of 0.905 MGD and a maximum month flow of 1.39 MGD). The immediate improvements would include the following:

- Upgrades to Lift Station #1 to increase capacity and replace aging infrastructure
- Add influent screening and install new influent flow meter
- Back end dechlorination and reaeration system improvements
- Add riprap to all lagoon embankments
- Sludge removal at all cells

Future (5-10 year range) improvements would include the following:

- Additional aeration added for improved oxygen transfer and mixing

- New chlorine contact chamber or expand existing to meet capacity requirements
- Petition DWQ to increase rated capacity of lagoons to 0.9 MGD (currently the lagoons are rated at 0.6 MGD by DWQ).

During the summer months, effluent would be disposed of using land application in order to meet the phosphorus load cap rule. A key element to this alternative will be the acquisition of land for effluent disposal. DWQ recommends purchase of the land by the city or at least a long term lease to ensure the city has a reliable method of effluent disposal for the foreseeable future. The City has begun negotiations with an adjacent landowner to evaluate whether leasing would be an option. The landowner has indicated he is willing to sign a long-term contract with the city to guarantee access to this water source. The landowner owns approximately 200 acres of property adjacent to the lagoons (south and east) and would like to utilize the effluent to grow pasture for his beef cattle. This same landowner also owns approximately 300 acres located west of the lagoons that could be utilized in the future as well.

During the summer months when water demand for the crops is highest, there may not be enough effluent available to satisfy the pasture land's irrigation requirements. If this is the case, supplemental irrigation water will need to be applied. Alternatively, effluent storage could be provided so the landowner can utilize the water on an as-needed basis. The landowner indicated he would prefer to construct an effluent storage reservoir to give him more flexibility for watering and reduce the use of supplemental irrigation water. The tentative plan is to construct the effluent storage reservoir adjacent to Cell 1. Detailed water balance calculations are included in the Appendix.

The land application effluent disposal alternative would include the following elements:

- Long term contract with landowner to ensure land availability for effluent disposal
- Duty/standby submersible pumps including force main from reaeration vault to effluent storage
- Effluent storage reservoir
- Land application pump station
- Irrigation filter to remove algae
- Force main to land application site(s)
- Sprinkler pivots
- Site work / grading of land as preparation for effluent disposal to control runoff
- Fencing around land application area (where required)
- Monitoring wells (typically one upgradient and two downgradient) may be required by DWQ to monitor the impact of land application on nitrate concentration in the groundwater

Prior to implementing this alternative, water rights associated with the effluent will need to be evaluated/determined.

B. Design Criteria

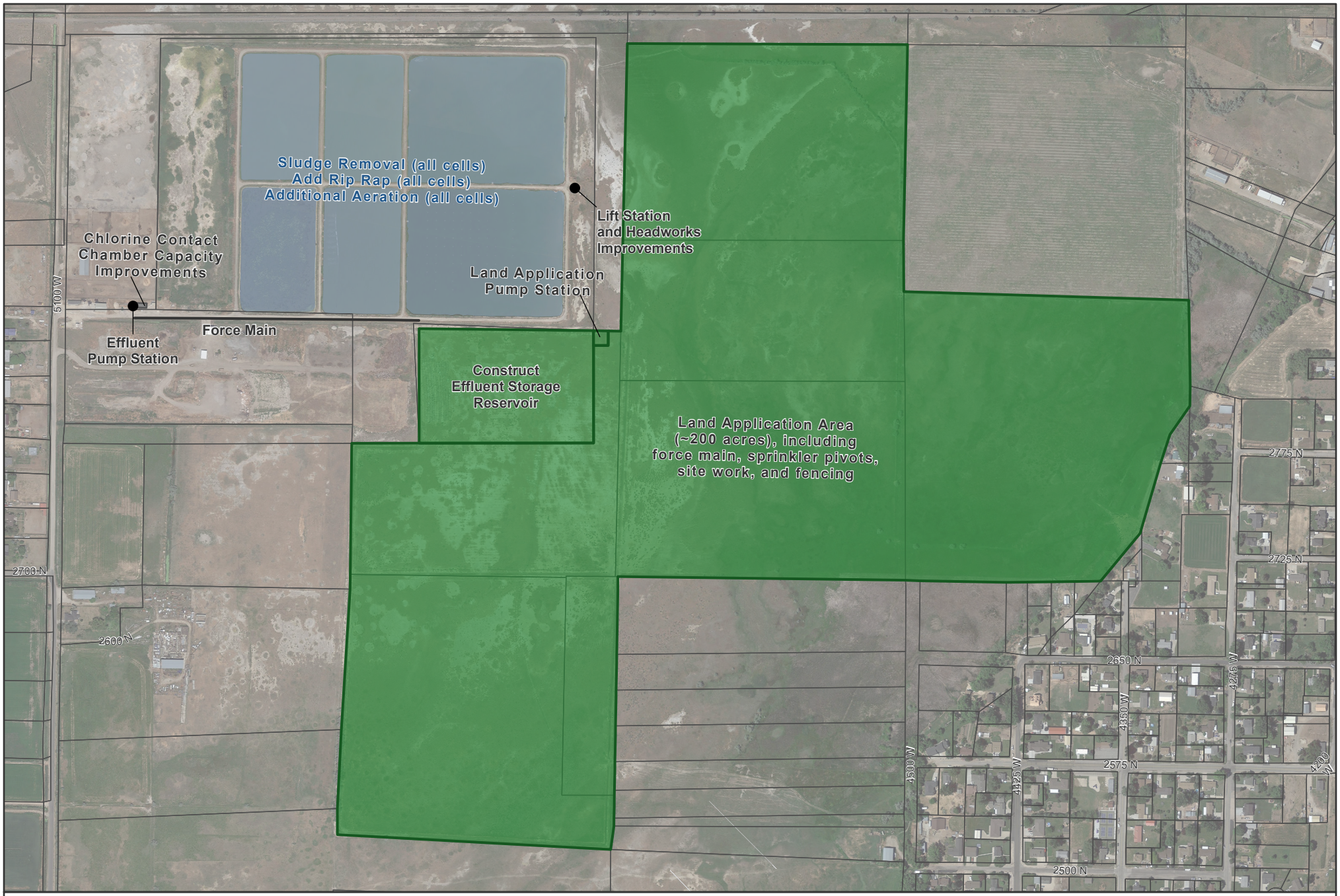
The design criteria relevant to Alternative 2 are summarized in the table below along with the improvements required to meet these criteria.

Table 4-3. Alternative 2 Design Criteria

Element	Design Criteria
Headworks	There currently is no screening structure at the lagoons. It is recommended a screen be installed to minimize debris accumulation in the lagoons.
Design Capacity	DWQ considers the design capacity of the lagoons to be 0.60 MGD. When influent flows approach 0.6 MGD around the year 2022, the city will need to work with DWQ to re-rate the facility for a higher allowable flow rate. A combination of hydraulic and aeration improvements may be required by DWQ prior to re-rating the facility.
Sludge Removal	Sludge depths in the majority of the primary cells appeared to be between 1 and 2 feet deep, with maximum measurement of 37". The sludge from all ponds needs to be removed to increase treatment volume, improve overall performance, and prevent the ponds from going septic/anaerobic.
Riprap on all Lagoon Embankments	Utah R317 regulations require a minimum riprap thickness of 8" for erosion protection. Install riprap on interior dikes of all cells.
Increase Aeration Capacity	Additional aeration is recommended (particularly in the primary pond) when the treatment performance for BOD begins to degrade or if an ammonia limit is added.
Chlorine Contact Chamber	The chlorine contact chamber is rated for 0.61 MGD at average day flow and needs to be replaced or expanded when this flow rate is reached.
Land Application Site	One way to meet the nutrient load caps using lagoon technology is to land apply effluent during the growing season. A landowner owns 200 acres adjacent to the lagoons and has indicated he would be willing to take the effluent and also pay for some of the required capital improvements associated with this alternative. The land application area needs to be graded/bermed so effluent cannot run-off the site. The state requires a 100 ft buffer to public access that needs to be accommodated and the property needs to be fenced and signed. It is recommended the city sign a long-term contract with this landowner to ensure reliable long term effluent disposal. This alternative also requires the construction of two pump stations, new force main, effluent storage reservoir, sprinkler pivots, site work, and additional reporting requirements.
Wetlands (Optional)	The wetlands can be repaired/reinstated to improve algae, TSS, and nutrient removal.

C. Map

See Figure 4-1 for a map depicting the changes proposed for this alternative. The items shown on Figure 4-1 are for all required facilities in the 20 year planning period. The 200 acres identified for land application are owned by a single landowner, who has indicated he is willing to sign a long-term contract with the city for effluent disposal. This same landowner also owns approximately 300 acres west of the lagoons.



Plain City Wastewater Treatment Facilities Plan

Alternative 2: Upgrade Lagoons and Land Apply During Growing Season

N

0 500 1,000 Feet

J·U·B ENGINEERS, INC.

THE LANGDON GROUP a J-U-B Company

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D. Environmental Impacts

This alternative puts the effluent to beneficial use and removes nutrients from the receiving water body. Continued use of the lagoons will result in potential odors at levels similar to the past. Degradation of groundwater could occur if the effluent is over applied. Aerosols can be managed by adhering to DWQ buffer zone requirements for public access. Excavation would be required to get the piping to the land application sites. This piping would be pressure pipe buried approximately 4 feet deep and would be subject to typical trenching construction impacts.

E. Land Requirements

It is proposed that 200 acres be made available for effluent disposal. Not all of this land needs to be utilized at startup. It is proposed to irrigate the land using pressurized sprinkler pivots. Buffer zones to public access are required per DWQ guidelines (R317-3-11). Site grading and berms to prevent surface runoff may be required to make the land suitable for land application. This same landowner also owns approximately 300 acres west of the lagoons that could be made available in the future if required.

F. Potential Construction Problems

At this time there are no foreseeable construction problems. Due to high groundwater in the area, the effluent storage reservoir will need to have a large footprint and be relatively shallow (similar to the existing lagoons).

G. Sustainability Considerations.

Lagoons cannot remove nutrients and other contaminants as effectively as a mechanical treatment facility. However, nutrient loads to the receiving ditch will be reduced when the city land applies effluent. In addition, the effluent is "reused" and put to beneficial use. Finally, power and chemical demands at lagoon facilities are significantly less than mechanical facilities.

For this alternative, the City is relying on a single landowner as a means to meet the phosphorus load cap. If the landowner elects to develop his property, the City is back to square one. Typically it is preferred that the City own the land. That said, land in Plain City is expensive and purchasing hundreds of acres of land would be extremely costly, even if there were willing sellers available.

H. Cost Estimates

Tables 4-3 and 4-4 summarize the capital and annual O&M costs for Alternative 2.

Table 4-3. Alternative 2 Capital Costs Summary

OPINION OF PROBABLE CAPITAL COSTS FOR LAGOON IMPROVEMENTS AND LAND APPLICATION					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$120,000	$120,000
2	Headworks - Mechanical Screen and Building	1	LS	$500,000	$500,000
3	Additional Aeration	1	LS	$300,000	$300,000
4	Chlorine Contact Tank Capacity Improvements	1	LS	$100,000	$100,000
5	Sludge Removal (all cells)	1	LS	$500,000	$500,000
6	Add Rip Rap (all cells)	1	LS	$25,000	$25,000
7	Effluent Pumps in Reaeration Box	1	LS	$50,000	$50,000
8	Force Main to Effluent Storage	1500	LF	$40	$60,000
9	Effluent Storage Reservoir	To Be Negotiated with Landowner			
10	Land Application Pump Station	To Be Negotiated with Landowner			
11	Irrigation Filter	To Be Negotiated with Landowner			
12	Electrical	To Be Negotiated with Landowner			
13	Force Main to Land App	To Be Negotiated with Landowner			
14	Land Application Area Site Work / Grading / Demo	To Be Negotiated with Landowner			
15	Sprinkler Pivots	To Be Negotiated with Landowner			
16	Land Application Area Fencing	To Be Negotiated with Landowner			
				Construction Subtotal	$1,655,000
NON-CONSTRUCTION					
17	Construction Contingency	1	EA	25%	$414,000
18	Land acquisition/ROW	Sign Contract with Landowner			
19	NEPA	1	EA	0.7%	$12,000
20	Design, bidding	1	EA	9%	$149,000
21	Construction adminstration services	1	EA	7%	$116,000
22	Materials testing	1	EA	0.5%	$8,000
23	Legal	1	EA	0.5%	$8,000
24	Bond Origination Fees	1	EA	0.5%	$8,000
25	One year of escalation	1	/yr	2%	$67,000
				Non-Construction Subtotal	$782,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$2,437,000

I. Advantages/Disadvantages

This solution will allow the city to comply with the phosphorus load cap rule. Assuming an adequate amount of land is available for effluent disposal and the regulations don't change, this will be the most cost effective method for the city to remain in compliance throughout the 20-year planning period. Even though land application requires additional effluent monitoring and recordkeeping requirements, it is a beneficial alternative because it allows the City to maximize use of their existing infrastructure.

One potential problem of this alternative is it relies on a single landowner as a means for effluent disposal to meet the phosphorus load cap. If this landowner elects to modify operations on this land or develop the property, the city would not be able to comply with the phosphorus load cap rule. If this occurred, the land application infrastructure constructed by the city would be abandoned and no immediate solutions for dealing with phosphorus would be available. Typically it is preferred that the City own the land to ensure the property is available in perpetuity. That said, purchasing hundreds of acres of land in Plain City would be prohibitively expensive, even if there were willing sellers available.

This solution works for the phosphorus load cap because it is based on an annual loading rate. In other words, the City can discharge at high phosphorus concentrations for part of the year because during the growing season they are essentially receiving a credit for not discharging. If the lagoons are hit with a challenging daily discharge limit in the future, such as a low effluent concentration of ammonia or a site-specific TMDL for total inorganic nitrogen, land application will not be a viable alternative. If changing regulations or growth require construction of a mechanical facility in the future, most of the improvements implemented as part of this alternative would need to be abandoned.

4.3 ALTERNATIVE 3: REGIONALIZATION - CENTRAL WEBER SEWER IMPROVEMENT DISTRICT

A. Description

Alternative 3 includes diverting a portion of Plain City's flow to Central Weber SID for treatment. There currently are approximately 90 homes in Plain City that send their wastewater to Central Weber. The Central Weber treatment facility is located adjacent to the Southeast corner of the Plain City boundary.

