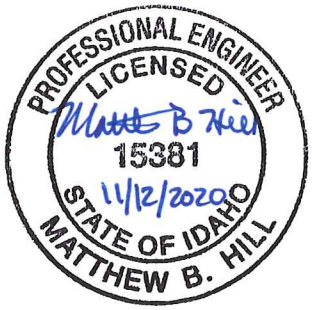
WASTEWATER FACILITIES PLANNING STUDY
PHOSPHORUS UPDATE
LAND APPLICATION AMENDMENT
FOR THE

CITY OF ABERDEEN



NOVEMBER 2020
KA PROJECT #: 216103-000

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EXECUTIVE SUMMARY

This Wastewater Facilities Planning Study (WWFPS) amendment presents an additional alternative to help the City of Aberdeen (City) address future phosphorus upgrades required as part of the City's NPDES permit. This new alternative is a wastewater reuse land application system and winter storage lagoon. The background information presented in the WWFPS dated June 17, 2019 is still relevant to this amendment and therefore is not repeated herein. Instead, the report addresses how a land application system and winter storage lagoon would work for the City, and the design criteria and other pertinent considerations are provided.

LAND APPLICATION ALTERNATIVE SUMMARY

Alternative 6 – Land Application System and Winter Storage Lagoon addresses the City's need to comply with the impending stringent phosphorus limits by ceasing to discharge treated wastewater into Hazard Creek and instead discharge the treated wastewater on a 182-acre land application/irrigation system. As part of this project, a 69.2 million gallon (MG) winter storage lagoon will be constructed to store wastewater during the non-irrigation season. Assuming a 10-foot water depth, the lagoon and required buffer will require a total of approximately 23-28 acres, depending on the topography and lithology of the lagoon site. A transfer pump station will pump the wastewater from the City's Wastewater Treatment Plant (WWTP) to the newly constructed lagoon, and an irrigation pump station will pump the stored water from the lagoon to the irrigation pivots. The fields required for irrigation will be leased through a long-term lease by the City from Simplot, and the area required for the lagoon will either be leased to the City by Simplot or be purchased from a nearby landowner.

The City will need to obtain a municipal reuse permit, which DEQ has already stated could be done. The proposed pivots are currently permitted for land application by Simplot under an industrial permit. The City's permit would require a sampling program consisting of wastewater, groundwater, soil, and crop tissue sampling. Groundwater monitoring wells are already in place since the fields have previously been used by Simplot for land application under their industrial wastewater reuse permit.

In addition to the land application system, the project will entail improved thickening and dewatering facilities for improved solids handling at the WWTP. The improved thickening will enable the City to transition to a biosolids land application system in the future.

FINANCIAL ANALYSIS

The improvements will be funded by a combination of grants and a loan. The City has already received a $11,000,000 loan offer from DEQ. Additional funding sources include USDA-Rural Development, Idaho Department of Commerce Community Development Block Grant (CDBG), and US Army Corps of Engineers (USACE). Expected annual loan repayments and monthly user rate increases necessary to repay these loans are provided in the report.

Table 1 Opinion of Probable Cost

Item	Cost	Monthly User Rate Increase
Alternative 6 – Land Application System and Winter Storage Lagoon	$ 9,203,000	$32.21 - $43.20

IMPLEMENTATION SCHEDULE

Table 2 contains the proposed schedule to implement the alternative.

Table 2 Preliminary Project Schedule

Event	Date
Obtain Funding*	March 1, 2021
Environmental Approval	October 2022
Bond Election/Judicial Confirmation	May or Nov. 2021 / Anytime for Jud. Conf.
Progress Report on Preliminary Design*	March 1, 2022
Complete Preliminary Design Report*	September 1, 2022
DEQ Review PER	October 2022
Complete Final Design*	September 1, 2023
DEQ Review Final Design	October 2023
Award Bid for Construction*	March 1, 2024
Begin Construction	May 2024
Construction Substantially Complete*	September 1, 2025
Cease Discharging into Hazard Creek*	February 1, 2026

** denotes items specified in NPDES Permit compliance schedule*

INTRODUCTION & BACKGROUND

BACKGROUND

This amendment proposes a new and preferred alternative for the City of Aberdeen's Wastewater Facilities Planning Study (WWFPS) Phosphorus Update. The WWFPS detailed alternatives for upgrading the City's Wastewater Treatment Plant (WWTP) to help the City meet impending stringent phosphorus loading limits. Upon completion of the WWFPS in June 2019, the City's preferred alternative was Alternative 3 Biological Phosphorus & Ammonia Removal with Chemical Precipitation & Tertiary Filtration. The City then set about arranging funding to be able to move forward with implementing Alternative 3.

