Engineering Report

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Project Title: Salmon Creek Treatment Plant Dewatering Equipment Replacement

Project No.: 157062

Engineering Report

Subject: Salmon Creek Treatment Plant Dewatering Equipment Replacement

Date: April 18, 2024

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Limitations:

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List of Abbreviations

Alliance	Discovery Clean Water Alliance
BFP	belt filter press
BC	Brown and Caldwell
District	Clark Regional Wastewater District
DT	dry ton(s)
Ecology	Washing State Department of Ecology
ER	Engineering Report
FKC	Fukoku Kogyo Company
2013 GSP	2013 Wastewater Facilities Plan/General Sewer Plan Amendment for Salmon Creek Wastewater Management System
NPV	net present value
O&M	operations and maintenance
Phase 5B2 ER	Phase 5B Phase 2 – Secondary Treatment Process Improvements Project Engineering Report
SCADA	supervisory control and data acquisition
SCTP	Salmon Creek Treatment Plant
SEPA	State Environmental Policy Act
TS	total solids
VSS	volatile suspended solids

Executive Summary

Brown and Caldwell (BC) provided preliminary engineering services to Discovery Clean Water Alliance (Alliance) for the replacement of the Salmon Creek Treatment Plant's (SCTP) existing dewatering equipment.

SCTP, owned by DCWA and operated by Clark Regional Wastewater District (District), currently operates two belt filter presses (BFP) to dewater digested sludge. The existing BFPs are nearing the end of useful life and need replacing.

BC evaluated centrifuge and screw press technology as replacement dewatering equipment for the digested sludge. Based on the evaluation, BC recommends replacement of both BFPs with two screw presses. The preliminary project cost, prepared as a Class 5 estimate with an accuracy of -50 to +100 percent, is estimated to be $7,060,000 and includes contractor labor, overhead and profit, and engineering services for design and construction management. The 20-year net project value, including capital costs, operation and maintenance costs, and costs associated with hauling/land application of biosolids, is $31,950,000.

A majority of the existing dewatering system appurtenances will be reused. Structural modifications to the existing floor and BFP pressate sumps will be evaluated and incorporated into the final design. Existing electrical gear will be reused where possible; the screw presses' electrical load is similar to the BFP's existing loads.

This Engineering Report provides information on the proposed upgrade to the existing dewatering facility at the SCTP in detail sufficient to progress the project to the next design phase and to satisfy the requirements of the Washington State Department of Ecology for an Engineering Report in accordance with Washington Administrative Code 173-240-060.

Section 1: Background Information

In 2011, Brown and Caldwell (BC) prepared the Salmon Creek Treatment Plant Dewatering Equipment Replacement Project Engineering Report (2011 BC ER) (BC, 2011) that described the preliminary engineering and design for replacing just one of the existing BFPs with a new screw press. The 2011 BC ER was approved by Washington State Department of Ecology (Ecology) but was never implemented.

This Engineering Report describes the revised preliminary engineering services and design for replacement of belt filter press (BFP) technology with screw press technology. Design criteria, preliminary layouts of basic project elements, a flow schematic, a preliminary opinion of probable construction costs, and a net present value (NPV) analysis for the project are presented. The concepts, criteria, and other project-specific information presented herein are intended to serve as the basis for detailed design.

The existing dewatering equipment and ancillary systems were installed in 1998 during the Phase 3 plant expansion and have not been modified since. BC evaluated a technology change for the dewatering system and reviewed load projections to determine design criteria. The evaluation determined that the two BFPs should be replaced with two screw presses.

This report includes the following elements related to these improvements:

- Preliminary design criteria
- Description of process components
- The requirements for relevant engineering components (e.g., general, mechanical, structural, electrical, and instrumentation and controls)

Additional supporting information regarding the Salmn Creek Treatment Plant (SCTP) service area and treatment facility can be found in the Wastewater Facilities Plan/General Sewer Plan Amendment for

Salmon Creek Wastewater Management System (2013 GSP) (CH2M, 2013) and the Engineering Report for Phase 5B Phase 2 – Secondary Treatment Process Improvements Project (2021 Phase 5B2 ER) (Jacobs, 2021).

Section 2: Owner and Authorized Representative

Discovery Clean Water Alliance (Alliance) owns the SCTP. The Owner's authorized representative for this facility is Robin Krause. His contact information is listed below.

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Section 3: Project Description and Location

The project proposed in this Engineering Report involves replacing both BFPs with two new screw presses. The upgrade will improve dewatering performance and reduce operating costs related to hauling and land application of dewatered biosolids. SCTP is located at 15100 Northwest McCann Road in Vancouver, Washington.

The existing dewatering equipment is located within a three-level building referred to as the Solids Processing Center. The BFP feed pumps are located in the Digester Complex Building and convey digested sludge to the Solids Processing Building. The work required for the proposed project will take place in those two buildings.