Central Weber SID is currently in the planning stages for a new trunk line that could serve the east side of Plain City. This line will replace their existing "Farr West" trunk line and lift station that do not have adequate capacity. Two potential alignments for the new Central Weber trunk line are under consideration:

1. Replace the trunk line in its current alignment. This is the least expensive solution for Central Weber but it would not be able to accommodate any flows from Plain City. Plain City would not participate if this option were selected.

2. Relocate the trunk line west near the power line corridor. This alignment will allow for the connection of existing developable land along the alignment (approximately 1,600 ERUs) in addition to approximately 520 existing homes. According to planning documents, this alignment will cost $8,891,000 compared to $7,794,000 for installing the trunk line in the current alignment. Plain City would be expected to pay for this additional $1.1 million cost. In addition, Central Weber would require a treatment impact fee for all existing homes that previously discharged to the lagoons whose flows would now go to Central Weber for treatment ($2,333/ERU). Plain City residents that are annexed into CWSID would also pay additional annual property taxes.

B. Design Criteria

The design criteria relevant to Alternative 3 are summarized in the table below along with the improvements required to meet these criteria.

Table 4-5. Alternative 3 Design Criteria

Element	Design Criteria
Option 1 – existing alignment, no participation from Plain City	12,950 ft of 30" and 36" trunk line along existing alignment.
Option 2 – Westerly Alignment Through Plain City	16,499 ft of 36" and 42" trunk line opens up 542 acres for development (1,600 ERUs). Allows approximately 520 existing Plain City customers to connect to Central Weber SID.

C. Map

See Figure 4-2 for a map depicting the changes proposed for this alternative. The items shown on Figure 4-2 are for all required facilities in the 20 year planning period.

D. Environmental Impacts

Excavation at depths of 20 ft deep or more in groundwater would be required to get the gravity sewer to the Central Weber treatment facility. The piping would be subject to typical trenching construction impacts. Sewage treated at Central Weber will be processed to a higher quality prior to discharge back to the environment, as it is a more advanced treatment system than Plain City's lagoons. In addition, any flows diverted to Central Weber will reduce the load to the Plain City lagoons and prolong their life. It will also eliminate up to 3 lift stations including their ongoing energy and O&M costs.

E. Land Requirements

Easements will be required for the new sewer trunk line. No additional land purchase would be required.

F. Potential Construction Problems

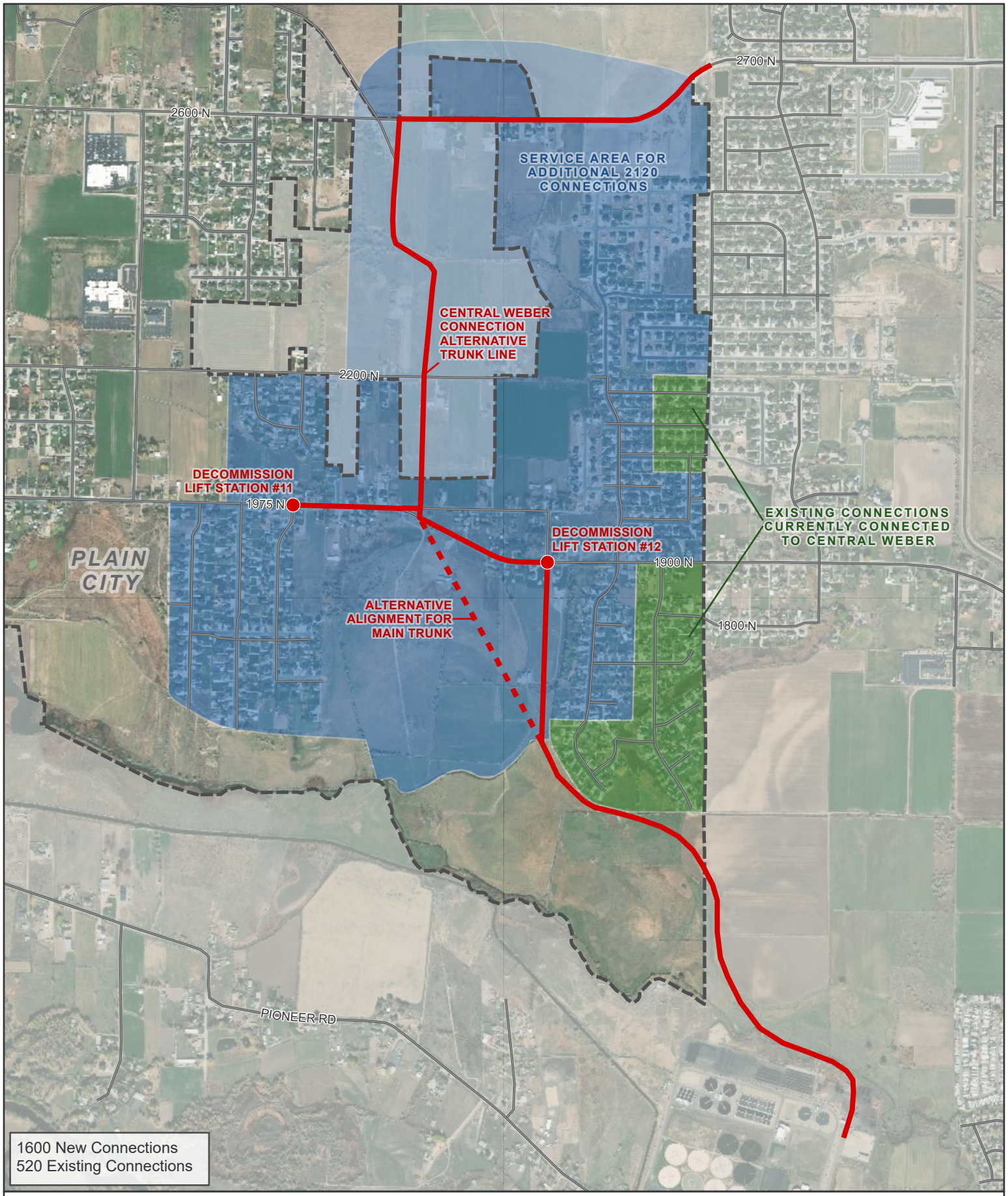
The biggest construction challenge will be the construction of large diameter gravity sewer in groundwater at depths ranging from 10-25 feet deep. In addition, there will be a crossing below Fourmile Creek and potential wetlands near the river corridor. That said, none of these construction concerns are insurmountable and qualified contractors are accustomed to doing this type of work.

G. Sustainability Considerations.

Regionalization is typically a preferred alternative for DWQ because they feel it is the most sustainable solution in the long run. The larger districts have advanced treatment facilities with numerous staff capable of dealing with emergencies and ongoing operating and maintenance requirements. They also have money available for capital improvement projects and repairs as required. There is an "economy of scale" for O&M costs because of the large volume of wastewater Central Weber is treating every day.

H. Cost Estimates

Tables 4-6 and 4-7 summarize the capital and annual O&M costs for Alternative 3.



Plain City Wastewater Treatment Facilities Plan

Alternative 3: Central Weber Connection

N

0 1,000 2,000 Feet

J-U-B ENGINEERS, INC.

THE LANGDON GROUP J-U-B Company

GATEWAY MAPPING INC. J-U-B Company

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Table 4-6. Alternative 3 Capital Costs Summary

OPINION OF PROBABLE CAPITAL COSTS FOR REGIONALIZATION WITH CENTRAL WEBER SID					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$10,000	$20,000
2	Decommission Existing Lift Stations	1	LS	$50,000	$50,000
3	New Sewer Lines to Tie Into Trunkline	1	LS	$165,000	$165,000
				Construction Subtotal	$235,000
NON-CONSTRUCTION					
4	Construction Contingency	1	EA	25%	$59,000
5	Alternate Alignment - Additional Cost to Plain City	1	LS	$1,100,000	$1,100,000
6	Impact Fees from Existing Houses	520	ERUs	$2,333	$1,213,000
7	NEPA	1	EA	0.7%	$2,000
8	Design, bidding (Plain City tie-ins only)	1	EA	9%	$21,000
9	Construction adminstration services (Plain City tie-ins	1	EA	7%	$16,000
10	Materials testing	1	EA	0.5%	$1,000
11	Legal	1	EA	0.5%	$1,000
12	Bond Origination Fees	1	EA	0.5%	$1,000
13	One year of escalation	1	/yr	2%	$9,000
				Non-Construction Subtotal	$2,423,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$2,658,000

I. Advantages/Disadvantages

The advantages and disadvantages of the regionalization/trunk line options are discussed below.

- Option 1 – No participation from Plain City

  If this alternative were pursued, Plain City would not participate in the construction of the new trunk line and no costs would be incurred. However, all future flows would need to be accommodated by the City. The city would continue to pump from the proposed Central Weber service area on the east side of town to the lagoons on the west. This involves pumping the same sewage numerous times and adding stress and creating bottlenecks in the collection system as additional growth occurs on the east side of town. In addition, the phosphorus load cap would need to be addressed at the Plain City lagoons.

- Option 2 – Westerly Alignment for new Trunk Line to accommodate new growth and divert flows from 520 Existing Houses to Central Weber

  The advantage of this alternative is it will divert both existing and future flow away from the lagoons, freeing up capacity both in the treatment system and collection system. This gives the city time and flexibility for complying with the phosphorus load cap rule and hydraulic deficiencies even as growth continues to occur. In addition, Plain City would make plans to decommission up to 3 lift stations with this option, eliminating required capital improvements and ongoing O&M costs at these lift stations. Lift Station #12 is one of the lift stations that would be decommissioned as part of this alternative; this lift station is one of the most problematic in the city and is scheduled to be replaced.

  One disadvantage of this alternative is the existing 520 homes that will now send their wastewater to Central Weber have already paid an impact fee for the Plain City lagoons. It is anticipated the new impact fees for the existing homes would be spread out amongst the entire

community, as all residents would benefit from reduced flow rates at the lift stations, in the collection system, and to the lagoons.

Another disadvantage of this alternative is it only buys the city approximately 5-10 years before the phosphorus load cap needs to be addressed as described in Alternatives 2, 4, 5, and 6.

4.4 ALTERNATIVE 4: HYBRID LAGOON TREATMENT SYSTEM WITH MECHANICAL COMPONENTS

A. Description

As more stringent permit limits are enacted around the country, some communities have been able to utilize a portion of their existing lagoon infrastructure while creating a quasi-mechanical treatment facility to improve effluent quality. There are at least three distinctive types of these "Hybrid" systems:

Table 4-8. Hybrid Lagoon Technologies

Technology	Description	Typical Manufacturers
Conventional activated sludge using large earthen basins	The use of repurposed lagoon cells and diffused air combined with an extended sludge retention time creates a stable treatment system with low operating and maintenance requirements. Install blowers and diffused aeration, some form of mechanical clarification, and a return activated sludge pump station to recycle mixed liquor back to the front of the facility. Chemical precipitation would be provided for phosphorus removal.	Parkson - Biolac System Lemna Technologies - LemTec process
Lagoon fixed film media	Retrofit the existing lagoons with contained fixed film media units designed to create a high surface area for attached biological growth to increase active biomass and nitrification. This also requires blowers and diffused aeration, although a recycle pump station may not be necessary. Chemical precipitation would be provided for phosphorus removal.	Entex Webitat WCS Biodomes
Submerged attached growth reactor	This involves the construction of multiple reactors arranged in parallel on the back end of the existing lagoons. The proprietary reactors are filled with aggregate media approximately 10 feet deep and constructed below grade to reduce temperature impacts on the biology. Blowers and diffused aeration are distributed along the bottom to supply oxygen for nitrification. Chemical precipitation and effluent filtration would be provided for phosphorus removal. Recycle flows could be added for nitrogen removal.	Nexom OPTAER and SAGR systems

The hybrid alternative has the advantage of continuing the use of existing lagoon infrastructure while adding mechanical elements such as blowers, diffused aeration, clarification, recycle pumping, and

chemical addition to improve performance. As such, this alternative would cost more than simply improving the lagoons but it would cost less than a new mechanical treatment facility.

It is J-U-B's opinion that hybrid lagoons would improve the effluent quality over the existing lagoon system, but not to the level of a mechanical treatment facility. Mechanical plants are customized to treat the specific influent wastewater strength with various aeration schemes, targeted hydraulic and solids retention time, and sophisticated controls. Therefore, mechanical plants can achieve better treatment than the hybrid lagoon systems which are dependent on existing infrastructure, have comparatively limited controls, and short circuiting of wastewater flows can occur.

The primary drawback of the Plain City infrastructure as it relates to the hybrid alternative is the ponds are very shallow, only 6 feet deep. All of the standard designs for the hybrid alternatives utilize diffused aeration to transfer oxygen into solution and create the conditions for advanced treatment. Oxygen transfer for fine bubble diffusers is more effective and efficient at 10-15 feet deep; at shallower depths a greater proportion of oxygen releases to the atmosphere rather than stay in solution.

J-U-B engaged DWQ to determine how a hybrid lagoon system would be regulated. The question was asked whether hybrid lagoons would be regulated under the phosphorus load cap (125% of existing loading) for lagoon systems or the technology-based limit of TP <1 mg/L for mechanical treatment facilities. John Mackey, DWQ Engineering Section Manager, responded with the following email:

> *Here is my response to the question, when does a lagoon system become a mechanical wastewater treatment plant?*
>
> *Starting with, say, a basic facultative lagoon system:*
>
> *1. Adding aeration by mechanical or diffused air equipment does not change the lagoon status*
>
> *2. Simply adding chemicals to the influent (or elsewhere), does not change the lagoon status*
>
> *3. Adding basic downstream equipment like a clarifier and a filter does not change the lagoon status*
>
> *4. Converting the lagoon system to provide advanced treatment using biological or biological/chemical processes COULD change the lagoon status. The "could" depends on what else they need to install and whether they are trying to establish a series of different oxic environments (i.e., for nutrient removal).*
>
> *5. If the advanced treatment in #4 above includes an external clarifier with sludge recycle but does not waste sludge it does not change the lagoon status.*
>
> *6. If the advanced system above includes an external clarifier with sludge recycle and waste sludge (so they are controlling SRT), the lagoon status CHANGES to a mechanical plant.*
>
> *Keep in mind that this discussion really only applies to phosphorus control and the TBPEL rule, although I think the distinction between lagoons and mechanical would also need to be considered with respect to alternate BOD and TSS limits for lagoons. If you become "mechanical" your TSS/BOD limit would become 25/25. If you have to remove TSS to meet the phosphorus cap,*

you will probably be meeting 25/25 anyway and you would likely be transitioned over to those limits. The speed with which this transition occurs would be dictated principally by plant performance. If phosphorus stays in compliance there is no requirement to immediately change the BOD/TSS. If phosphorus is not controlled, the BOD/TSS limit would likely be part of the equation in considering how the owner should bring the plant under control and into compliance.