In late Fall of 2019, the City expressed interest after discussions with an industrial landowner, Simplot, in exploring the feasibility of converting the WWTP discharge from a point source discharge to a municipal reuse land application system. Doing so would simplify the treatment process upgrades required at the WWTP, and would minimize the risk and expense of needing to do future upgrades should discharge permit limits continue to become more stringent. Interest from Simplot in leasing land to the City that was previously used as an industrial wastewater reuse Management Unit (MU) brought the potential costs of this alternative down from what they would be if the City had to purchase the land outright, thereby making this an attractive alternative for the City. Preliminary talks with DEQ about converting an industrial wastewater reuse MU into a municipal wastewater reuse MU have been positive, making this alternative appear to be feasible from a regulatory approval standpoint. This amendment outlines the environmental, technical, regulatory, and financial elements of this new land application alternative.

This amendment uses flow data from August 2017 through July 2020, while the WWFPS used data from 2014 through 2017. This new data set shows average flows slightly lower than the previous data set, and phosphorus loading significantly lower than the previous data set. It is believed that these lower values are a result of better managed indirect discharges from the potato fresh pack facilities.

REPORT ORGANIZATION

This amendment is intended to be supplemental to the 2019 WWFPS. Therefore, Chapters 1 through 4 from the WWFPS which provide a detailed introduction to the report, present the environmental and socio-economic context, detail the existing facilities, demands, and loading, and explain the need for the project are still relevant and are not repeated in this amendment. This amendment will begin with Chapter 5 Improvement Alternatives Considered and progress through Chapter 8 Conclusions and Recommendations, addressing only the new land application alternative and how it compares to the other previously generated alternatives.

CHAPTER 5 IMPROVEMENT ALTERNATIVES CONSIDERED

This section discusses only the new alternative being presented in this amendment, *Alternative 6 Land Application System and Winter Storage Lagoon*. Alternatives 1 through 5 are explained in detail in the WWFPS completed in June 2019.

Removing nutrients such as nitrogen (e.g., ammonia) and phosphorus in a mechanical treatment plant require advanced levels of wastewater treatment (typically referred to as tertiary treatment) and rely on complex biological processes. By applying secondary treated wastewater to crops, the plants evapotranspirate the water and uptake the nutrients, which are in turn removed from the system by harvesting the crop. The design criteria and preliminary design calculations for this alternative are presented below. The improvements will be designed in accordance with IDAPA 58.01.16 Wastewater Rules, IDAPA 58.01.17 Recycled Water Rules, and DEQ's Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater.

5.1 IMPROVEMENT ALTERNATIVE 6 – LAND APPLICATION SYSTEM AND WINTER STORAGE LAGOON

5.1.1 Description

This alternative entails ceasing the discharge of secondary treated wastewater into Hazard Creek, and instead using the water in a reuse land application system to irrigate crops. The WWTP will remain as currently configured, and the effluent will be pumped via a transfer pump station to an HDPE lined lagoon, which will act as a winter storage lagoon during the nongrowing seasons from November through March and as an equalization basin during the irrigation season from April through October. From the lagoon, the water will be disinfected with chlorine and an irrigation station will pump the reuse water to existing pivot irrigation systems for land application.

The City will also install sludge thickening and dewatering equipment as part of this alternative. A detailed discussion of the need for improved solids handling was provided in the WWFPS.

5.1.2 Design Criteria

Table 5-1 shows the design criteria, variables, and values used in estimating the required land area, lagoon volume, and thickening and dewatering improvements. The total land application area required is sized based on maximum hydraulic and nutrient loading, per IDAPA 58.01.17, and the winter storage lagoon volume is sized based on five months of storage. A 30-year planning period was used for estimating future hydraulic and phosphorus loading because, according to the City, that was their preferred length of time for the land application area lease agreement.

Table 5-1 Land Application System Design Criteria

Parameter	Unit	Value
Planning Horizon	years	30
Population Projection (2050)	No.	2702
Annual Ave. Flow (2020)	mgd	0.253
Annual Ave. Flow (2050)	mgd	0.342
Months of Storage	No.	5
Maximum Storage Volume	MG	68
Phosphorus Concentration (2020)	mg/L	3.20
Phosphorus Loading (2020)	lbs/d	6.76
Phosphorus Loading (2050)	lbs/d	9.13
TKN + Nitrate/Nitrite Concentration	mg/L	9.43
Total Dissolved Solids (TDS)	mg/L	696
Fixed Dissolved Solids (FDS)	mg/L	556
Maximum Leaching Requirement - Alfalfa	%	15
Maximum Leaching Requirement - Wheat	%	11
Alfalfa Yield	tons/acre	4.67
Alfalfa Phosphorus Uptake	lbs/ton	5.13
Alfalfa Nitrogen Uptake	lbs/ton	50.4
Wheat Grain Yield	tons/acre	2.23
Wheat Grain Phosphorus Uptake	lbs/ton	7.92
Wheat Straw Yield	tons/acre	2.97
Wheat Straw Phosphorus Uptake	lbs/ton	1.33
Wheat Nitrogen Uptake	lbs/ton	40
Corn Silage Yield	tons/acre	18.8
Corn Silage Phosphorus Uptake	lbs/ton	1.81
Corn Silage Nitrogen Uptake	lbs/ton	10.0
WAS Thickening	% solids	4%
Solids Retention Time	days	60
Sludge Dewatering	% solids	15%