The proposed screw presses will be installed in the area currently occupied by both BFPs. Most of the existing dewatering appurtenances will be reused. The proposed screw presses will be sized to dewater the projected solids loadings through the Phase 5 plant expansion while actively dewatering approximately 9 hours per day, 7 days per week. Screw press operating hours per day could be increased beyond Phase 5 as solids loadings increase. Overall, the new screw press equipment will reduce long haul truck trips, diesel use, and local truck traffic in comparison to the existing dewatering equipment. The new equipment will position SCTP to maximize solids quantity reduction benefits of a future Class A biosolids program.

Section 4: Dewatering Alternatives and Selected Technology

The Alliance retained BC to evaluate alternatives for replacing the existing BFPs. The objective was to review equipment technology alternatives and select one that will improve dewatering performance, reduce operating costs related to hauling and land application of dewatered biosolids, and reduce truck traffic in the residential area where the plant is located. The 2011 BC ER evaluated rotary press and BFP technologies in addition to screw press and centrifuge technology. Results indicated that screw press and centrifuge technologies were best suited for the plant. As a result, the following equipment technology alternatives were evaluated for this project:

- Screw presses
- High-speed centrifuge

To evaluate each technology, the potential performance of the dewatering equipment was assessed initially through laboratory testing of the SCTP digested sludge. Laboratory test results, capital costs, operating costs, and non-cost considerations were then used to determine the best-suited alternative. Lab testing of digested biosolids was conducted by centrifuge and screw press manufacturers. Both technologies produced cake in the range of 13 percent to 19 percent solids with varying polymer usage. Further discussion of the digested biosolids testing and characteristics is included in Section 5.1.

To understand the life-cycle cost of each alternative, a 20-year NPV analysis was developed. The results in 2024 dollars are listed in Table 1 from one screw press technology manufacturer (Fukoku Kogyo Company [FKC]) and one dewatering technology manufacturer (Centrisys). Additional information regarding development of the capital costs and 20-year NPV for the screw press are provided in Section 13 of this Engineering Report. Based on laboratory test results, a 20-year NPV analysis, and consideration of non-cost factors, the screw press was determined to be the better alternative. The improved dewatering performance of the screw presses over the BFPs will translate to reduced hauling costs and a reduction of truck traffic over the longer term. The baseline dewatered biosolids hauling costs for both alternatives is based on hauling and land application at the furthest location, Goldendale, WA, for a high-level projection of worst-case costs.

Table 1. 20-Year NPV Estimate for Evaluated Alternatives

Description	Screw Press[a], 2024 dollars	Centrifuge[b,c], 2024 dollars
Labor	$40,000	$80,000
Repair and Replacement	$94,000	$250,000
Power	$46,000	$160,000
Polymer	$9,015,000	$8,360,000
Biosolids Hauling and Land Application Cost[d]	$16,605,000	$15,322,000
Total Operating and Maintenance (O&M) Life-Cycle Cost	$25,798,000	$24,170,000
Total Capital Cost[e]	$6,152,000	$5,615,000
Estimated Project NPV[f]	$31,950,000	$29,785,000

a. *FKC was used as the basis of estimate screw press manufacturer.*
b. *Centrisys was used as the basis of estimate centrifuge manufacturer.*
c. *The centrifuge was not considered to be an appropriate technology for unsupervised service; therefore, the capital costs listed for this alternative reflect equipment with sufficient capacity to process the projected loading in seven 9-hour shifts per week.*
d. *Lower costs reflect drier solids and a reduction of the volume of biosolids hauled and land applied. The unit cost used for the calculation reflects current hauling and land application costs for SCTP if all biosolids are sent to Goldendale, WA. Based on dewatered sludge solids concentration of 16%.*
e. *Total capital costs include budget quotes for the equipment plus a planning-level estimate for appurtenances, installation, demolition, and engineering. Refer to Attachment B-1.*
f. *The 20-year NPV assumed a 4 percent inflation rate and 3.5 percent discount rate. The value is rounded.*

Both technologies can be operated on a continuous basis, but the centrifuge was not considered to be an appropriate technology for unsupervised service. Operations staff noted key no-cost benefits of screw press equipment include low energy consumption, low rotating speed, long term reliability, and low maintenance requirements. The cost to rebuild or repair a centrifuge is greater than that for a screw press, and most repairs require significant equipment downtime to ship components offsite. Screw press repairs can occur with equipment in place and can be performed by plant staff. While projected polymer consumption is higher for screw presses, actual polymer demand could vary from projections for either equipment and reduce the polymer cost differential between the equipment technologies. Considering the accuracy range of -50 to

+100 percent for a Class 5 estimate, the similar costs for each O&M component support the favored selection of the screw press over the centrifuge.