Obviously a nutrient-oriented TMDL can be a game changer because the cap will be set by water quality standards, not lagoon versus mechanical technology.

The Parkson Biolac Conventional Activated Sludge process (see Figure 4-3) is an example of a hybrid lagoon system that DWQ would regulate as a mechanical facility based on the guidance described above. There are numerous other competitors to Parkson that utilize similar design features (Lemna Technologies, Bioworks, etc.). This treatment scheme includes clarifiers, recycle flows, and sludge wasting as a means to controls the solids retention time. It would be difficult to consistently and reliably meet the strict nutrient limits that are proposed for mechanical facilities (TP < 1 mg/L and nitrogen in the future), particularly in the cold winter climate. Since this hybrid alternative would be regulated as a mechanical facility, it was not considered further in this report.

Figure 4-3. Hybrid Lagoon System Regulated as a Mechanical Facility

Photo courtesy of Parkson Corporation

An example of a hybrid lagoon alternative that would not be regulated as a mechanical facility is described below. Fixed film media modules would be installed to create a high surface area for attached growth biological nitrification. An example of this is the Entex Technologies Webitat system shown below and also the Wastewater Compliance Systems Biodomes that are already installed in the lagoons. However, these fixed film media containers are a supplemental process with limited operational control and no recycle flows. These systems are primarily designed to improve nitrification and are not designed for phosphorus. The biodomes in particular are useful and proven as a means for introducing aeration into shallow lagoons. They improve BOD removal and nitrification during cold weather; however, the primary concern in Plain City is treating for phosphorus and the biodomes are not designed for this. Phosphorus reduction would need to be met through chemical precipitation and filtration at the back end of the

lagoons. However, filter blinding is a significant risk due to algae growth, duckweed, and other particulates common in lagoon systems due to the long retention times. For the reasons described above, this alternative was not investigated further.

Figure 4-4. Hybrid Lagoon System – Fixed Film Media Containers

Photo courtesy of Entex Technologies

The final hybrid lagoon alternative that was investigated is the submerged attached growth reactor (SAGR), which is shown below in Figure 4-5. The SAGR treatment system is a more robust solution than the fixed film media containers described above. Nexom's SAGR treatment system consists of multiple reactors in parallel filled with an aggregate media bed 8-10 feet deep. The basin is constructed below grade to limit the effects of cold air temperatures on the process. Linear aeration lines are distributed along the bottom of the reactor to supply oxygen for nitrification. The technology-based phosphorus standard for mechanical facilities will not apply since the SAGR system does not waste sludge or control the solids retention time. Therefore, the SAGR system would be regulated under the phosphorus load cap rule.

In addition to providing the fixed media required for nitrifying organisms, the SAGR acts as a polishing filter for BOD, TSS, and algae. Phosphorus would be removed using chemical addition to precipitate the phosphorus, which would then be filtered through cloth media. The amount of chemical required and the potential for blinding the effluent cloth disk filter would be reduced following effluent polishing in the submerged reactor. The existing effluent phosphorus concentration is approximately 3.4 mg/L. It is

anticipated that an effluent phosphorus concentration of 2 mg/L will be required to accommodate 20-year flow rates based on the load cap and projected growth rates.

An advantage of the SAGR system compared to the fixed film alternatives is the number of configurations available depending on the degree of nutrient removal required. For the Plain City project, it is proposed the submerged attached growth reactors be installed followed by chemical addition and cloth disk filters for phosphorus removal. When nitrogen limits are implemented in the future, additional SAGRs would be installed, anoxic zones would be created in the primary lagoon cells, and effluent would be recycled to the front of the lagoons for TIN removal/denitrification.

Figure 4-5. Hybrid Lagoon System – Submerged Attached Growth Reactor

Photo courtesy of Nexom

B. Design Criteria

For Alternative 4, a hybrid lagoon system with submerged attached growth reactors is planned. The major design elements for this facility include the following:

Table 4-9. Alternative 4 Design Criteria

Element	Design Criteria
Sludge Removal	Sludge depths in the majority of the primary cells appeared to be between 1 and 2 feet deep, with maximum measurement of 37”. The sludge from all ponds needs to be removed to increase treatment volume, improve overall performance, and prevent the ponds from going septic/anaerobic.

Riprap on all Lagoon Embankments	Utah R317 regulations require a minimum riprap thickness of 8" for erosion protection. Install riprap on interior dikes of all cells.
Headworks Screen	It is recommended to install a headworks building and mechanical screen to protect the mixers and minimize buildup in the anoxic zone. The screen will also reduce the potential of debris clogging the rock media in the SAGR system.
Lagoon Aeration Upgrades	The aeration system in the lagoons will be upgraded to ensure process performance and reliability. Surface aerators will be considered due to the shallow depth of the ponds.
Submerged Attached Growth Reactors	Four reactors consisting of aeration, rock media, and wood chips as an insulating layer would be located between the ponds and the disinfection area. The site would be built up to match the top elevation of the SAGRs. A pump station would be required to pump to the effluent filters. When nitrogen limits are implemented, a future pump station would send recycle flows back the anoxic zone for denitrification.
Process and Mechanical Building	Building to house blowers, filtration pump station, cloth disk filter, chemical feed system, plant water system, laboratory, and offices
Chlorine Contact Chamber	The chlorine contact chamber is rated for 0.61 MGD at average day flow and needs to be replaced or expanded when this flow rate is reached.
Chemical Addition and Filtration	Alum dosing provided for phosphorus control. Precipitated phosphorus will be filtered using disk filters with backwash water returned to first cell.

A summary of the current and future effluent design criteria is included in Table 4-10.

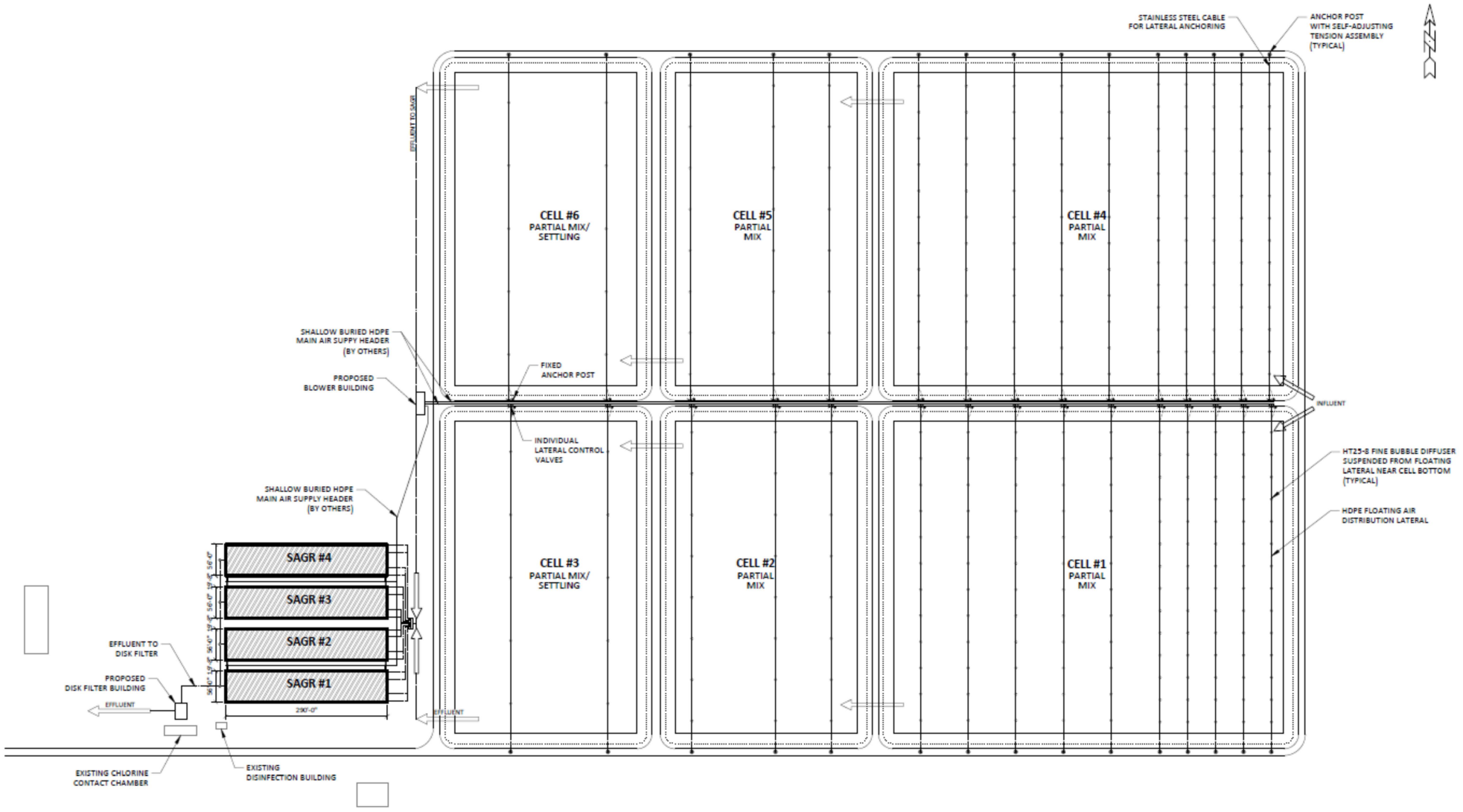
Table 4-10. Effluent Quality Design Criteria

Parameter	Units	Current UPDES Limits[1]	Potential Future Limits – Design Criteria
5-Day Biochemical Oxygen Demand, BOD_5	mg/L	45	25
Total Suspended Solids, TSS	mg/L	45	< 15-20
Total Inorganic Nitrogen, TIN	mg/L	No limit [2]	Unknown
Total Phosphorus, TP	mg/L	125% existing	< 2.0
pH	S.U.	6.5 to 9.0	6.5 to 9.0
Dissolved Oxygen, D.O.	mg/L	>5.0	>5.0
E-coli	No./100ml	<126	<126
Total Residual Chlorine	Mg/L	0.3 – 1.5 seasonal	Reduced limits as flows increase

1. Current UPDES Permit Limits associated with the existing lagoon system.
2. TIN limits will be enacted in the future on a site-specific basis.

C. Map

A preliminary configuration and layout for the SAGR hybrid lagoon alternative is shown below in Figures 4-6 and 4-7.



Plain City Wastewater Treatment Facilities Plan

Alterative 4: Hybrid Lagoon Treatment System with Mechanical Components

N

J-U-B ENGINEERS, INC.

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D. Environmental Impacts

Continued use of the lagoons will generate odors typical of lagoons systems, but likely at reduced levels compared to the past due to the improved aeration system. The submerged attached growth reactors will be constructed at the existing lagoon site and will utilize City-owned property, between the lagoons and the disinfection area. Increased aeration demands will result in the new hybrid lagoon facility using additional energy to treat Plain City's wastewater, although the effluent quality will be improved. Chemical use for phosphorus removal and associated transport will be required for this alternative.

E. Land Requirements

No additional land will be required for this alternative. The submerged attached growth reactors will fit within the existing footprint of city-owned land between the lagoons and the disinfection area. A process and mechanical building will also be constructed just south of the SAGR units. No additional easements would be required for construction.

F. Potential Construction Problems

The submerged reactors would be constructed in a previously disturbed location between the lagoons and the disinfection area. The site is relatively flat and level. Moderate construction issues are expected due to shallow groundwater in the area. Geotechnical exploration will be required to document soil conditions and groundwater elevations. An HDPE liner would be installed to separate the SAGR units from the groundwater. Depending on the hydraulic profile it may be required to pump up to the SAGR units. In this case, the site would be built up to match the finish grade of the SAGRs.

G. Sustainability Considerations

Power demands at the hybrid plant will be greater than the existing lagoon facility, primarily due to increased aeration requirements. However, effluent quality will be improved. Premium efficiency motors, VFDs, and other energy reduction measures will be specified where feasible. Effluent would reused for utility water around the site. The filtered effluent would also be suitable for Type I reuse in the City's pressure irrigation system. Solids would not need to be handled and transported for disposal; this is an advantage over mechanical facilities. Instead, the solids would accumulate in the lagoons which would likely need to be dredged every 10+ years.

H. Cost Estimates

Tables 4-11 and 4-12 summarize the capital and annual O&M costs for Alternative 5.

OPINION OF PROBABLE CAPITAL COSTS FOR HYBRID LAGOONS - SAGR					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$400,000	$500,000
2	Headworks - Mechanical Screen and Building	1	LS	$500,000	$500,000
3	Site Civil - Rock for SAGRs, raise grade, yard piping	1	LS	$750,000	$750,000
4	Sludge Removal (all cells)	1	LS	$500,000	$500,000
5	RipRap Embankment of all 4 Lagoon Cells	1	LS	$25,000	$25,000
6	Purchase and installation of SAGR equipment (blowers, mixers, aeration, etc.)	1	LS	$1,750,000	$1,750,000
7	Filtration Pump Station	1	LS	$150,000	$150,000
8	Chorine Contact Tank Capacity Improvements	1	LS	$100,000	$100,000
9	Process and Mechanical Building	3200	SF	$135	$432,000
10	Chemical Equipment, Disc Filter, Backwash Pumping	1	LS	$1,000,000	$1,000,000
11	Electrical	1	LS	$1,000,000	$1,000,000
				Construction Subtotal	$6,707,000
NON-CONSTRUCTION					
12	Construction Contingency	1	EA	25%	$1,677,000
13	Geotechnical	1	LS	$15,000	$15,000
14	NEPA	1	EA	0.7%	$47,000
15	Design, bidding	1	EA	9%	$604,000
16	Construction adminstration services	1	EA	7%	$469,000
17	Materials testing	1	EA	0.5%	$34,000
18	Legal	1	EA	0.5%	$34,000
19	Bond Origination Fees	1	EA	0.5%	$34,000
20	One year of escalation	1	/yr	2%	$271,000
				Non-Construction Subtotal	$3,185,000
			TOTAL CAPITAL OPINION OF PROBABLE COST		$9,892,000

I. Advantages/Disadvantages

The advantages and disadvantages of a hybrid lagoon system are listed below.