5.1.3 Site Plan

The proposed site plan is shown in Figure 5-1. Buffers for the land application site and the winter storage lagoon are taken from Table 6-4, Scenario G in the guidance manual based on treating to a Class C effluent. A detailed breakdown of the plan is provided in Section 7.2.

Table 5-2 Buffer Distances

Parameter	(ft)
Lagoon to Residential Property Lines	200
Lagoon Bottom to Groundwater	2
Lagoon Bottom to Bedrock	2
Land App Site and Inhabited Dwellings	300
Land App Site and Areas Accessible to Public	0
Land App Site and Private Drinking Water Wells	500

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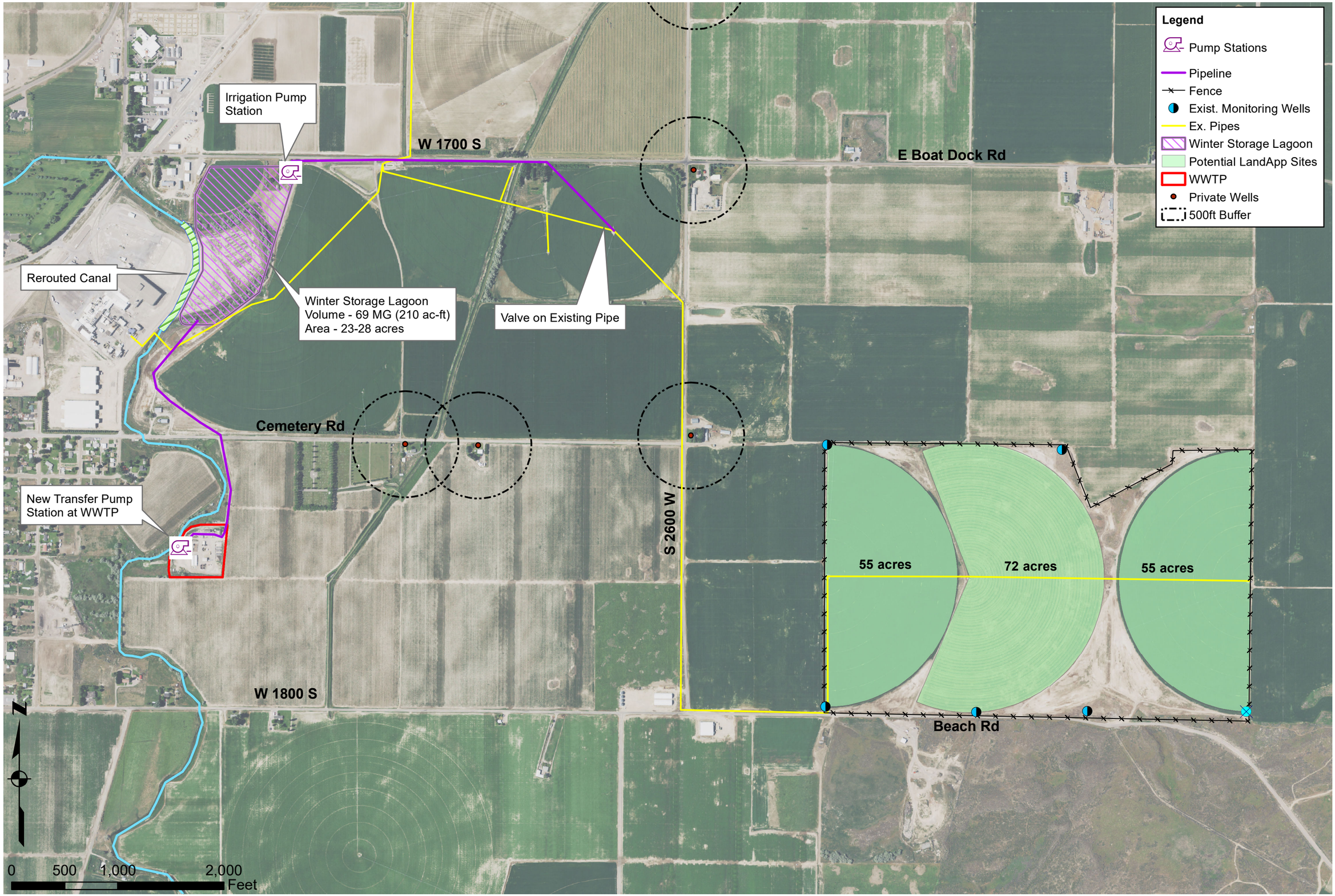