4.1 Screw Press

The screw press offers mechanical simplicity, low power consumption, and a high degree of reliability due to the low rotating speed. Staffing and O&M requirements for the screw presses are essentially the same as for the existing BFPs. Since screw presses are fully enclosed, odors are minimized and direct connection to the existing odor control system is possible. The following sections present additional information regarding screw presses and their operation.

4.1.1 Equipment Description

A screw press consists of a slowly rotating tapered screw surrounded by a wedge-wire mesh or perforated stainless-steel screen. The screw and screen are enclosed within a stainless-steel assembly. Digested sludge is pumped to the equipment and conditioned with polymer in one of two ways. Sludge can be conditioned in the screw press feed pipe for a pressurized-feed, or in a small flocculation tank for gravity-feed into the screw press inlet. Polymer-conditioned sludge is then introduced at the inlet end of the press, and the dewatered cake is discharged at the opposite end. Pressate is collected in the lower section of the enclosure and is discharged to a flanged connection. As sludge travels the length of the screw, the volume between the screw and the screen is continuously reduced, which squeezes water from the sludge. The pressure imparted on the sludge must be sufficient to dewater it, but not so great as to force excess particulate matter through the screen into the pressate. A screw press illustration is presented in Figure 1.

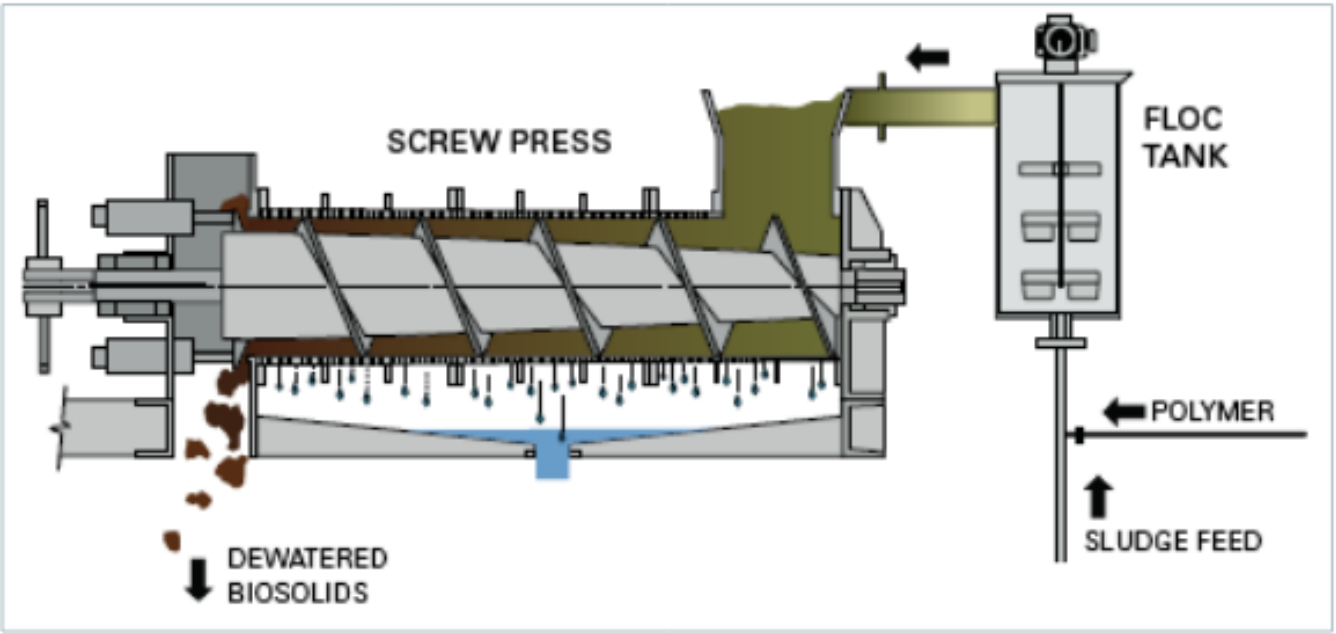

Figure 1. Screw press with polymer flocculation tank

The rotating speed of the screw is variable to accommodate variable feed rates. The slow rotational speed, at approximately one revolution per minute, accommodates use of a small electric motor and reduction gear to turn the screw, which minimizes energy requirements. The slow rotating speed also reduces wear and maintenance requirements and provides a high level of reliability. The screw press is intended for continuous service but requires periodic cleaning of the wedge-wire or perforated screen. Screw presses only

require a short startup period, typically less than 30 minutes, before dewatering operation can begin. Screw press shutdown is typically automated and does not require operator oversight or management.