Advantages

- Maximizes use of existing infrastructure while still meeting nutrient removal requirements.
- Improved effluent quality over existing lagoon system, particularly during the winter months.
- Initial capital costs are less than mechanical treatment facilities.
- Moderate level of maintenance associated with equipment and controls as compared to mechanical facilities.
- Capable of handling higher flows, such as from infiltration and inflow during rain events, without an equalization tank.
- Flexibility – ability to be configured for various performance/permit requirements and can be implemented in phases.
- Biosolids handling and disposal requirements are greatly reduced compared to mechanical facilities. However, the lagoons would still need to be dredged every 10+ years to remove accumulated solids.
- Some infrastructure (headworks screen, effluent filtration, etc.) could be reused at a future mechanical facility.

Disadvantages

- Historical performance data is limited, relatively few installations and none in the western United States.
- Long term equipment maintenance and media replacement requirements are unknown. The oldest installed system is approximately 10 years old.
- Larger footprint required compared to mechanical treatment facilities.
- High aeration (energy) requirements that are comparable to or even higher than a similarly sized mechanical facility.
- Increased operations and maintenance costs compared to existing lagoon facilities.
- Less flexibility for expansion compared to a mechanical facility.
- Shallow lagoons reduce performance and optimization of OPTAER system.

Table 4-11. Alternative 4 Capital Costs Summary

CAPITAL COSTS					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$400,000	$500,000
2	Headworks Screen and Building	1	LS	$500,000	$500,000
3	Site Civil - Rock for SAGRs, raise grade, yard piping	1	LS	$750,000	$750,000
4	Sludge Removal (all cells)	1	LS	$500,000	$500,000
5	RipRap Embankment of all 4 Lagoon Cells	1	LS	$25,000	$25,000
6	Purchase and installation of SAGR equipment (blowers, mixers, diffusers, etc.)	1	LS	$1,750,000	$1,750,000
7	Filtration Pump Station	1	LS	$150,000	$150,000
8	Chorine Contact Tank Capacity Improvements	1	LS	$100,000	$100,000
9	Process and Mechanical Building	3200	SF	$135	$432,000
10	Chemical Equipment, Disc Filter, Backwash Pumping	1	LS	$1,000,000	$1,000,000
11	Electrical	1	LS	$1,000,000	$1,000,000
				Construction Subtotal	$6,707,000
NON-CONSTRUCTION					
12	Construction Contingency	1	EA	25%	$1,677,000
13	Geotechnical	1	LS	$15,000	$15,000
14	NEPA	1	EA	0.7%	$47,000
15	Design, bidding	1	EA	9%	$604,000
16	Construction adminstration services	1	EA	7%	$469,000
17	Materials testing	1	EA	0.5%	$34,000
18	Legal	1	EA	0.5%	$34,000
19	Bond Origination Fees	1	EA	0.5%	$34,000
20	One year of escalation	1	/yr	2%	$271,000
				Non-Construction Subtotal	$3,185,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$9,892,000

4.5 ALTERNATIVE 5: CONVENTIONAL ACTIVATED SLUDGE WITH NUTRIENT REMOVAL

A. Description

Alternative 5 involves the construction of a new wastewater treatment facility utilizing conventional activated sludge treatment with dedicated nutrient removal planning. The nutrient removal facility will be based on the Modified Ludzack-Ettinger (MLE) process. The facility will be designed to meet the recently implemented phosphorus discharge limit of 1 mg/L for all mechanical plants. Initially phosphorus removal will be accomplished using chemical precipitation. An example of a conventional activated sludge mechanical treatment facility is shown below in Figure 4-8.

Figure 4-8. Mechanical Treatment Facility in Coalville, UT

The state has indicated they intend to implement total inorganic nitrogen discharge limits in the future. Negotiations between DWQ and the treatment districts are still ongoing regarding the timing and magnitude of future nitrogen requirements. The MLE process is a nitrogen removal process that is proven to produce effluent total nitrogen of 6-8 mg/L. For this alternative, the MLE process was chosen as the conventional biological treatment process considering the wastewater quality (i.e., carbon availability to support nutrient removal), site footprint, reliability of the process, and ability to be modified to meet potential lower nitrogen and phosphorus limits in the future.

The detailed basis for the sizing and the flow rates for new facilities is presented in Chapter 3. Alternative 5 includes facilities to meet the 2037 flows and influent water quality shown in Tables 3-1 and 3-2 and the effluent quality design criteria of Table 4-13 shown below.

Table 4-13. Effluent Quality Design Criteria

Parameter	Units	Current UPDES Limits[1]	Potential Future Limits – Design Criteria[2]
5-Day Biochemical Oxygen Demand, BOD_5	mg/L	45	25
Total Suspended Solids, TSS	mg/L	45	25
Total Inorganic Nitrogen, TIN	mg/L	No limit [3]	< 10 [3]
Total Phosphorus, TP	mg/L	125% existing	< 1.0
pH	S.U.	6.5 to 9.0	6.5 to 9.0
Dissolved Oxygen, D.O.	mg/L	>5.0	>5.0
E-coli	No./100ml	<126	<126
Total Residual Chlorine	Mg/L	0.3 – 1.5 seasonal	Reduced limits as flows increase

1. Current UPDES Permit Limits associated with the existing lagoon system.
2. Typical limits for mechanical facilities in Utah.
3. TIN limits will be enacted in the future on a site-specific basis.

The site is master planned to accommodate flows that are two times the 20-year flow rates evaluated as part of this study (up to 1.8 mgd). The treatment facility would be situated south of the lagoons on land already owned by the city, including room for future expansion.

B. Design Criteria

For Alternative 5, a new facility using conventional activated sludge treatment with nutrient removal is planned. The design elements for this facility include the following:

Table 4-14. Alternative 5 Design Criteria

Element	Design Criteria
Headworks Building	Mechanical fine screen (6 mm openings) sized for 2037 peak hour flows and grit removal equipment
Conventional Activated Sludge Process	Two 0.7 mgd process trains (based on a maximum month design flow condition), anoxic basins for nitrogen control and alkalinity recovery, and aeration basins (located outside). Includes circular clarifiers and Return Activated Sludge (RAS) pump station.
Disinfection	Ultraviolet light disinfection, sized for 2037 peak hour flows and future Type I reuse.

Solids Handling	Biosolids holding tank and screw press dewatering equipment. Dispose of residuals at landfill or offsite composting/land application.
Chemical Addition	Alum dosing provided for phosphorus control
Future Tertiary Filtration	Space provided for tertiary filters for future discharge limits or potential Type I reuse
Decommissioning of Existing Lagoons	Demo and decommission existing ponds (by City staff)

A summary of the current and future effluent design criteria for the primary design elements is included in Table 4-13.

C. Map

Figure 4-9 shows the preferred area within the existing lagoons property boundary for a new treatment facility. A conceptual layout of the facility is also presented in Figure 4-9.

D. Environmental Impacts

The mechanical treatment facility will be constructed at the existing lagoon site and will utilize available footprint south of the lagoons. Once the project is completed there may be a slight increase in traffic to the area (employees and trucks hauling biosolids). Noise will be limited to the extent possible by minimizing vehicle trips. The new mechanical treatment facility will require more energy than the existing lagoons to treat Plain City's wastewater, although the effluent quality will be significantly improved.

E. Land Requirements

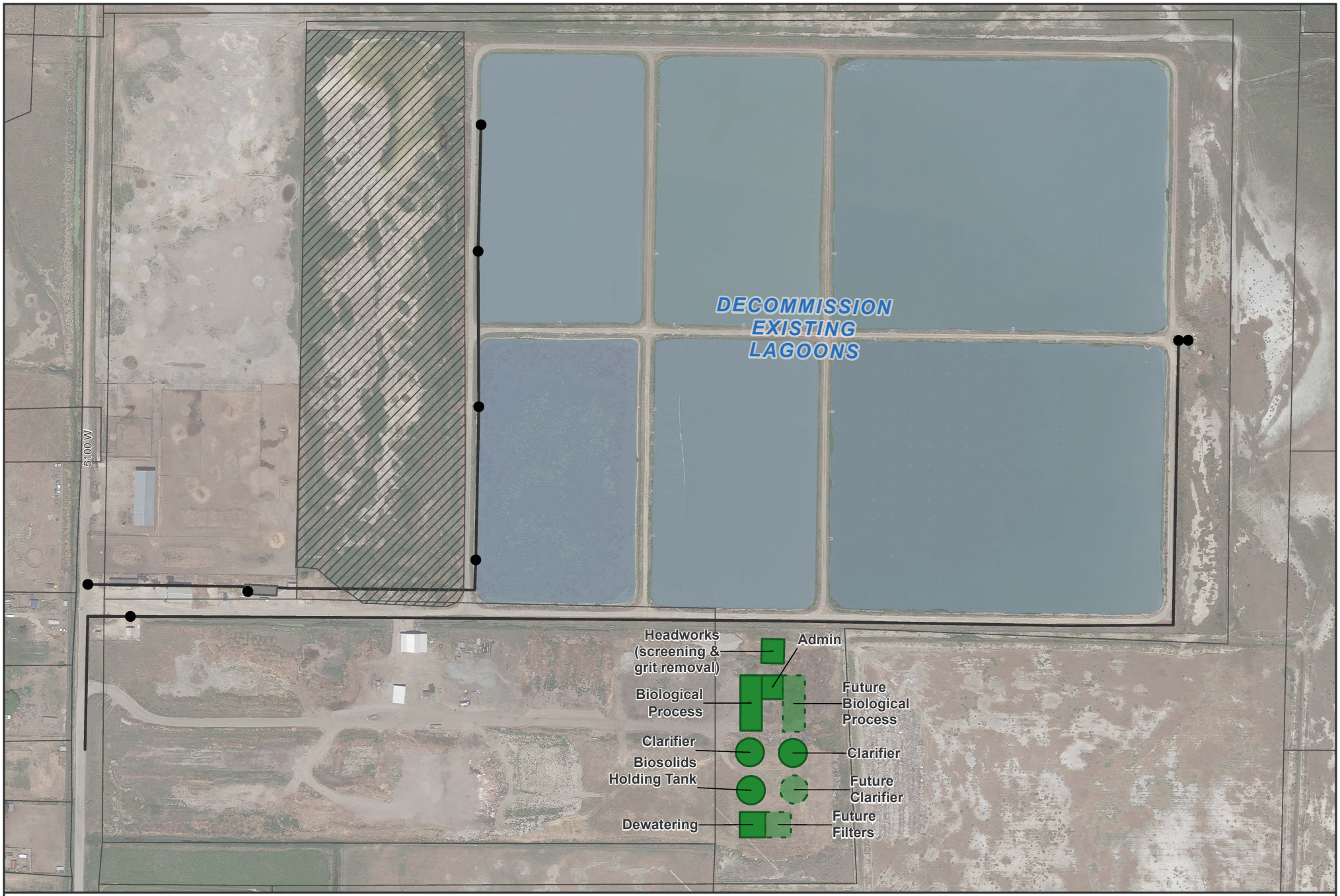
No additional land will be required for this alternative. The mechanical treatment facility will fit within the City-owned property south of the lagoons. The City owns 82 acres where the ponds, wetlands, and landfill are located. Only 5-10 acres are needed to accommodate a mechanical treatment plant constructed for 20-year flows. To accommodate build-out growth, the treatment facility would be "mirrored", see Figure 4-9. No additional easements would be required for construction of a mechanical treatment facility.

F. Potential Construction Problems

The mechanical plant would be constructed in a previously disturbed location just south of the existing lagoon facility. Moderate construction issues are expected due to shallow groundwater in the area and potentially poor soil conditions. Geotechnical exploration will be required to document soil conditions and groundwater elevations. The site is relatively flat and level. The area is surrounded by farmland and pasture.

G. Sustainability Considerations.

Power and chemical demands at the mechanical plant will be greater than the existing lagoon facility. However, effluent quality will be significantly improved. Premium efficiency motors, VFDs, and other energy reduction measures will be specified where feasible. The site will be master planned for the addition of tertiary filtration in the future. Filters would produce Type I water that can be "reused" in the City's pressure irrigation system. Biosolids generated by the facility could be composted, land applied, or landfilled.



Plain City Wastewater Treatment Facilities Plan

Alternative 5: Mechanical WWTP— Conventional Activated Sludge with Nutrient Removal

N

0 200 400 Feet

J-U-B ENGINEERS, INC.

OTHER J-U-B COMPANIES

H. Cost Estimates

Tables 4-15 and 4-16 summarize the capital and annual O&M costs for Alternative 5.

Table 4-15. Alternative 5 Capital Costs Summary

OPINION OF PROBABLE CAPITAL COSTS FOR MECHANICAL WWTP - CONVENTIONAL ACTIVATED SLUDGE					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$800,000	$800,000
2	Site Civil and Yard Piping	1	LS	$1,250,000	$1,250,000
3	Site Dewatering	1	LS	$500,000	$500,000
4	Electrical and Instrumentation	1	LS	$2,000,000	$2,000,000
5	Headworks Building	1	LS	$1,000,000	$1,000,000
6	MLE Biological Process Area	1	LS	$1,200,000	$1,200,000
7	Administration Area, Mechanical / Pump Rooms	1	LS	$1,500,000	$1,500,000
8	Secondary Clarifiers	1	LS	$850,000	$850,000
9	Chlorine Contact Improvements and Utility Water System	1	LS	$150,000	$150,000
10	Dewatering, Including Building	1	LS	$1,000,000	$1,000,000
11	Sludge Holding Tank	1	LS	$200,000	$200,000
				Construction Subtotal	$10,450,000
NON-CONSTRUCTION					
12	Construction Contingency	1	EA	25%	$2,613,000
13	Geotechnical	1	LS	$15,000	$15,000
14	NEPA	1	EA	0.4%	$42,000
15	Design, bidding	1	EA	9%	$941,000
16	Construction adminstration services	1	EA	7%	$732,000
17	Materials testing	1	EA	0.5%	$52,000
18	Legal	1	EA	0.5%	$52,000
19	Bond Origination Fees	1	EA	0.5%	$52,000
20	One year of escalation	1	/yr	2%	$422,000
				Non-Construction Subtotal	$4,921,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$15,371,000

1. Dewatering building could be eliminated if sludge lagooning is used (i.e., store waste activated sludge in abandoned lagoon cell and dredge solids every 10 years).