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PROJECT NO. 216103-000

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ABERDEEN

WWTP PHOSPHORUS STUDY

ALT. 6 - LAND APPLICATION

FIGURE NO.
5-1

5.1.4 Environmental Impacts

By ceasing to discharge into Hazard Creek, this alternative will reduce the creek's seasonal flows by a minimal amount, while simultaneously eliminating the discharge of nutrients to the creek and into American Falls Reservoir.

During the City's discussions of this alternative with DEQ and Simplot, it was mentioned that the groundwater in the vicinity of Simplot's existing MUs may have a high concentration of contaminants due to its history as an industrial land application site, and that irrigating with low strength municipal reuse water could actually dilute the constituents in the groundwater, thereby improving the quality of groundwater in the immediate area.

5.1.5 Land Requirements

This alternative has a large land requirement. 154 acres minimum are required for the land application site, and approximately 23-28 acres are required for the winter storage lagoon, which includes the stored water surface area and buffer. The actual size will depend on the lithology of the lagoon site, the lagoon depth, and the design of the lagoon.

5.1.6 Potential Construction Problems

The primary construction issue associated with this alternative is construction of the lagoon. The City has been discussing obtaining land on both sides of Hazard Creek from Simplot. Constructing the lagoon there would require rerouting Hazard Creek. The canal company has indicated that they would be willing to complete this work as a maintenance activity to improve the drainage capability. Additionally, building the lagoon so close to the creek would require embankments above the 500-yr flood elevation to protect the lagoon from flood events.

5.1.7 Sustainability Considerations

Water and Energy Efficiency –This alternative is the most sustainable of the six alternatives because it treats the wastewater and nutrients as a resource rather than a source of pollution. Due to salts (i.e., ions) in the wastewater, a small amount of leaching (irrigation with another water source under than treated municipal wastewater) will be required to prevent salt buildup in the rootzone. Aside from this leaching and practical irrigation application efficiencies and uniformity, the water will be used for growing crops, leading to an extremely high sustainability rating.

This alternative will use more energy than the WWTP is currently using due to the transfer pump station and irrigation pump station, but is not anticipated to use more energy than the other alternatives, which require significant pumping due to recycle flows.

Green Infrastructure – This alternative qualifies as green infrastructure due to the reuse of existing irrigation equipment and the reuse of wastewater and nutrients for agricultural production.

Other – This process requires additional Operator licensure for Land Application systems. However, the level of training required to obtain this license is significantly less than the level required to operate a WWTP with tertiary treatment. The Operator(s) of the Land Application System will have the additional responsibility and time requirement

of managing the additional pump stations and pivot operation than is currently required. It is estimated that 20% to 40% of an additional full-time equivalent Operator will be required to take care of the additional pump stations, pivots, thickening, and dewatering equipment.

5.1.8 Costs Estimates

The construction cost associated with this alterative (including mobilization, contingency, and contractor overhead & profit) is approximately $7,466,000, and the non-construction costs include engineering design, construction management services, and funding administration totals approximately $1,737,000. This yields a total project cost of $9,203,000. A detailed breakdown of these costs is included in the appendix.

Annual O&M costs will increase because of the additional pump stations, pivots, and heating and cooling of the solids handling building, but the additional time maintaining the thickening and dewatering equipment will be offset by the Operator's time saved by not having to handle the dewatering bags and rotate the sludge with the front loader for air drying. The increase in annual O&M is estimated to be $58,000, which includes energy costs, sampling lab costs, and time required for sample collection and maintenance related to the land application system. See Table 5-3.

Table 5-3 O&M Costs

Item	Cost
Energy Costs	$14,766
Additional Employee Cost	$32,000
Annual Reuse Report Cost	$5,000
Annual Reuse Sampling	$6,744
Decrease in discharge sampling costs	$ (5,000)
Tipping Fee (sludge disposal)	$4,493
Total	**$58,003**

Additionally, the short-lived assets replacement costs would increase by $17,000 per year due to the additional pumps, controls, and HVAC equipment in the new pump stations. These costs and the impacts to users are shown in Table 5-4. The existing short-lived assets for the system are estimated to be $97,000 per year.