4.1.2 Screw Press Manufacturers

The evaluation considered three manufacturers with municipal sludge dewatering experience: FKC, Huber, and Schwing. These manufacturers' screw presses operate on a similar principle but have differences in how sludge is fed, screen construction, and maintenance requirements. All three manufacturers performed bench-scale laboratory testing of the digested sludge in 2021 and 2023.

To maximize screw press throughput and efficiency, the screen surrounding the screw must be cleaned periodically to remove material that has been lodged. The Huber, FKC, and Schwing screw presses are all equipped with automated, periodic washing cycles that use high-pressure wash water to clean the screen during operation without impacting the dewatering operating cycle. The Huber screw press uses a steel brush attached to the screw flight to clean the wedge-wire mesh screen continuously while the unit is operating. The Schwing screw press uses a sealing lip on the edge of the screw flight to clean the perforated screen continuously while the unit is operating. Rather than requiring contact with the screen for cleaning, the FKC screw press uses the tight tolerance between screw flights and the perforated screen to limit screen blinding.

The Huber screw press is commonly supplied with a small polymer dosing skid that blends/dilutes bulk polymer. A skid-mounted dilution pump then feeds polymer to an inline mixer on the pressurized sludge feed pipe. A tubular reactor downstream of the inline mixer aids in sludge flocculation upstream of the screw press sludge inlet connection. The Schwing and FKC screw presses are commonly supplied with a single polymer injection location into a mechanically mixed reaction tank where it is mixed with digested sludge. The flocculated sludge then flows into the screw press.

All three manufacturers allow for the screen basket and screw, if needed, to be removed from above using a crane or monorail hoist. Major equipment maintenance that would necessitate overhead removal would not be expected more frequently than approximately every 10 years. The FKC screw press is heavier and larger than both the Huber and Schwing units at the same unit capacity.

4.2 Centrifuge

A centrifuge consists of a horizontal cylindrical bowl and an internal screw conveyor rotating in the same direction at slightly different speeds. A centrifuge uses centrifugal force rather than compression to separate water from sludge. The screw conveyor is shaped to convey sludge from the inlet end of the equipment to the outlet. The centrifugal force of the rotating bowl forces digested sludge to the outer wall and permits pressate/centrate to be separated from the sludge.

Centrifuges operate at higher rotational speeds than screw presses. With the higher rotational speeds, additional maintenance is required to minimize friction and maximize separation efficiency. Centrifuge technology offers high dewatering performance but increased power consumption, increased maintenance attention, and limitations on unsupervised operation. Staffing and O&M requirements for centrifuges is higher than BFPs due to the impacts of increased rotational speeds. Since centrifuges are fully enclosed, odors are minimized and direct connection to the existing odor control system is possible.

This evaluation considered three centrifuge manufacturers: Centrisys, Alfa Laval, and Flottweg. All three manufacturers performed bench-scale testing of digested sludge for approximated dewaterability performance.

Section 5: Design Criteria

The characteristics of digested biosolids produced at SCTP and the performance criteria for the dewatering equipment are discussed in this section.

5.1 Digested Biosolids Characteristics

The dewatering equipment at SCTP processes anaerobically digested sludge meeting Class B regulations. The digested sludge consists of blended primary, and waste activated municipal sludge that is anaerobically digested in two silo-type digesters. The digestion process is mesophilic, and digesters are currently operated in parallel. The digested solids are temporarily held in a day tank equipped with a pumped mixing system prior to being transferred to the dewatering equipment. Based on historical plant data from January 2017 through October 2022, the volatile suspended solids (VSS) concentration of the digested sludge is typically between 70 and 75 percent and the total solids concentration (TS) concentration of the digested sludge is typically between 1.7 percent and 2.8 percent.

The digested biosolids at SCTP have been challenging to dewater over the past decade. Declining dewatered solids concentration has been observed and the capture rate of the existing BFPs has declined as well. Laboratory bench-scale testing was performed by six equipment manufacturers (three for screw presses and three for centrifuges) in 2021. Laboratory test results are summarized in Table 2. Note that some manufacturers provided additional sludge characteristics beyond the TS percent and dewatered biosolids solids percent for equipment simulation.

The bench-scale lab testing results indicate that switching dewatering technology will improve dewatered sludge solids percentage in comparison to the 2017-2022 historical average of 13.5 percent. Each manufacturer noted the poor dewaterability of the sludge samples and the unusual properties in comparison to other anaerobically digested municipal sludges. Adding a coagulant improved the dewatered biosolids solids percent by several points. To provide more accurate dewatered cake solids percentages, the manufacturers recommended that equipment pilot testing be performed on site, which was done at SCTP circa 2012. In lieu of additional pilot testing that the plant has indicated is not desired at this time, a second round of digested sludge sample testing was performed in April 2023 to compare simulated dewatering test results with 2021 lab testing. The results of the April 2023 digested sludge sample testing are summarized in Table 3.