I. Advantages/Disadvantages

For Alternative 5, the conventional activated sludge process with nutrient removal, the advantages and disadvantages of such a system are listed below.

Advantages

- Improved effluent quality over existing lagoon system.
- Efficient, well-proven process that produces a stable effluent quality
- Activated Sludge system includes biological nutrient removal, primarily focused on nitrification and de-nitrification but with phosphorus removal capabilities.
- Filters and anaerobic selectors can be added for biological phosphorus removal (in the future).
- Highly flexible process, capable of meeting all future regulations.
- High mixed liquor concentration capable of handling variations in loadings.
- Capable of handling higher flows, such as from infiltration and inflow during rain events, without an equalization tank.
- Expandable in phases.
- Energy requirements are higher than the existing lagoons but less than membrane bioreactor technology.

- Initial capital costs are less than membrane bioreactor technology.

Disadvantages

- Larger footprint as compared to sequencing batch reactor.
- There is the possibility of solids separation issues and performance as compared to membrane bioreactor technology.
- Increased operations and maintenance costs compared to lagoon facilities.
- Need for skilled operators/staff.

4.7 ALTERNATIVE 6: SEQUENCING BATCH REACTOR

A. Description

Alternative 6 involves the construction of a new wastewater treatment facility utilizing sequencing batch reactor (SBR) technology with dedicated nutrient removal planning. The facility will be designed to meet the recently implemented phosphorus discharge limit of 1 mg/L for all mechanical plants. This will typically be provided biologically; however, chemical phosphorus removal equipment will be included to ensure reliability. The treatment facility will also be capable of meeting a potential future total inorganic nitrogen limit of 10 mg/L. A photo of a sequencing batch reactor is shown below in Figure 4-12.

Sequencing batch reactors differ from conventional activated sludge treatment facilities (as described in Alternative 5) in that all of the biological treatment is performed in a single reactor. This minimizes the required tank volumes thereby reducing the amount of concrete and associated costs. The treatment is performed in "batches" rather than in a continuous flow environment. SBR systems have five main process steps which are carried out in the sequence as follows: (1) fill, (2) react (aeration), (3) settle (sedimentation/clarification), (4) decant, and (5) sludge wasting. A second train receives flow while the first train completes its treatment cycle. Process modifications have been developed utilizing various aeration/mixing schemes and cycle times to achieve phosphorus and nitrogen removal.

The design basis for flows and water quality are the same as presented above in Alternatives 5 and 6. The treatment facility would be situated on city-owned land south of the lagoons, including room for future expansion.

B. Design Criteria

For Alternative 6, a new sequencing batch reactor is planned. The design elements for this facility include the following:

Table 4-20. Alternative 6 Design Criteria

Element	Design Criteria
Headworks Building	Mechanical fine screen (6 mm openings) sized for 2037 peak hour flows and grit removal equipment
Sequencing Batch Reactor	Two 0.7 mgd process trains (based on a maximum month design flow condition). Process trains will be located outside and will incorporate phosphorus and nitrogen removal.
Surge Equalization	A surge equalization tank will receive SBR decant batch flows and will serve to reduce peak flows to UV and future filters.
Disinfection	Ultraviolet light disinfection, sized for 2037 peak hour flows and future

	Type I reuse.
Solids Handling	Biosolids holding tank and screw press dewatering equipment. Dispose of residuals at landfill or offsite composting/land application.
Chemical Addition	Phosphorus removal will occur biologically; however, chemical phosphorus removal equipment will be included to ensure reliability.
Off-line Influent Equalization	Utilize existing lagoon Cell #1 to divert and store peak flow events. Stored influent will be pumped into the SBR at a near constant rate to reduce peaking factors.
Future Tertiary Filtration	Space provided for future tertiary filters for potential Type I reuse or to meet future permit limits.
Decommissioning	Demo and decommission existing ponds (by City staff).

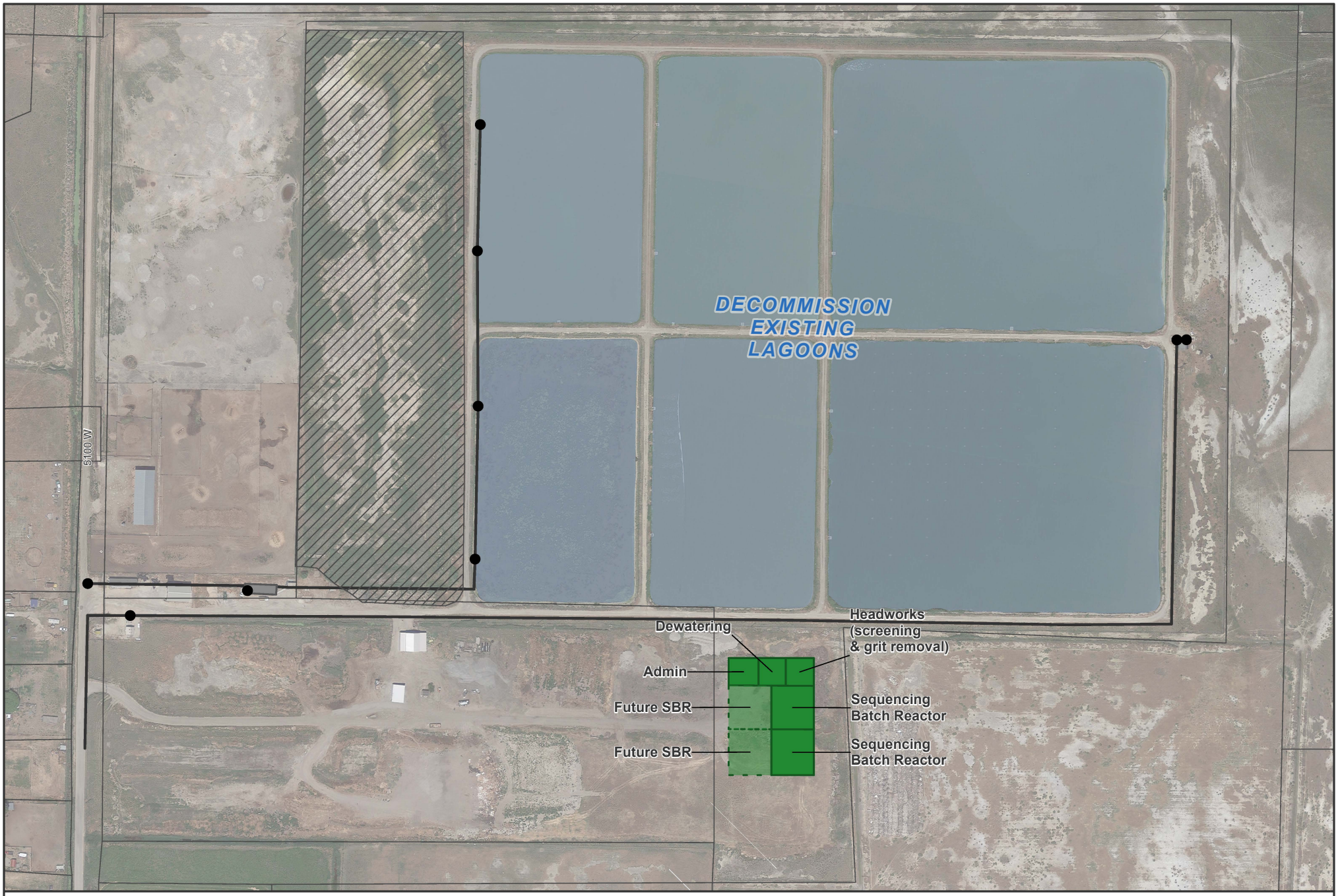
A summary of the current and future effluent design criteria for the primary design elements is included in Table 4-13.

Figure 4-12. Sequencing Batch Reactor

Photo Courtesy of Aqua Aerobic Systems, Inc.

C. Map

Figure 4-13 shows the preferred area within the existing lagoons property boundary for a new SBR treatment facility. A conceptual layout of the facility is also presented in Figure 4-13.



Plain City Wastewater Treatment Facilities Plan

Alternative 6: Mechanical WWTP— Sequencing Batch Reactor

N

0 200 400 Feet

J-U-B ENGINEERS, INC.

THE LANGDON GROUP a J-U-B Company

GATEWAY MAPPING INC. a J-U-B Company

OTHER J-U-B COMPANIES

D. Environmental Impacts

The sequencing batch reactor will be constructed on city-owned property located just south of the ponds. Once the project is completed there may be a slight increase in traffic to the area (employees and trucks hauling biosolids). Noise will be limited to the extent possible by minimizing vehicle trips. The new mechanical treatment facility will require more energy than the existing lagoons to treat Plain City's wastewater, although the effluent quality will be significantly improved.

E. Land Requirements

No additional land will be required for this alternative. The SBRs will be constructed just south of the existing lagoons. Compared to other treatment alternatives, sequencing batch reactors use the least amount of land. The City owns 82 acres at the lagoon site and only approximately 5 acres are required to accommodate buildout of the SBR facility. For build-out, the treatment facility would be "mirrored" as shown in Figure 4-13. No additional easements would be required for construction of the sequencing batch reactor treatment facility.

F. Potential Construction Problems

The SBR would be constructed in a previously disturbed location adjacent to the existing lagoons. Moderate construction issues are expected due to shallow groundwater in the area and potentially challenging soil conditions. Geotechnical exploration will be required to document soil conditions and groundwater elevations. The site is relatively flat and level. The area is surrounded by farmland and pasture.

G. Sustainability Considerations.

Power and chemical demands at the SBR will be greater than the existing lagoon facility. However, effluent quality will be significantly improved. Premium efficiency motors, VFDs, and other energy reduction measures will be specified where feasible. Repurposing of the lagoons for flow equalization saves material and O&M costs by not needing to build concrete equalization tanks. The site will be master planned for the addition of tertiary filtration in the future. Filters would produce Type I water that can be "reused" in the City's pressure irrigation system. Biosolids generated by the facility could be composted, land applied, or landfilled.

H. Cost Estimates

Tables 4-21 and 4-22 summarize the capital and annual O&M costs for Alternative 6.

Table 4-21. Alternative 6 Capital Costs Summary

OPINION OF PROBABLE CAPITAL COSTS FOR MECHANICAL WWTP - SEQUENCING BATCH REACTOR					
Item	**Description**	**Quantity**	**Units**	**Unit Price**	**Cost**
CONSTRUCTION					
1	Mobilization/Demobilization/Div 1	1	LS	$600,000	$600,000
3	Site Civil including Yard Piping	1	LS	$1,000,000	$1,000,000
4	Site Dewatering	1	LS	$350,000	$350,000
5	Electrical and Instrumentation	1	LS	$1,500,000	$1,500,000
6	Headworks Building including Grit Removal	1	LS	$1,000,000	$1,000,000
7	SBR Equipment Supply and Installation	1	LS	$1,000,000	$1,000,000
8	Concrete Basins for SBR and Surge Tank	1500	CY	$600	$900,000
9	Process and Mechanical Building	2400	SF	$150	$360,000
10	Chlorine Contact Improvements and Utility Water System	1	LS	$150,000	$150,000
11	Dewatering Building	1	LS	$1,000,000	$1,000,000
12	Equalization, Pumping, and Repurposing Cell 1	1	LS	$500,000	$500,000
				Construction Subtotal	$8,360,000
NON-CONSTRUCTION					
13	Construction Contingency	1	EA	25%	$2,090,000
14	Geotechnical	1	LS	$15,000	$15,000
15	NEPA	1	EA	0.4%	$33,000
16	Design, bidding	1	EA	9%	$752,000
17	Construction adminstration services	1	EA	7%	$585,000
18	Materials testing	1	EA	0.5%	$42,000
19	Legal	1	EA	0.5%	$42,000
20	Bond Origination Fees	1	EA	0.5%	$42,000
21	One year of escalation	1	/yr	2%	$338,000
				Non-Construction Subtotal	$3,939,000
				TOTAL CAPITAL OPINION OF PROBABLE COST	$12,299,000

1. Dewatering building could be eliminated if sludge lagooning is used (i.e., store waste activated sludge in abandoned lagoon cell and dredge solids every 10 years).

I. Advantages/Disadvantages

For Alternative 6, the sequencing batch reactor with nutrient removal, the advantages and disadvantages of such a system are listed below.

Advantages

- Improved effluent quality over existing lagoon system.
- SBRs are well-proven and common with hundreds of installations in the U.S.
- Filters can be added in the future to allow for Type I water reuse and to meet very low phosphorus limits that could be mandated by a future TMDL.
- Expandable in phases.
- Energy requirements are higher than the existing lagoons but less than membrane bioreactor technology.
- Smaller footprint and less equipment than other mechanical treatment facilities due to batch operating mode and all unit processes occurring in single tank.
- Initial capital costs are less than conventional activated sludge and membrane bioreactor technology.
- Secondary clarifiers and RAS pumping are not required.
- Nutrient removal can be accomplished through operational modifications and changing cycle times.

Disadvantages

- Increased operations and maintenance costs compared to lagoon facilities.
- Less flexible process control compared to conventional activated sludge.
- Higher flows, such as from infiltration and inflow during rain events, can disrupt operation and impact treatment performance. In this case, it is proposed equalization will be provided in lagoon Cell #1 to minimize the risk of this occurring.
- Higher maintenance skills required for instruments, monitoring devices, automatic valves, and more complex process control.
- Less customization, married to equipment vendor.
- Poor settling or bulking sludge can occasionally result in poor effluent quality. Using the existing lagoons to further treat or store off-spec water can mitigate this concern.