Table 5-4 Short-lived Assets

Item	Lifespan (years)	QTY	Replacement Cost (2020)	Total Cost	Annualized Replacement Cost
Transfer Station - Replace motors	15	3	$15,000	$45,000	$3,000
Transfer Station - Replace electrical and telemetry	20	3	$10,000	$30,000	$1,500
Irrigation Station - Replace motors	15	2	$15,000	$30,000	$2,000
Irrigation Station - Replace electrical and telemetry	20	2	$10,000	$20,000	$1,000
Pivot Repair - Replace drive motors, tires	15	5	$15,000	$75,000	$5,000
Thickener Motor & Drive Mechanisms	15	1	$10,000	$10,000	$667
Thickener Sludge Pump	15	2	$10,000	$20,000	$1,333
Dewatering Equipment	15	1	$20,000	$20,000	$1,333
Conveyer Motor & Drive Mechanisms	15	1	$15,000	$15,000	$1,000
Total Annual Contribution Needs (rounded)					$17,000
Total EDUs					927
User Cost Estimate for Short Lived Asset Replacement ($/month)					$1.53

CHAPTER 6 ALTERNATIVES ANALYSIS

In this chapter, the life cycle costs and non-monetary considerations of Alternative 6 are compared with Alternatives 1 through 4.

6.1 LIFE CYCLE COST ANALYSIS

The calculations used in the life cycle cost analysis were presented in the WWFPS. The analysis for each alternative is calculated using a planning period of 20 years and a real discount rate of 3%. Table 6-1 shows the life cycle costs of the alternatives.

Table 6-1 Life Cycle Costs of Alternatives

Cost Description	Alt 1 – BPR w/ Tertiary Filtration	Alt 2 – Tertiary Filtration	Alt 3 – BPR & Ammonia Removal w/ Tertiary Filtration	Alt 4 - Ammonia Removal w/ Tertiary Filtration	Alt 6 – Land Application
Construction & Non-Construction Cost	$7,349,000	$6,308,000	$9,383,000	$8,371,000	$9,203,000
Present Value (15-yr components)	$1,039,174	$917,221	$1,231,733	$1,109,779	$946,105
Present Value (1-yr components)	$2,307	$2,307	$2,307	$2,307	$2,307
Present Value of Annual O&M Costs	$4,774,117	$4,962,208	$4,916,267	$5,104,358	$4,946,402
Net Present Value	$13,164,599	$12,189,735	$15,533,307	$14,587,444	$15,097,813

From the table it is evident that Alternative 2 has the least capital cost and present value of the four alternatives.

6.2 NON-MONETARY FACTORS

The primary non-monetary factors of importance to the City are the risk of incurring more WWTP upgrade costs in the future due to future changes in discharge permit limits, and the level of maintenance and mechanical and operator training required with the alternatives. Alternatives 1 through 4 all have concerns with future limits and operational requirements.

Alternative 6 has the lowest level of complexity and one of the lowest O&M costs, as there are no tertiary treatment processes involved, and maintaining pump stations and pivots are relatively simple compared with maintaining biological and chemical phosphorus removal system. Additionally, reusing the water and nutrients for agricultural purposes is the most sustainable solution, as it converts a potential source of pollution into a valuable resource.

CHAPTER 7 RECOMMENDED IMPROVEMENT ALTERNATIVES

7.1 RECOMMENDED ALTERNATIVE – ALTERNATIVE 6 LAND APPLICATION AND WINTER STORAGE LAGOON

The City's preferred alternative is Alternative 6 – Land Application and Winter Storage Lagoon. This alternative was chosen by the City because it reduces the risk of having to implement more upgrades to the WWTP in the future due to increasingly stringent discharge permit limits, and it does not add a high level of complexity to the WWTP such as would occur with tertiary treatment and phosphorus removal. Additionally, due to land and equipment donations by Simplot, the costs for implementing this alternative are considerably less than they would be if the City had to purchase the required land and equipment.

7.2 PRELIMINARY PROJECT DESIGN

The preliminary site plan for this alternative is shown in Figure 5-1. With this alternative the mechanical treatment plant will continue its current operation, treating the wastewater to a Class C (<23 CFU/100 ml). After the plant's UV reactor disinfection process, the disinfected wastewater will be pumped via a transfer pump station to a winter storage lagoon. The transfer station will be designed with duplex or triplex pumps operating in an alternating and lead/lag configuration. The pumps shall be capable of conveying the peak flows with the largest pump out of service (IDAPA 58.01.16.440), and will operate continuously via a variable frequency drive (VFD) and level control loop so as to minimize the size of the wet well at the WWTP.