Table 2. Manufacturer Laboratory Bench-scale Testing Results

Equipment Type	Manufacturer	Sample Data			Polymer			Dewatered Solids %			Solids Capture %
		TS %	Fiber Content	VSS %	Type	Dose	Flocc Size	Gravity	Hand	Equipment Simulation	
Screw Press	FKC	2.06	8.3	-	Clarifloc WE-2009	44 lb./ton active	0.5" to 0.75"	5.5	11.93	16.43	92
Screw Press	Huber	2.18	-	74.46	Clarifloc WE-2009	31-35 lb./ton active	-	-	-	13.00[a]	95
Screw Press	Schwing	2.32	-	-	SBI-4231	75 lb./ton active	-	-	-	18.06	95
Centrifuge	Alfa Laval	2.1	-	-	Polydyne C26266	62 lb./ton active	-	-	-	16.00	95
Centrifuge	Flottweg	2.09	-	74.40	FW1206/FW1209	31 lb./ton active	-	-	-	14.00	90
Centrifuge	Centrisys	2.17	-	-	Clarifloc WE-2009	60 lb./ton total	-	-	-	16.30	90
						78.4 lb./ton total	-	-	-	17.10	96.5
						83 lb./ton total	-	-	-	15.72	98

a. Huber's test results indicated a dewatered solids concentration of higher than 13 percent but did not specify estimated actual concentration.

Table 3. 2023 Manufacturer Laboratory Bench-scale Testing Results

Equipment Type	Manufacturer	Source	Sample Data			Polymer		Dewatered Solids %			
			TS %	Fiber Content	VSS %	Type	Dose	Capture Rate	Gravity	Hand	Equipment Simulation
Screw Press	Schwing	Digester 1	2.21	--	--	SBI-4216	43.43 lb./ton active	≥ 95	--	--	--
		Digester 2	2.29	--	--	SBI-4218	44.75 lb./ton active	≥ 95	--	--	--
		Day Tank	2.27	--	--	SBI-4222	46.96 lb./ton active	≥ 95	--	--	--
Screw Press	FKC	Digester 1	2.16	7.09	--	Clarifloc WE-2009	33.2 lb./ton active	95%	5.78	--	15.42
		Digester 2	2.21	8.88	--	Clarifloc WE-2009	27.9 lb./ton active	95%	6.06	--	17.92
		Day Tank	2.14	10.54	--	Clarifloc WE-2009	35.8 lb./ton active	95%	5.69	--	19.60
Screw Press	Huber	Digester 1	--	--	--	--	--	--	--	--	--
		Digester 2	--	--	--	--	--	--	--	--	--
		Day Tank	2.17	--	74.3	C-6276 PWG	42 - 45 lb./ton active	> 95%		16-18	--
Screw Press	Andritz	Digester 1	2.15	--	75.9	C-6266	35.0 – 42.0 lb./ton active	--	--	--	--
		Digester 2	2.21	--	74.2	C-6266	35.0 – 42.0 lb./ton active	--	--	--	--
		Day Tank	2.01		76.5	C-6266	35.0 – 42.0 lb./ton active	--	--	--	--
Centrifuge	Andritz	Digester 1	2.15	--	75.9	C-6266	35.0 – 42.0 lb./ton active	≥ 95	--	15-17	--
		Digester 2	2.21	--	74.2	C-6266	35.0 – 42.0 lb./ton active	≥ 95	--	15-18	--
		Day Tank	2.01	--	76.5	C-6266	35.0 – 42.0 lb./ton active	≥ 95	--	14-17	--
Centrifuge	Centrisys	Digester 1	2.1	--	--	Clarifloc WE-2009	30.6 - 61.2 lb./ton active	> 95	--	17.57	--
		Digester 2	2.15	--	--	--	--	--	--	--	--
		Day Tank	2.07	--	--	--	--	--	--	--	--
Centrifuge	Alfa Laval	Digester 1	2.16	--	73.8	Clarifloc WE-2009	--	95-98	--	16-17	--
		Digester 2	2.19	--	73.9	Clarifloc WE-2009	--	95-98	--	16-17	--
		Day Tank	2.14	--	72.3	Clarifloc WE-2009	--	95-98	--	16-17	--
Centrifuge	Flottweg	Digester 1	--	--	--	--	--	--	--	--	--
		Digester 2	--	--	--	--	--	--	--	--	--
		Day Tank	2.54	--	61.1	FW 1206	16.0 -25.0 lb./ton active	--	--	--	--

5.2 Dewatering Equipment Performance Criteria

SCTP has traditionally operated the existing dewatering facility during five, 8-hour shifts per week while the plant is fully staffed. To reduce the per unit capacity requirement of the new dewatering equipment, it is recommended to install two smaller units and extend near-term dewatering facility operation to 9 hours per day, 7 days a week, for both new screw presses. This equipment, due to its slow operating speed and ability to produce consistent cake with limited operator attention, is well suited for continuous, unattended operation in the future to meet loading projections. As plant solids loadings increase, the dewatering facility can be operated in longer shifts each day to match the increase.