5.0 SELECTION OF AN ALTERNATIVE

Chapter 3 identified deficiencies and project needs at the existing treatment facilities. Chapter 4 proposed alternatives to address these deficiencies. This chapter analyzes the data presented in Chapter 4 in a systematic manner to identify a recommended alternative. The analysis presented below includes consideration of both economic and non-monetary factors.

a) Capital Costs

Tables 5-1 and 5-2 summarize the capital cost for all of the alternatives. All of the opinions of probable capital costs include the following:

- Construction contingency (25%)
- Engineering services for design and construction
- Geotechnical investigation and materials testing
- NEPA requirements
- Legal, bond origination fees, and price escalation with inflation

Table 5-1. Monetary Comparison of Immediate Project Needs

Do Nothing	Back End Improvements – Dechlorination and Reaeration	Lift Station 1 Replacement – Triplex Submersible	Lift Station 1 Replacement – Triplex Wet Pit / Dry Pit
Not a Feasible Alternative	$177,500	$923,000 + negotiated costs for 3-phase power	$1,826,000 + negotiated costs for 3-phase power

Table 5-2. Monetary Comparison of Feasible Treatment Alternatives

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Do Nothing	Upgrade Lagoons, Discharge in Winter, Land Application during Growing Season	Regionalization - Divert Some Flows to Central Weber SID	Hybrid Lagoons - SAGR	Conventional Activated Sludge with Nutrient Removal (MLE Process)	Sequencing Batch Reactor
Not a Feasible Alternative	$2,437,000, other costs to be negotiated with landowner	$2,658,000	$9,892,000	$15,371,000	$12,299,000

b) Non-Monetary Factors

The previous section summarized the economic impact for each of the technically feasible alternatives. It is also important to consider non-monetary factors as part of the recommended alternative analysis. The following non-monetary considerations were evaluated.

- Long term regulatory compliance – includes existing regulations, nutrient load caps, and potential future TMDL regulations.
- Addresses aging infrastructure – the lagoons were constructed nearly 50 years ago including some of the associated lift stations.
- Easiest expansion potential – ability to expand within existing footprint as growth occurs.
- Siting challenges and land ownership issues – the lagoon improvement alternatives require additional land for effluent disposal.
- Easiest to operate and maintain – mechanical facilities are more complex than lagoons and require a Grade IV operator's license.

Generally speaking,

- The regionalization alternative buys the city time (5-10 years) to make a long term decision regarding treatment and the phosphorus load cap.

- The lagoon improvement alternative is the easiest to operate and maintain. Land application during the growing season and discharge during the winter months is the most favorable alternative economically.

- The mechanical treatment facility alternatives are more favorable for long-term regulatory compliance, addressing aging infrastructure needs, ease of expansion, and fewer land ownership issues.

- The hybrid lagoon alternative is generally less expensive than the mechanical alternatives, although it has a larger footprint and is not as easily expandable.

Table 5-2 shows an example decision matrix that combines the non-monetary considerations described above with the economic impacts that were previously developed.

From the decision matrix scoring presented below and based on the City's specific needs and preferences, it is recommended the City move forward with Alternative XXX. Chapter 6 will provide a summary of the recommended alternative including a user rate analysis and a proposed project schedule.

Table 5-2. Decision Matrix for Wastewater Treatment Facilities

Category	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Description	Do Nothing	Upgrade Lagoons, Discharge in Winter, Land Application during Growing Season	Regionalization - Divert Some Flows to Central Weber SID	Hybrid Lagoons - SAGR	Conventional Activated Sludge with Nutrient Removal (MLE Process)	Sequencing Batch Reactor
	Score	**Score**	**Score**	**Score**	**Score**	**Score**
Lowest Capital Costs	Not a feasible alternative - A change in process or disposal method is required to meet existing deficiencies and phosphorus load cap					
Lowest O&M Costs						
Long Term Regulatory Compliance						
Addresses Aging Infrastructure						
Easiest Expansion Potential						
Least Siting Challenges and Land Ownership Issues						
Easiest to Operate and Maintain						
Scoring (higher is more favorable)	**NOT RANKED**					

APPENDIX A

UPDES PERMIT

STATE OF UTAH
DIVISION OF WATER QUALITY
DEPARTMENT OF ENVIRONMENTAL QUALITY
SALT LAKE CITY, UTAH

UTAH POLLUTANT DISCHARGE ELIMINATION SYSTEM (UPDES) PERMITS

Minor Municipal Permit No. UT0021326

In compliance with provisions of the Utah *Water Quality Act, Title 19, Chapter 5, Utah Code Annotated ("UCA") 1953, as amended* (the *"Act"*),

Plain City

is hereby authorized to discharge from its facility located approximately one mile west of Plain City, Utah with the outfall located at latitude, 41° 18' 38' N and longitude 112° 06' 05" W to receiving waters named

Unnamed drainage ditch, Dix Creek, First Salt Creek, Harold S. Crane Waterfowl Management Area and Willard Spur of the Great Salt Lake

in accordance with the discharge point, effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on October 1, 2015.

This permit expires at midnight on September 30, 2020.

Signed this 2 day of October, 2015.

Walter L. Baker, P.E.
Director

Table of Contents

I. DISCHARGE LIMITATIONS AND REPORTING REQUIREMENTS

A. Description of Discharge Point. The authorization to discharge wastewater provided under this part is limited to those outfalls specifically designated below as discharge locations. Discharges at any location not authorized under a UPDES permit are violations of the *Act* and may be subject to penalties under the *Act*. Knowingly discharging from an unauthorized location or failing to report an unauthorized discharge may be subject to criminal penalties as provided under the *Act*.

Outfall Number	Location of Discharge Outfall
001	The Plain City lagoons are approximately 1 mile due west of Plain City. The discharge is on the west end of the lagoon system, out of a chlorine contact chamber, thence to a v-notch weir, into an irrigation ditch. Latitude 41° 18' 38" N and longitude 112° 06' 05" W.

B. Narrative Standard. It shall be unlawful, and a violation of this permit, for the permittee to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum, or other nuisances such as color, odor or taste, or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by a bioassay or other tests performed in accordance with standard procedures.

C. Specific Limitations and Self-Monitoring Requirements.

1. Effective immediately and lasting the duration of this permit, the permittee is authorized to discharge from Outfall 001. Such discharges shall be limited and monitored by the permittee as specified below:

Parameter	Effluent Limitations[1]			
	Maximum Monthly Average	Maximum Weekly Average	Daily Minimum	Daily Maximum
Flow, mgd	0.6			0.9
BOD_5, mg/L	45	65		
Total Suspended Solids (TSS), mg/L	45	65		
E. coli, No./100mL	126	158		
pH, Standard Units			6.5	9.0
Dissolved Oxygen, mg/L			5.0	
Oil & Grease, mg/L				10
Total Residual Chlorine, mg/L				
Summer (Jul-Sep)				1.5
Fall (Oct-Dec)				0.5
Winter (Jan-Mar)				0.3
Spring (Apr-Jun)				0.5

Influent Self-Monitoring and Reporting Requirements[1]			
Parameter	Frequency	Sample Type	Units
Total Flow[2]	Continuous	Recorder	mgd
BOD_5[2]	Monthly	Grab	mg/L
TSS[2]	Monthly	Grab	mg/L
Total Phosphorus (as P)[3]	Monthly	Composite[4]	mg/L
Total Kjeldahl Nitrogen (as N)[3]	Monthly	Composite[4]	mg/L

Effluent Self-Monitoring and Reporting Requirements[1]			
Parameter	Frequency	Sample Type	Units
Total Flow[2]	Continuous	Recorder	mgd
BOD_5[2]	Monthly	Grab	mg/L
TSS[2]	Monthly	Grab	mg/L
E. coli	Monthly	Grab	No./100mL
pH	Monthly	Grab	SU
Dissolved Oxygen	Monthly	Grab	mg/L
Oil & Grease[5]	Monthly	Grab	mg/L
Total Residual Chlorine	Monthly	Grab	mg/L
Total Phosphorus (as P)[3]	Monthly	Composite[4]	mg/L
Orthophosphate (as P)[3]	Monthly	Composite[4]	mg/L
Ammonia (as N)[3]	Monthly	Composite[4]	mg/L
Nitrate-Nitrite (as N)[3]	Monthly	Composite[4]	mg/L
Total Kjeldahl Nitrogen (as N)[3]	Monthly	Composite[4]	mg/L

[1] See Definitions, *Part VI*, for definition of terms.
[2] Influent samples and the influent flow shall be monitored and measured at the same frequency as the effluent samples and the effluent flow.

[3] Monitoring of these parameters shall be conducted and begin in accordance with R317-1-3.3.D.
[4] Composite samples shall be 24 hour composites collected by use of an automatic sampler or minimum of four grab samples collected a minimum of two hours apart.
[5] Sample only if a sheen is observed.

D. Reporting of Wastewater Monitoring Results. Monitoring results obtained during the previous month shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1) or by NetDMR, post-marked or entered into NetDMR no later than the 28th day of the month following the completed reporting period. The first report is due on November 28, 2015. If no discharge occurs during the reporting period, "no discharge" shall be reported. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the requirements of *Signatory Requirements (see Part VII.G)*, and submitted by NetDMR, or to the Division of Water Quality at the following address:

Department of Environmental Quality
Division of Water Quality
195 North 1950 West
PO Box 144870
Salt Lake City, Utah 84114-4870

II. INDUSTRIAL PRETREATMENT PROGRAM

A. Definitions.
For this section the following definitions shall apply:

1. Significant industrial user (SIU) is defined as an industrial user discharging to a publicly-owned treatment works (POTW) that satisfies any of the following:

   a. Has a process wastewater flow of 25,000 gallons or more per average work day;

   b. Has a flow greater than five percent of the flow carried by the municipal system receiving the waste;

   c. Is subject to Categorical Pretreatment Standards, or

   d. Has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement.

2. Local Limit is defined as a limit designed to prevent pass through and/or interference. And is developed in accordance with 40 CFR 403.5(c).

B. Pretreatment Reporting Requirements.

Because the design capacity of this municipal wastewater treatment facility is less than 5 MGD, the permittee will not be required to develop a State-approved industrial pretreatment program at this time. However, in order to determine if development of an industrial pretreatment program is warranted, the permittee shall conduct an **industrial waste survey**, as described in *Part II.C.1*, and submit it to the Division of Water Quality within **sixty (60) calendar days** of the effective date of this permit.

C. Industrial Waste Survey (IWS).

1. As required by *Part II.B.1*. the industrial waste survey consists of;

   a. Identifying each industrial user (IU) and determining if the IU is a signification industrial user (SIU),

   b. Determination of the qualitative and quantitative characteristics of each discharge, and

   c. Appropriate production data.

2. The IWS must be maintained and updated with IU information as necessary, to ensure that all IUs are properly permitted and/or controlled at all times. Updates must be submitted to the Director sixty (60) days following a change to the IWS.

3. Evaluate all significant industrial users at least once every two years to determine if they need to develop a slug prevention plan. If a slug prevention plan is required, the permittee shall notify the Director.

4. Notify all significant industrial users of their obligation to comply with applicable requirements under *Subtitles C and D* of the *Resource* Conservation and Recovery Act (RCRA).

5. The permittee must notify the Director of any new introductions by new or existing SIUs or any substantial change in pollutants from any major industrial source. Such notice must contain the information described in 1. Above, and be forwarded no later than sixty (60) days following the introduction or change.

D. General and Specific Prohibitions

1. Developed pursuant to *Section 307* of *The Water Quality Act of 1987* require that under no circumstances shall the permittee allow introduction of the following pollutants into the waste treatment system from any source of non-domestic discharge:

   a. Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including, but not limited to, wastestreams with a closed cup flashpoint of less than 140°F (60°C);

   b. Pollutants, which will cause corrosive structural damage to the POTW, but in no case, discharges with a pH lower than 5.0;

   c. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;

   d. Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge at such volume or strength as to cause interference in the POTW;

   e. Heat in amounts, which will inhibit biological activity in the POTW, resulting in interference, but in no case, heat in such quantities that the influent to the sewage treatment works exceeds 104°F (40°C);

   f. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

g. Pollutants which result in the presence of toxic gases, vapor, or fumes within the POTW in a quantity that may cause worker health or safety problems; or,

h. Any trucked or hauled pollutants, except at discharge points designated by the POTW.

i. Any pollutant that causes pass through or interference at the POTW.

2. In addition to the general and specific limitations expressed above, more specific pretreatment limitations have been and will be promulgated for specific industrial categories under *Section 307* of *the Water Quality Act of 1987 as amended (WQA). (See 40 CFR, Subchapter N, Parts 400* through *500*, for specific information).

E. Signification Industrial Users Discharging to the POTW.

The permittee shall provide adequate notice to the Director and the Division of Water Quality Industrial Pretreatment Coordinator of;

1. Any new introduction of pollutants into the treatment works from an indirect discharger (i.e., industrial user) which would be subject to *Sections 301* or *306* of the *WQA* if it were directly discharging those pollutants;

2. Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source introducing pollutants into the treatment works at the time of issuance of the permit; and

3. For the purposes of this section, adequate notice shall include information on:

a. The quality and quantity of effluent to be introduced into such treatment works; and,

b. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from such publicly owned treatment works.

4. Any SIU that must comply with applicable requirements under *Subtitles C and D* of the *Resource* Conservation and Recovery Act (RCRA).

F. Change of Conditions.
At such time as a specific pretreatment limitation becomes applicable to an industrial user of the permittee, the Director may, as appropriate, do the following:

1. Amend the permittee's UPDES discharge permit to specify the additional pollutant(s) and corresponding effluent limitation(s) consistent with the applicable national pretreatment limitation;

2. Require the permittee to specify, by ordinance, contract, or other enforceable means, the type of pollutant(s) and the maximum amount which may be discharged to the permittee's facility for treatment. Such requirement shall be imposed in a manner consistent with the POTW program development requirements of the *General Pretreatment Regulations* at *40 CFR 403;*

3. Require the permittee to monitor its discharge for any pollutant, which may likely be discharged from the permittee's facility, should the industrial user fail to properly pretreat its waste; and/or,

4. Require the permittee to develop an approved pretreatment program.

G. Legal Action.
The Director retains, at all times, the right to take legal action against the industrial user and/or the treatment works, in those cases where a permit violation has occurred because of the failure of an industrial user to discharge at an acceptable level. If the permittee has failed to properly delineate maximum acceptable industrial contributor levels, the Director will look primarily to the permittee as the responsible party.