The winter storage lagoon shall be designed to accommodate five months of storage so that operators do not have to irrigate in the coldest months of November through March when the freezing of irrigation pivots is most likely. The storage lagoon will be HDPE lined and include ballasts, air vents, and escape ladders. The City is in negotiations with Simplot to obtain land located along both sides of Hazard Creek for the winter storage lagoon. Use of this land would necessitate rerouting Hazard Creek, which would be done Aberdeen-Springfield Canal Company, who has agreed to cover the costs and efforts of rerouting the canal as a maintenance activity. If this alternative does not prove feasible, the City is prepared to lease or purchase land from other land owners in the area. The winter storage lagoon will have a volume of approximately 210 acre-feet (ac-ft), or 69.2 MG, which assuming a water depth of 10 feet will equate to approximately 23 to 28 total disturbed acres once freeboard, access roads, and embankments are included.

During the irrigation season, an irrigation pump station located at the storage lagoon will pump directly to the existing irrigation pivots. The irrigation pump station will have duplex pumps operating in an alternating configuration, and have chlorine injection on the discharge side of the pumps. The pumps will be selected to match the maximum irrigation application rate of the existing irrigation pivots.

The irrigated areas for the reuse water will be located on agricultural land leased from Simplot that was historically used for industrial wastewater land application and referred to as the Knudsen site. Agricultural crops will likely be alfalfa alternated every 5-7 years with silage corn or spring wheat for livestock feed. Wheat has a lower phosphorus uptake per acre than alfalfa, and therefore requires a larger area to uptake the total phosphorus applied. Silage corn is higher than wheat but lower than alfalfa. The total acreage required for growing wheat, assuming both the grain and straw are harvested and removed from site, is 154 acres. The total irrigated area shown in Figure 5-1 is approximately 182 acres. The irrigation rate will be

calculated based on the irrigation water requirement of the crops, leaching requirements for management of salts in the soil, and maximum nutrient uptake rates calculated from DEQ's *Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater*. Supplemental irrigation water will be applied to the crop to properly manage the crop water and leaching requirements.

The City will follow a sampling program as dictated by a municipal MU permit. The sampling program will entail wastewater samples, supplemental water samples, crop tissue samples, soil samples, and groundwater samples. For reuse water sampling, the groundwater monitoring wells are already in place and are shown on Figure 5-1. All pump stations will be equipped with SCADA systems and digital flow meters to be able to accurately monitor operation and flows for flow reporting.

Similar to the alternatives presented in the WWFPS, the City still has a need for improved sludge dewatering. Additionally, the City has expressed interest in transitioning to land application of biosolids, which, as explained in the WWFPS, requires thickening facilities to obtain the solids retention time (SRT) required for Class B biosolids. The existing maintenance building will be modified or replaced to accommodate new thickening and dewatering equipment. The thickening and dewatering can be accomplished via a single belt filter press equipped with a gravity belt thickener, or can be accomplished with separate thickening and dewatering facilities, such as a gravity belt thickener and screw press. For purposes of cost estimating in the study, a gravity belt thickener and belt filter press will be used. The WAS will be sent to the thickener for thickening before being pumped to the digesters, and the sludge, post-digestion, will be pumped to the dewatering equipment by the existing progressive cavity sludge pump before being loaded into a truck via a conveyer. The loaded truck can either drive directly to a land application site or dump the dewatered solids on the drying beds for further drying.

To be eligible for USDA Rural Development funding the facilities must be designed to be protected from the 500-year flood. All existing processes that were part of the 2012 upgrade were designed to this flood elevation. Therefore, these upgrades will also be designed to withstand a 500-year flood event.

The preliminary sizing of the various process elements described above are shown in Table 7-1.

Table 7-1 New Component Sizing

Equipment	Units	Size
Irrigated Area	acres	182
Winter Storage Lagoon	MG	69.2
Transfer Station	gpm	1,000
Irrigation Pump Station	gpm	Combined pivot maximum flow rate
Thickener	gpm	50
Dewatering	gpm	10

7.3 PROJECT SCHEDULE

The timeline to implement system improvements is driven by the compliance schedule in the NPDES permit, which is summarized in Table 7-2. However, the true schedule will likely be more aggressive than that shown so that the City can be ahead of the deadlines. All necessary lease agreements and permits will need to be thoroughly discussed with the respective parties and agencies prior to beginning design, and will need to be finalized prior to starting construction.

Table 7-2 Preliminary Project Schedule

Event	Date
Obtain Funding*	March 1, 2021
Environmental Approval	October 2022
Bond Election/Judicial Confirmation	May or Nov. 2021 / Anytime for Jud. Conf.
Progress Report on Preliminary Design*	March 1, 2022
Complete Preliminary Design Report*	September 1, 2022
DEQ Review PER	October 2022
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DEQ Review Final Design	October 2023
Award Bid for Construction*	March 1, 2024
Begin Construction	May 2024
Construction Substantially Complete*	September 1, 2025
Cease Discharging into Hazard Creek*	February 1, 2026

** denotes items specified in NPDES Permit compliance schedule*

7.4 PERMIT REQUIREMENTS

A Municipal Reuse Permit will need to be obtained from DEQ prior to using the land application system. Coordination with Simplot's existing industrial permit will be required.