There are four primary performance criteria related to screw press specifications:

- Solids loading capacity (throughput)
- Solids capture rate
- Polymer consumption
- Cake solids concentration

The best operating point provides the highest throughput with acceptable cake solids concentration, capture rate, and polymer consumption.

In general, throughput is a function of the screw press size and the available footprint within the existing dewatering room. Based on bench-scale laboratory test results, a reasonable throughput value for the screw presses under consideration is 900 pounds of dry solids per hour. Huber does not offer a screw press that is able to meet this loading requirement and will not be considered for final design.

Capture rate is defined as the percentage of solids retained within the dewatered cake divided by the total solids in the feed material. Based on bench-scale laboratory test results, screw press manufacturers can achieve a 92 percent capture rate or better. Given a 92 percent capture rate, 8 percent of the solids in the feed material will be returned to the plant in the pressate, which is a major improvement over the current observed capture rate of 70 percent to 75 percent.

Polymer consumption is based on the pounds of active polymer required to dewater 1 dry ton of solids. Based on bench-scale laboratory test results, all three screw press manufacturers can dewater the SCTP sludge to 16 percent solids with polymer consumption equal to or less than 45 pounds active per dry ton (lb./DT) of solids dewatered.

The design criteria for the proposed screw presses are listed in Table 4.

Table 4. Design Criteria for Each Screw Press

Equipment Type	Sludge Feedstock, % TS	VSS in feed sludge, %	Minimum Solids Throughput, pounds per hour	Minimum Hydraulic Throughput, gallons per hour	Maximum Polymer Consumption, Active lb./DT	Minimum Solids Capture Rate, %	Minimum Dewatered Cake Solids, %	Minimum Production Time per Day, hours[a]
Screw Press	1.7 to 2.8	70 to 75	900	106	45	90	16	9

a. Minimum production time is defined as operating hours per screw press, not including time required for cleaning cycles or maintenance.

In accordance with the criteria presented in Table 4, each screw press should provide sufficient throughput capacity to dewater 1,438 dry tons per year (DT/yr.) of biosolids for a total dewatering capacity of 2,876 DT/yr. on a 9-hour-per-day, 7-days-a-week dewatering schedule, 355 operating days per year.

Section 6: Loading Projections

The biosolids handling facilities at SCTP process residual solids generated from the Salmon Creek, Battle Ground, and Ridgefield service areas. Revised annual average biosolids projections for the combined service areas are listed in Table 5. The production projections represent the digested biosolids quantity going to the dewatering equipment based on influent loading projections. Dewatered biosolids quantity conveyed to the solids storage bays will be less than the digested biosolids due to the equipment capture rate. Percent total solids data is only available at in the day tank so baseline solids loading projections were calculated using measured annual hauled solids weight and assuming the existing BFPs achieve a conservative solids capture rate of 85 percent.

Table 5. Digested Biosolids Annual Average Loading Projections

Year	Annual Growth Rate (%)	Digested Biosolids Production[a,b] (DT/yr.)	Dewatered Biosolids[c] (DT/yr.)
2025	3.0	1,595	1,356
2026	3.0	1,643	1,397
2027	3.0	1,693	1,439
2028	3.0	1,743	1,482
2029	3.0	1,796	1,526
2030	3.0	1,849	1,572
2031	3.0	1,905	1,619
2032	3.0	1,962	1,668
2033	3.0	2,021	1,718
2034	3.0	2,082	1,769
2035	3.0	2,144	1,822
2036	3.0	2,208	1,877
2037	3.0	2,275	1,933
2038	3.0	2,343	1,991
2039	3.0	2,413	2,051
2040	3.0	2,486	2,113
2041	3.0	2,560	2,176
2042	3.0	2,637	2,241
2043	3.0	2,716	2,309
2044	3.0	2,798	2,378
2045	3.0	2,881	2,449

a. Biosolids production refers to anaerobically digested residual solids loading to dewatering equipment.
b. Projected biosolids production values based on 3 percent annual growth from District-supplied influent flow and load projections.
c. Dewatered biosolids production based on capture rate of 85% and dewatered cake solids percent of 16.

Section 7: Dewatering Equipment Process Capabilities

The dewatering project under consideration will replace both existing BFPs with two new screw presses. With two new screw presses, it is recommended that both units operate concurrently to meet digested biosolids loading projections at the dewatering facility. With the proposed screw press design criteria, the per-unit capacity will be sufficient to take one press offline for maintenance and have the other unit process the entire maximum month biosolids load through approximately year 2042.