H. Local Limits
If local limits are developed per R317-8-8.5(4)(b) to protect the POTW from pass through or interference, then the POTW must submit limits to DWQ for review and public notice, as required by R317-8-8.5(4)(c).

III. BIOSOLIDS REQUIREMENTS

The State of Utah has adopted the 40 CFR 503 federal regulations for the disposal of sewage sludge (biosolids) by reference. However, since this facility is a lagoon, there is not any regular sludge production. Therefore 40 CFR 503 does not apply at this time. In the future, if the sludge needs to be removed from the lagoons and is disposed in some way, the Division of Water Quality must be contacted prior to the removal of the sludge to ensure that all applicable state and federal regulations are met.

IV. STORM WATER REQUIREMENTS.

The *Utah* Administrative *Code (UAC) R-317-8-3.9* requires storm water permit provisions to include the development of a storm water pollution prevention plan for waste water treatment facilities if the facility meets one or both of the following criteria.

- waste water treatment facilities with a design flow of 1.0 MGD or greater, and/or,
- waste water treatment facilities with an approved pretreatment program as described in *40CFR Part 403,*

The permittee does not meet either of the above criteria; therefore this permit does not include storm water provisions. The permit does however include a storm water re-opener provision.

V. MONITORING, RECORDING & GENERAL REPORTING REQUIREMENTS

A. Representative Sampling. Samples taken in compliance with the monitoring requirements established under *Part I* shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge. Samples of biosolids shall be collected at a location representative of the quality of biosolids immediately prior to the use-disposal practice.

B. Monitoring Procedures. Monitoring must be conducted according to test procedures approved under *Utah Administrative Code ("UAC") R317-2-10 and 40CFR Part 503*, unless other test procedures have been specified in this permit.

C. Penalties for Tampering. The *Act* provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

D. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

E. Additional Monitoring by the Permittee. If the permittee monitors any parameter more frequently than required by this permit, using test procedures approved under *UAC R317-2-10* and *40 CFR 503* or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or the Biosolids Report Form. Such increased frequency shall also be indicated. Only those parameters required by the permit need to be reported.

F. Records Contents. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements:
2. The individual(s) who performed the sampling or measurements;
3. The date(s) and time(s) analyses were performed;
4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used; and,
6. The results of such analyses.

G. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all

reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least five years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time. A copy of this UPDES permit must be maintained on site during the duration of activity at the permitted location

H. Twenty-four Hour Notice of Noncompliance Reporting.

1. The permittee shall (orally) report any noncompliance including transportation accidents, spills, and uncontrolled runoff from biosolids transfer or land application sites which may seriously endanger health or environment, as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of circumstances. The report shall be made to the Division of Water Quality, (801) 538-6146, or 24-hour answering service (801) 536-4123.

2. The following occurrences of noncompliance shall be reported by telephone (801) 536-4123 as soon as possible but no later than 24 hours from the time the permittee becomes aware of the circumstances:

   a. Any noncompliance which may endanger health or the environment;

   b. Any unanticipated bypass, which exceeds any effluent limitation in the permit (See *Part IV.G, Bypass of Treatment Facilities.)*;

   c. Any upset which exceeds any effluent limitation in the permit (See *Part IV.H, Upset Conditions.*);

   d. Violation of a maximum daily discharge limitation for any of the pollutants listed in the permit; or,

   e. Violation of any of the Table 3 metals limits, the pathogen limits, the vector attraction reduction limits or the management practices for biosolids that have been sold or given away.

3. A written submission shall also be provided within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected;

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and,

e. Steps taken, if any, to mitigate the adverse impacts on the environment and human health during the noncompliance period.

4. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Division of Water Quality, (801) 538-6146.

5. Reports shall be submitted to the addresses in *Part I.D, Reporting of Monitoring Results.*

I. Other Noncompliance Reporting. Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for *Part I.D* are submitted. The reports shall contain the information listed in *Part III.H.3*

J. Inspection and Entry The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, including but not limited to, biosolids treatment, collection, storage facilities or area, transport vehicles and containers, and land application sites;

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the *Act*, any substances or parameters at any location, including, but not limited to, digested biosolids before dewatering, dewatered biosolids, biosolids transfer or staging areas, any ground or surface waters at the land application sites or biosolids, soils, or vegetation on the land application sites; and,

5. The permittee shall make the necessary arrangements with the landowner or leaseholder to obtain permission or clearance, the Director, or authorized representative, upon the presentation of credentials and other

documents as may be required by law will be permitted to enter without delay for the purposes of performing their responsibilities.

VI. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity, which may result in noncompliance with permit requirements.

B. Penalties for Violations of Permit Conditions. The *Act* provides that any person who violates a permit condition implementing provisions of the *Act* is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions or the Act is subject to a fine not exceeding $25,000 per day of violation. Any person convicted under *UCA 19-5-115(2)* a second time shall be punished by a fine not exceeding $50,000 per day. Except as provided at *Part IV.G, Bypass of Treatment Facilities* and *Part IV.H, Upset Conditions*, nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce Activity not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit, which has a reasonable likelihood of adversely affecting human health or the environment. The permittee shall also take all reasonable steps to minimize or prevent any land application in violation of this permit.

E. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

F. Removed Substances. Collected screening, grit, solids, sludge, or other pollutants removed in the course of treatment shall be disposed of in such a manner so as to prevent any pollutant from entering any waters of the state or creating a health hazard. Sludge/digester supernatant and filter backwash

shall not directly enter either the final effluent or waters of the state by any other direct route.

G. Bypass of Treatment Facilities.

1. Bypass Not Exceeding Limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to paragraph 2 and 3 of this section.

2. Prohibition of Bypass.

   a. Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

      (1) Bypass was unavoidable to prevent loss of human life, personal injury, or severe property damage;

      (2) There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance, and

      (3) The permittee submitted notices as required under *section IV.G.3.*

   b. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed in *sections IV.G.2.a (1), (2) and (3).*

3. Notice.

   a. *Anticipated bypass.* Except as provided above in *section IV.G.2* and below in *section IV.G.3.b*, if the permittee knows in advance of the need for a bypass, it shall submit prior notice, at least ninety days before the date of bypass. The prior notice shall include the following unless otherwise waived by the Director:

      (1) Evaluation of alternative to bypass, including cost-benefit analysis containing an assessment of anticipated resource damages:

(2) A specific bypass plan describing the work to be performed including scheduled dates and times. The permittee must notify the Director in advance of any changes to the bypass schedule;

(3) Description of specific measures to be taken to minimize environmental and public health impacts;

(4) A notification plan sufficient to alert all downstream users, the public and others reasonably expected to be impacted by the bypass;

(5) A water quality assessment plan to include sufficient monitoring of the receiving water before, during and following the bypass to enable evaluation of public health risks and environmental impacts; and,

(6) Any additional information requested by the Director.

b. *Emergency Bypass*. Where ninety days advance notice is not possible, the permittee must notify the Director, and the Director of the Department of Natural Resources, as soon as it becomes aware of the need to bypass and provide to the Director the information in *section IV.G.3.a.(1) through (6)* to the extent practicable.

c. *Unanticipated bypass*. The permittee shall submit notice of an unanticipated bypass to the Director as required under *Part III.H*, Twenty Four Hour Reporting. The permittee shall also immediately notify the Director of the Department of Natural Resources, the public and downstream users and shall implement measures to minimize impacts to public health and environment to the extent practicable.

H. Upset Conditions.

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of paragraph 2 of this section are met. Director's administrative determination regarding a claim of upset cannot be judiciously challenged by the permittee until such time as an action is initiated for noncompliance.

2. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the permittee can identify the cause(s) of the upset;

b. The permitted facility was at the time being properly operated;

c. The permittee submitted notice of the upset as required under *Part III.H, Twenty-four Hour Notice of Noncompliance Reporting*; and,

d. The permittee complied with any remedial measures required under *Part IV.D, Duty to Mitigate*.

3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

VII. GENERAL REQUIREMENTS

A. Planned Changes. The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when the alteration or addition could significantly change the nature or increase the quantity of parameters discharged or pollutant sold or given away. This notification applies to pollutants, which are not subject to effluent limitations in the permit. In addition, if there are any planned substantial changes to the permittee's existing sludge facilities or their manner of operation or to current sludge management practices of storage and disposal, the permittee shall give notice to the Director of any planned changes at least 30 days prior to their implementation.

B. Anticipated Noncompliance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity, which may result in noncompliance with permit requirements.

C. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall apply for and obtain a new permit. The application shall be submitted at least 180 days before the expiration date of this permit.

E. Duty to Provide Information. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

F. Other Information. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Director, it shall promptly submit such facts or information.

G. Signatory Requirements. All applications, reports or information submitted to the Director shall be signed and certified.

1. All permit applications shall be signed by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Director, and,

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. A duly authorized representative may thus be either a named individual or any individual occupying a named position.

3. Changes to authorization. If an authorization under *paragraph V.G.2* is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of *paragraph V.G.2.* must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. Penalties for Falsification of Reports. The *Act* provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000.00 per violation, or by imprisonment for not more than six months per violation, or by both.

I. Availability of Reports. Except for data determined to be confidential under *UAC R317-8-3.2*, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the office of Director. As required by the *Act*, permit applications, permits and effluent data shall not be considered confidential.

J. Oil and Hazardous Substance Liability. Nothing in this permit shall be construed to preclude the permittee of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under the *Act*.

K. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

L. Severability. The provisions of this permit are severable, and if any provisions of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

M. Transfers. This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Director at least 20 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new permittee's containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,

3. The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph *2* above.

N. State or Federal Laws. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by *UCA 19-5-117* and *Section 510* of the *Act* or any applicable Federal or State transportation regulations, such as but not limited to the Department of Transportation regulations.

O. Water Quality - Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include the

appropriate effluent limitations and compliance schedule, if necessary, if one or more of the following events occurs:

1. Water Quality Standards for the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit.

2. A final wasteload allocation is developed and approved by the State and/or EPA for incorporation in this permit.

3. Revisions to the current CWA § 208 area wide treatment management plans or promulgations/revisions to TMDLs (40 CFR 130.7) approved by the EPA and adopted by DWQ which calls for different effluent limitations than contained in this permit.

P. Biosolids – Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include the appropriate biosolids limitations (and compliance schedule, if necessary), management practices, other appropriate requirements to protect public health and the environment, or if there have been substantial changes (or such changes are planned) in biosolids use or disposal practices; applicable management practices or numerical limitations for pollutants in biosolids have been promulgated which are more stringent than the requirements in this permit; and/or it has been determined that the permittees biosolids use or land application practices do not comply with existing applicable state of federal regulations.

Q. Toxicity Limitation - Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include, whole effluent toxicity (WET) limitations, a compliance date, a compliance schedule, a change in the whole effluent toxicity (biomonitoring) protocol, additional or modified numerical limitations, or any other conditions related to the control of toxicants.

R. Storm Water-Reopener Provision. At any time during the duration (life) of this permit, this permit may be reopened and modified (following proper administrative procedures) as per *UAC R317.8*, to include, any applicable storm water provisions and requirements, a storm water pollution prevention plan, a compliance schedule, a compliance date, monitoring and/or reporting requirements, or any other conditions related to the control of storm water discharges to "waters-of-State".

VIII. DEFINITIONS

A. Wastewater.

1. The "7-day (and weekly) average", other than for e-coli bacteria, fecal coliform bacteria, and total coliform bacteria, is the arithmetic average of all samples collected during a consecutive 7-day period or calendar week, whichever is applicable. Geometric means shall be calculated for e-coli bacteria, fecal coliform bacteria, and total coliform bacteria. The 7-day and weekly averages are applicable only to those effluent characteristics for which there are 7-day average effluent limitations. The calendar week, which begins on Sunday and ends on Saturday, shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms. Weekly averages shall be calculated for all calendar weeks with Saturdays in the month. If a calendar week overlaps two months (i.e., the Sunday is in one month and the Saturday in the following month), the weekly average calculated for that calendar week shall be included in the data for the month that contains Saturday.

2. The "30-day (and monthly) average," other than for e-coli bacteria, fecal coliform bacteria and total coliform bacteria, is the arithmetic average of all samples collected during a consecutive 30-day period or calendar month, whichever is applicable. Geometric means shall be calculated for e-coli bacteria, fecal coliform bacteria and total coliform bacteria. The calendar month shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms.

3. "Act," means the *Utah Water Quality Act*.

4. "Acute toxicity" occurs when 50 percent or more mortality is observed for either test species at any effluent concentration.

5. "Bypass," means the diversion of waste streams from any portion of a treatment facility.

6. "Chronic toxicity" occurs when the survival, growth, or reproduction for either test species exposed to a dilution of 25 percent effluent (or lower) is significantly less (at the 95 percent confidence level) than the survival, growth, or reproduction of the control specimens.

7. "IC_{25}" is the concentration of toxicant (given in % effluent) that would cause a 25% reduction in mean young per female or a 25% reduction in overall growth for the test population.

8. "CWA," means *The Federal Water Pollution Control Act*, as amended, by *The Clean Water Act of 1987*.

9. "Daily Maximum" (Daily Max.) is the maximum value allowable in any single sample or instantaneous measurement.

10. "EPA," means the United States Environmental Protection Agency.

11. "Director," means Director of the Utah Division of Water Quality.

12. A "grab" sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

13. An "instantaneous" measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

14. "Severe Property Damage," means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

15. "Upset," means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

FACT SHEET/STATEMENT OF BASIS
PLAIN CITY CORPORATION
UPDES PERMIT NUMBER UT0021326
PERMIT RENEWAL FOR MINOR MUNICIPAL

FACILITY CONTACT

Mayor:	Bruce Higley
Person Name:	Dustin Palmer, Public Works Director
Position:	Public Owned Treatment Works Operator
Organization:	Plain City Corporation
Mailing Address:	4160 West 2200 North
Telephone:	Office (801) 731-4908
	Cell (801) 645-0393

DESCRIPTION OF FACILITY

This facultative lagoon sewer system was built and came into operation in 1970 and serves the community of Plain City which is located west of Ogden in Weber County. The treatment facility consists of a comminutor, followed by a six cell facultative lagoon system with two primary cells and a total surface area of 35 acres. Disinfection is accomplished with chlorination that includes three concrete tanks that serve as mixing basins. A V-notch weir is at the outfall of the basins and is used to measure the flow. A Reconnaissance Inspection was conducted on August 5, 2014 and the primary and secondary cells appeared healthy and the entire lagoon system is well maintained. The Design flow is 1.75 million gallons a day (mgd) with a monthly maximum of 1.0 mgd. Based on a review of the past 5 years of data provided in discharge monitoring reports the average monthly flow has been 0.27 mgd with a maximum peak flow during that time of 1.64 mgd. Plain City has a population of approximately 5,500 people.