7.5 ORGANIZATIONAL AND STAFFING REQUIREMENTS

The recommended alternative will require that an operator with a wastewater treatment license for land application (WWTLA). The operator will need to have a basic understanding of irrigation scheduling, but will likely coordinate irrigation efforts with the farmer contracted to grow the crops. The operator will need to implement a regular sampling program for the land application system, but the current discharge sampling required with the NPDES permit will mostly, if not entirely, be eliminated. The operator will need to perform routine O&M on the new transfer station, irrigation pump station, and the sludge handling equipment. Based on the increased O&M, it is highly recommended that the WWTP higher an additional part time employee to assist with the reuse irrigation systems, sampling, and perform routine maintenance on equipment.

7.6 TOTAL PROJECT COST ESTIMATE

The total construction costs of this alternative are estimated to be approximately $7,470,000, which includes equipment costs, contractor mobilization and overhead & profit, and a 20% contingency. Engineering, funding administration, and CMS are estimated at $1,737,000. The combined total project cost is approximately $9,203,000. A breakdown of the total cost estimate for this alternative is included in the appendix, along with short-lived assets and O&M costs.

7.7 FINANCING OPTIONS

Funding for the implementation of the system improvements may come from several sources. The City has already received a $11,000,000 loan offer from DEQ's State Revolving Fund with $154,516 principal forgiveness, but they will continue to pursue grants from entities including USDA-Rural Development, Idaho Department of Commerce (Community Development Block Grant Program, or CDBG), USACE, and Special Congressional Appropriations. A detailed description of these funding sources was provided in the WWFPS.

7.8 ANNUAL OPERATING BUDGET

The annual operating budget, O&M costs, debt repayment, reserves, and resulting user charges for the repayment of this loan are explained below.

Annual Revenue and O&M Costs – Aberdeen's 2017 annual revenue and O&M costs are explained in Section 5.1.8**Error! Reference source not found.**. This alternative will increase Aberdeen's annual short-lived asset replacement costs by approximately $17,000 and the annual O&M costs by approximately $58,000 due to sampling costs, staffing requirements, and electrical energy costs.

Anticipated User Charges and Debt Repayment – Wastewater rates should be set based upon the loan amounts that the system will receive plus the increase in operation and maintenance and short-lived asset costs. Table 7-3 shows the required annual loan repayments and the increase in monthly user billing rate necessary to meet this cost from user rates alone. The table shows two scenarios, both with CDBG grants of $500,000. The first scenario is a DEQ-SRF loan with $154,516 principal forgiveness, 30-year period at 1.75% interest. The second scenario is a USDA-RD grant of 25% and 75% loan for 30 years at 1.125% interest. The first scenario would rate user rates by $43.20/EDU/month, and the second scenario would raise user rates by around $32.21/EDU/month. In addition to raising user rates, it is recommended that the connection fee be increased 2-3% per year to keep up with inflationary changes.

Table 7-3 Funding Scenarios

Item	DEQ loan for 30 yrs @ 1.75% interest ($154,500 Principal Forgiveness)	USDA-RD loan for 30 yrs @ 1.125% interest (25% grant)
Total System Cost	$9,203,000	$9,203,000
CDBG Grant	$500,000	$500,000
Anticipated Grant/Principal Forgiveness	$154,516	$2,175,750
Loan	$8,548,484	$6,527,250
Annual Loan Payment	$368,694	$257,562
Annual Debt Service Reserve, 10%	$36,869	$25,756
Annual O&M Cost Increase	$58,003	$58,003
Short-lived Asset Reserve Increase	$17,000	$17,000
Total Annual Water System Cost	$480,566	$358,321
Current Monthly User Rate per EDU (927 EDUs)	$41.35	$41.35
Estimated User Rate Increase	$43.20	$32.21
New Monthly User Rate	$84.55	$73.56

7.9 PUBLIC PARTICIPATION

The City Council and Mayor will decide whether to pursue a bond election or judicial confirmation for this project. Should they choose a bond election, it is likely that the City will sponsor open house meeting(s) to educate the public on why this is their preferred alternative. If the City chooses to pursue judicial confirmation, they will vote on it at a City Council meeting and the citizens will have the opportunity to provide input at that time. Under both scenarios, it is recommended that the City seek legal counsel assistance who is familiar with Bond Elections or Judicial Confirmation process. The citizens of Aberdeen can obtain updated information on the alternatives, implementation efforts, easements, and public health and environmental issues related to the water system at the Aberdeen City Hall Public Works Department.

CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

This WWFPS amendment presented a new alternative to help the City of Aberdeen address future stringent phosphorus limits in their NPDES permit. The new alternative is *Alternative 6 – Land Application System and Winter Storage Lagoon*. This alternative eliminates the need to remove phosphorus and ammonia from the wastewater with advanced tertiary treatment techniques, and instead treats these components as nutrients that can be used for growing crops. Data from August 2017 through July 2020 was used to calculate current and projected future average wastewater flows and phosphorus loading. The 2020 average flow is 0.253 mgd, and the 2050 projected flow is 0.342 mgd, while the 2020 phosphorus loading is 6.76 lbs/day and the 2050 phosphorus loading is 9.13 lbs/day. The current flows and phosphorus loadings were lower than the values used in the WWFPS because of the observed decrease in slug discharges from the potato fresh pack facilities.

The alternative entails ceasing to discharge to Hazard Creek and instead pumping the treated wastewater to a winter storage lagoon and land application site. A transfer pump station will be installed after the disinfection process at the WWTP, and the wastewater will be pumped to a 23 to 28 acre HDPE lined winter storage lagoon with a 69.2 MG capacity. The lagoon will be constructed on land that is currently Simplot's but that will be leased to the City. The land currently straddles the Hazard Creek canal drain, but will be rerouted around the site by the Aberdeen-Springfield Canal Company.

The wastewater will be stored in the winter storage lagoon from November through March when irrigation is not practical due to freezing temperatures. During the irrigation season, an irrigation pump station will pump the stored water from the lagoons to 182 acres with existing irrigation pivots.

The WWTP will also install new sludge thickening and dewatering equipment for improved sludge handling. This new equipment will be housed in the existing maintenance building, which will need to be restored from its current condition.

The total project costs are anticipated to be approximately $9,203,000. Due to the two new pump stations owned by the City, and Simplot's irrigation pivots that the City will likely be need to maintain, the short-lived asset replacement costs are anticipated to increase by approximately $17,000 per year, and the O&M costs are anticipated to increase by $58,000.

The alternatives are likely to be funded partially by grant and loan. The City has already received a loan offer from DEQ for $11,000,000 with a $154,500 principal forgiveness. Grants may be possible through the USDA-Rural Development, Idaho Department of Commerce Community Development Block Grant (CDBG), or private funding. Expected annual loan repayments and monthly user rate increases necessary to repay two loan scenarios are provided in Section 7.8. Depending on loan offers, the increase in monthly user rate per EDU is estimated to range from $32.21 to $43.20.

Appendix

- Alternative 6 Cost Estimate

Alternative 6 - Land Application and Winter Storage Lagoon

Objective:

Use phosphorus and ammonia as fertilizer in wastewater land application. Improve solids handling with sludge thickening and dewatering.

Potential Issues:

Rerouting of Hazard Creek necessary for preferred siting of Winter storage Lagoon.

Assumptions:

Simplot leases ~182 acres of irrigated land, a booster irrigation pump station, irrigation pivots, and groundwater monitoring wells to the City.

General Line Items	Unit	Unit Price	Estimated Quantity	Cost
Lagoon - HDPE Lined	MG	$ 45,000	69.2	$ 3,114,000
Pump Station	LS	$ 300,000	2	$ 600,000
10-inch Pipe - Excavation, Backfill, Valves	LF	$ 70	6,400	$ 448,000
Electrical Power	LS	$ 40,000	1	$ 40,000
Road Crossing	EA	$ 5,000	1	$ 5,000
Canal Crossing	EA	$ 5,000	1	$ 5,000
Sludge Thickening and Dewatering	LS	$ 990,000	1	$ 990,000
SCADA Integration - Sludge Handling & Transfer Pump	LS	$ 50,000	1	$ 50,000
Fencing Land App Sites	LF	$ 5.00	13,800	$ 69,000
Total Direct Cost				***$ 5,321,000***
Mobilization (2%)	%	2%		$ 106,420
Contingency & Allowances (20%)	%	20%		$ 1,064,200
Subtotal				***$ 6,491,620***
Contractor OH&P (15%)	%	15%		$ 973,743
Total Estimated Construction Cost				***$ 7,465,363***
Funding Administration (5%)	%	5%		$ 373,268
Legal Fees for Land Leases	LS	$ 20,000		$ 20,000
Engineering (18%)	%	18%		$ 1,343,765
Total Project Cost (rounded)				***$ 9,203,000***

* All costs in 2020 Dollars.