In accordance with the design criteria presented previously in Table 4, each screw press will provide the capacity to dewater 900 lb./hr. of digested biosolids, or 0.45 DT/hr. Table 6Table 6 presents the required screw press runtimes, assuming parallel operation, to dewater the annual average digested biosolids loading projections from Table 5 with two new screw presses operating in parallel. This information will help to approximate the future equipment runtime, estimate changes to plant staffing requirements, and identify approximate timing for additional dewatering equipment.

Table 6. Annual Average Biosolids Production and Dewatering Operating Hours[a]

Year	Digested Biosolids Production, Annual Average (DT/yr.)	Screw Press 1 Daily Runtime[b] (hr.)	Screw Press 2 Daily Runtime[b] (hr.)	Reserve Dewatering Capacity per Screw Press[a] (DT/yr.)
2025	1,595	5.0	5.0	3,041
2026	1,643	5.1	5.1	3,018
2027	1,693	5.3	5.3	2,994
2028	1,743	5.5	5.5	2,969
2029	1,796	5.6	5.6	2,944
2030	1,849	5.8	5.8	2,918
2031	1,905	6.0	6.0	2,891
2032	1,962	6.1	6.1	2,864
2033	2,021	6.3	6.3	2,835
2034	2,082	6.5	6.5	2,806
2035	2,144	6.7	6.7	2,776
2036	2,208	6.9	6.9	2,745
2037	2,275	7.1	7.1	2,712
2038	2,343	7.3	7.3	2,679
2039	2,413	7.6	7.6	2,645
2040	2,486	7.8	7.8	2,610
2041	2,560	8.0	8.0	2,574
2042	2,637	8.3	8.3	2,537
2043	2,716	8.5	8.5	2,499
2044	2,798	8.8	8.8	2,460
2045	2,881	9.0	9.0	2,419

a. Based on a per unit capacity of 900 lb./hr.
b. Operating hours do not include time for maintenance, startup, or shutdown.

While two screw presses would provide adequate redundant capacity well into the future at average conditions, it is important to review max month loading for proper equipment sizing and sequencing. Table 7 presents the required screw press runtimes, assuming parallel operation, to dewater the maximum month digested biosolids loading projections with two new screw presses operating in parallel. Maximum month dewatering feed rates are based on a calculated peaking factor of 1.45 from available historical data.

Table 7. Max Month Biosolids Production and Dewatering Operating Hours[a]

Year	Digested Biosolids Production, Maximum Month (DT/yr.)	Screw Press 1 Daily Runtime[b] (hr.)	Screw Press 2 Daily Runtime[b] (hr.)	Reserve Dewatering Capacity per Screw Press[a] (DT/yr.)
2025	2,284	7.1	7.1	2,692
2026	2,353	7.4	7.4	2,658
2027	2,423	7.6	7.6	2,622
2028	2,496	7.8	7.8	2,586
2029	2,571	8.0	8.0	2,548
2030	2,648	8.3	8.3	2,510
2031	2,728	8.5	8.5	2,470
2032	2,809	8.8	8.8	2,429
2033	2,894	9.1	9.1	2,387
2034	2,981	9.3	9.3	2,344
2035	3,070	9.6	9.6	2,299
2036	3,162	9.9	9.9	2,253
2037	3,257	10.2	10.2	2,206
2038	3,355	10.5	10.5	2,157
2039	3,455	10.8	10.8	2,106
2040	3,559	11.1	11.1	2,055
2041	3,666	11.5	11.5	2,001
2042	3,776	11.8	11.8	1,946
2043	3,889	12.2	12.2	1,890
2044	4,006	12.5	12.5	1,831
2045	4,126	12.9	12.9	1,771

a. Based on a per unit capacity of 900 lb./hr.
b. Operating hours do not include time for maintenance, startup, or shutdown.

Based on the operating hours required to dewater projected digested sludge production, the two new screw presses will be operating 12 hours/day around the year 2042 at maximum month conditions. At that time, the plant would not have fully redundant screw press dewatering capacity and a third screw press would be required to maintain redundancy.

Section 8: Existing Facilities

The following subsections describe the plant's existing dewatering facilities.

8.1 Solids Processing Building

The existing dewatering equipment is located within a three-level building referred to as the Solids Processing Center. The facility was constructed in 1996 as part of the SCTP Phase 3 Expansion. The dewatering equipment room is located on the upper floor and is configured with two large sumps, one under each BFP. There are two large odor control hoods, one for each BFP. Equipment access is through a large overhead door on the south side of the building. Pressate from the BFPs is conveyed by gravity to a sump on the lower floor of the building and is subsequently pumped through three existing pressate recycle pumps to the SCTP recycle pumping station. Polymer storage, mixing, and feed equipment are located on the lower level of the building, along with pumps that provide pressurized plant effluent for belt cleaning. Dewatered solids are conveyed from the dewatering equipment to the cake storage hopper on the building's exterior. A load-out area is located under the storage hopper. The existing dewatering equipment room is shown in Figure 2, and in Figure 1 in the attachments.