The influent enters though a head works structure with an electronic flow meter before entering the lagoon system. The lagoon system is operated in two parallel tracks with three cells each. After exiting the lagoon system the tracks are comingled into a seven acre polishing wetland and then proceeds to a chlorine contact chamber if the system is discharging. If the system is discharging required sampling is conducted at a weir from a platform at the end of the chlorine contract chamber.

Two types of aeration systems are employed on the South track. 50 "Poo-Gloos" are installed in South track cell 2. These structures look like igloos. They are five feet high, and are six feet in diameter. They have multiple layers of surface area, with a high surface to volume area with packing material between the layers. The PVC pipe provides more media for bacteria in very small places to treat the wastewater. To accomplish this, the bacteria need a lot more oxygen, which is provided with forced air that produces massive amounts of very tiny bubbles that flow in and around the PVC pipe. This was the first system in the nation to have this system installed.

In addition, the operator has installed modified aeration culverts in South track cell 1 with 154 and South track cell 3 with 13. Both the Poo-Gloos and the aeration culverts are intended to aerate the cell to increase dissolved oxygen and aid in release of volatile compounds. Expansion plans call for a possible installation of a bar screen at the head works.

DESCRIPTION OF DISCHARGE

The Plain City lagoon system has one discharge point named 001. Outfall 001 is where all samples of the effluent are taken for the monitoring requirements. The outfall is located at latitude 41° 18' 38" and longitude 112° 06' 05". Discharge monitoring report (DMR) data for the past 5 years shows 15 effluent limitation (see Discharge Monitoring Results section) violations for TSS, BOD_5 and pH. Four of these violations are categorized as serious violations for exceeding the effluent limitation by 40% or more. However, since many of these exceedances span over a number of years for each constituent no notices of violation have been issued to the facility. This is in large part to the facility operators responding promptly to these exceedances.

STREAM CLASSIFICATION

The discharge flows into a drainage ditch, then Dix Creek, First Salt Creek, Harold S. Crane Waterfowl Management Area and finally into Willard Spur of the Great Salt Lake. The drainage ditch is Class 2B and 3E, according to Utah Administrative Code (UAC) R317-2-13.10 (a).

> Class 2B – Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.
>
> Class 3E - Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.

The Dix Creek presumptive designated beneficial uses are Class 2B and 3D, according to Utah Administrative Code (UAC) R317-2-13.13.

> Class 3D – Protected for waterfowl, shore birds and other water oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.

BOD_5 AND TSS ALTERNATIVE DISCHARGE & 85% REMOVAL LIMITATIONS

On October 26, 2001, the City applied to the Utah Water Quality Board (Board) for the alternate discharge limitations under R317-1-3.2.G., that allows lagoon systems to discharge higher BOD_5 and TSS concentrations (45 mg/l monthly average, 65 mg/l weekly average limitations) if the lagoon system meets 5 criteria. The Board minutes from January 18, 2001, state the petition was unanimously approved and these concentrations were incorporated August 1, 2002 into the City's UPDES permit.

On March 20, 2015, the Plain City Corporation (City) applied for exemption from the permit limitations for 85% removal of BOD_5 and total suspended solids (TSS). The 85% removal exemption was granted by the Director of the Division of Water Quality on April 17, 2015 and the limitation was removed as part of the 2015 permit renewal.

DISCHARGE MONITORING RESULTS

Below is the DMR data for the past 5 years of effluent limitation exceedances for TSS, BOD_5 and pH. Four of these violations are categorized as serious violations for exceeding the effluent limitation by 40% or more. However, since many of these exceedances span over a number of years for each constituent no notices of violation have been issued to the facility. This is in large part to the facility operators responding promptly to these exceedances.

Monitoring Period Ending		Maximum 7 Day Average		Maximum 30 day average	
BOD, 5-day, 20 deg. C					
	Limit	65		45	
	9/30/2010	86.6	mg/L	86.6	mg/L
	7/31/2011	60.2	mg/L	47.05	mg/L
	7/31/2012	75.9	mg/L	75.9	mg/L
pH		MINIMUM		MAXIMUM	
	Limit	5.0		9.0	
	4/30/2010	9.1	SU	9.1	SU
	7/31/2011	9.27	SU	9.27	SU
	7/31/2012	9.32	SU	9.32	SU
	6/30/2013	9.35	SU	9.35	SU
	4/30/2014	9.33	SU	9.33	SU
Total Suspended Solids (TSS)					
		Maximum 7 Day Average		Maximum 30 day average	
	Limit	65		45	
	9/30/2010	83	mg/L	83	mg/L
	7/31/2011	62.3	mg/L	58	mg/L
	7/31/2012	71.4	mg/L	71.4	mg/L

BASIS FOR EFFLUENT LIMITATIONS

The maximum monthly average flow limitation is based off the November 1997 *Comprehensive Performance Evaluation and Composite Correction Plan Results* for Plain City Corporation report and the daily maximum is based off the waste load analysis (WLA). Limitations on total suspended solids (TSS), biochemical oxygen demand (BOD_5), *E. coli* bacteria, pH and percent removal requirements are based on current Utah Secondary Treatment Standards, *Utah Administrative Code R317-1-3.2.* Limitations on total residual chloride are based on current

Utah Numeric Criteria for Aquatic Wildlife (Table 2.14.2) Standards, *Utah Administrative Code R317-2*. The WLA (attached) indicates these limitations should be sufficiently protective of water quality, in order to meet State water quality standards in the receiving waters. The flow, monitoring and reporting requirements are based on the Utah Division of Water Quality guidelines of December 1991.

Effluent Limitations

Parameter	Effluent Limitations[1]			
	Maximum Monthly Average	Maximum Weekly Average	Daily Minimum	Daily Maximum
Flow, mgd	0.6			0.9
BOD_5, mg/L	45	65		
Total Suspended Solids (TSS), mg/L	45	65		
E. coli, No./100mL	126	158		
pH, Standard Units			6.5	9.0
Dissolved Oxygen, mg/L			5.0	
Oil & Grease, mg/L				10
Total Residual Chlorine, mg/L				
Summer (Jul-Sep)				1.5
Fall (Oct-Dec)				0.5
Winter (Jan-Mar)				0.3
Spring (Apr-Jun)				0.5

[1] See Definitions, *Part VI*, for definition of terms.

SELF-MONITORING AND REPORTING REQUIREMENTS

The following influent and effluent self-monitoring requirements include some additions from the previous permit. Monitoring for total phosphorus, orthophosphate, total kjeldahl nitrogen, nitrate-nitrite, and ammonia are required in accordance with *UAC R317-1-3.3.D*. Reports shall be submitted monthly on DMR forms, and are due 28 days after the end of the monitoring period.

Influent Self-Monitoring and Reporting Requirements[1]			
Parameter	Frequency	Sample Type	Units
Total Flow[2]	Continuous	Recorder	mgd
BOD_5 [2]	Monthly	Grab	mg/L
TSS[2]	Monthly	Grab	mg/L
Total Phosphorus (as P)[3]	Monthly	Composite[4]	mg/L
Total Kjeldahl Nitrogen (as N)[3]	Monthly	Composite[4]	mg/L

Effluent Self-Monitoring and Reporting Requirements[1]			
Parameter	Frequency	Sample Type	Units
Total Flow[2]	Continuous	Recorder	mgd
BOD_5 [2]	Monthly	Grab	mg/L
TSS[2]	Monthly	Grab	mg/L
E. coli	Monthly	Grab	No./100mL
pH	Monthly	Grab	SU
Dissolved Oxygen	Monthly	Grab	mg/L
Oil & Grease[5]	Monthly	Grab	mg/L
Total Residual Chlorine	Monthly	Grab	mg/L
Total Phosphorus (as P)[3]	Monthly	Composite[4]	mg/L
Orthophosphate (as P)[3]	Monthly	Composite[4]	mg/L
Ammonia (as N)[3]	Monthly	Composite[4]	mg/L
Nitrate-Nitrite (as N)[3]	Monthly	Composite[4]	mg/L
Total Kjeldahl Nitrogen (as N)[3]	Monthly	Composite[4]	mg/L

[1] See Definitions, *Part VI*, for definition of terms.
[2] Influent samples and the influent flow shall be monitored and measured at the same frequency as the effluent samples and the effluent flow.
[3] Monitoring of these parameters shall be conducted and begin in accordance with R317-1-3.3.D.
[4] Composite samples shall be 24 hour composites collected by use of an automatic sampler or minimum of four grab samples collected a minimum of two hours apart.
[5] Sample only if a sheen is observed.

STORM WATER REQUIREMENTS

Wastewater Treatment Facilities, which includes Lagoon Systems, are required to comply with storm water permit requirements if they meet one or both of the following criteria,

- waste water treatment facilities with a design flow of 1.0 MGD or greater, and/or,
- waste water treatment facilities with an approved pretreatment program as described in *40CFR Part 403,*

The Plain City Lagoon system does not meet either of the criteria and therefore no storm water requirements are included in the permit. A storm water re-opener provision is included in the permit should storm water requirements be needed in the future.

PRETREATMENT REQUIREMENTS

The permittee has not been designated for pretreatment program development because it does not meet conditions which necessitate a full program. The flow through the plant is less than five (5) MGD, there are no categorical industries discharging to the treatment facility, industrial discharges comprise less than 1 percent of the flow through the treatment facility, and there is no indication of pass through or interference with the operation of the treatment facility such as upsets or violations of the POTW's UPDES permit limits.

Although the permittee does not have to develop a State-approved pretreatment program, any wastewater discharges to the sanitary sewer are subject to Federal, State and local regulations. Pursuant to *Section 307* of the *Clean Water Act*, the permittee shall comply with all applicable Federal General Pretreatment Regulations promulgated, found in *40 CFR 403* and the State Pretreatment Requirements found in *UAC R317-8-8.*

An industrial waste survey (IWS) is required of the permittee as stated in Part II of the permit. The IWS is to assess the needs of the permittee regarding pretreatment assistance. The IWS is required to be submitted within sixty (60) days after the issuance of the permit. If an Industrial User begins to discharge or an existing Industrial User changes their discharge the permittee must resubmit an IWS no later than sixty days following the introduction or change as stated in Part II of the permit.

It is recommended that the permittee perform an annual evaluation of the need to revise or develop technically based local limits for pollutants of concern, to implement the general and specific prohibitions *40 CFR, Part 403.5(a)* and *Part 403.5(b)*. This evaluation may indicate that present local limits are sufficiently protective, need to be revised or should be developed. It is recommended that the permittee submit for review any local limits that are developed to the Division of Water Quality for review.

BIOMONITORING REQUIREMENTS

As part of a nationwide effort to control toxic discharges, biomonitoring requirements are being included in permits for facilities where effluent toxicity is an existing or potential concern. In Utah, this is done in accordance with the *State of Utah Permitting and Enforcement Guidance*

Document for Whole Effluent Toxicity (WET) Control (biomonitoring). Authority to require effluent biomonitoring is provided in *Permit Conditions, UAC R317-8-4.2, Permit Provisions, UAC R317-8-5.3* and *Water Quality Standards, UAC R317-2-5* and *R317 -2-7.2.*

The permittee is a minor municipal intermittent discharger that will be contributing a small volume of effluent when compared to the existing receiving waters, in which toxicity is not likely to be present. Based on these considerations, and the fact that there are no present or anticipated industrial users on the system, there is no reasonable potential for toxicity in the permittee's discharge *(per State of Utah Permitting and Enforcement Guidance Document for WET Control).* As such, there will be no numerical WET limitations or WET monitoring requirements in this permit. However, the permit will contain a toxicity limitation re-opener provision that allows for modification of the permit should additional information indicate the presence of toxicity in the discharge.

BIOSOLIDS (SEWAGE SLUDGE) DISPOSAL REQUIREMENTS

The State of Utah has adopted the 40 CFR 503 federal regulations for the disposal of sewage sludge (biosolids) by reference. However, since this facility is a lagoon, there is not any regular sludge production. Therefore 40 CFR 503 does not apply at this time. In the future, if the sludge needs to be removed from the lagoons and is disposed in some way, the Division of Water Quality must be contacted prior to the removal of the sludge to ensure that all applicable state and federal regulations are met

SUBSTANTIVE PERMIT CHANGES

Flow effluent limitations and seasonally based total residual chlorine limitations were added during this permit renewal. In addition, monitoring for total phosphorus, orthophosphate, total kjeldahl nitrogen, nitrate-nitrite, and ammonia are required in accordance with *UAC R317-1-3.3.D.* Last, the 85% percent removal of BOD_5 and TSS were removed as treatment standards as discussed above.

PERMIT DURATION

It is recommended that this permit be effective for duration of five (5) years from the date of issuance.

Drafted by Ken Hoffman, P.E. 801-536-4313 (kenhoffman@utah.gov)
Mike Herkimer – WET
Jennifer Robinson – Pretreatment
Nicholas von Stackelberg, P.E. – Wasteload Analysis
Mike George – Stormwater
Dan Griffin, P.E. - Biosolids

Division of Water Quality
May 8, 2015

PUBLIC NOTICE

Began: January 17, 2015
Ended: February 17, 2015
Public Noticed in the Ogden Standard Examiner.

Comments Received: During the public comment period it was discovered incorrect flow values were used for the waste load analysis. Due to this oversight the waste load was reevaluated and the effluent discharge limitations in the permit were adjusted. In addition, monitoring requirements were added based on the requirements of *UAC R317-1-3.3.D.* Due to these changes being significant the permit was put out to public notice a second time.

Began: August 21, 2015
Ended: September 21, 2015
Public Noticed in the Ogden Standard Examiner.

Comments Received:

During the public comment period provided under R317-8-6.5, any interested person may submit written comments on the draft permit and may request a public hearing, if no hearing has already been scheduled. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing. All comments will be considered in making the final decision and shall be answered as provided in R317-8-6.12.

No comments were received during the public notice period; therefore the permit is the same as the public notice draft.