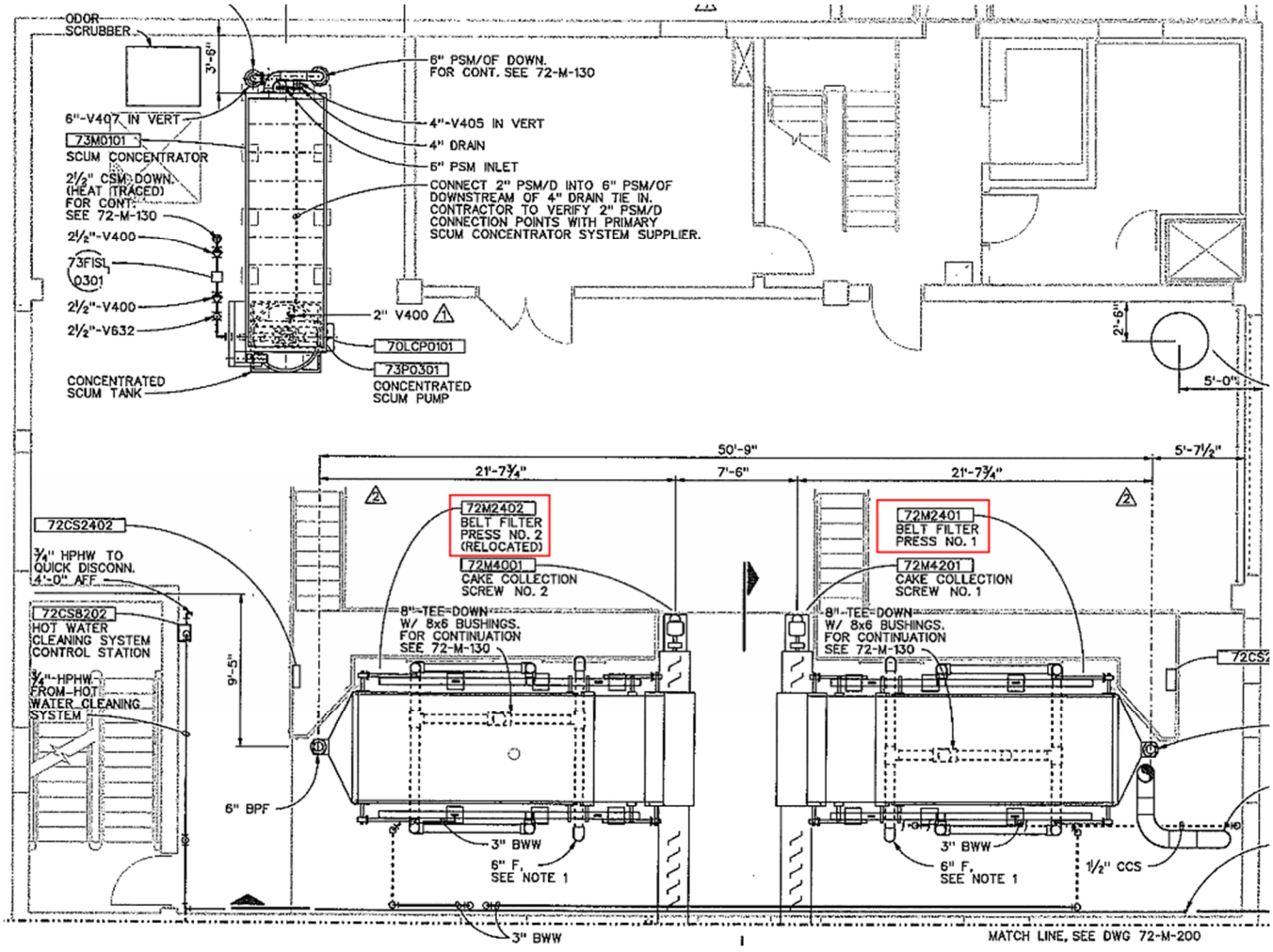

Figure 2. Existing belt filter presses on upper level of solids processing center

8.2 Digester Complex Building

The existing BFP feed pumps are located within a single-level building referred to as the Digester Control Complex. The facility was modified in 1996 as part of the SCTP Phase 3 Expansion. Digested sludge flows by gravity from the biosolids day tank to feed pumps where it is pumped to one of the two BFP units within the Solids Processing Center. The Digester Control Complex houses an electrical room that contains electrical equipment associated with the BFP feed pumps, digester feed pumps, and biosolids day tank mix pumps. The existing BFP feed pumps are shown in Figure 3.

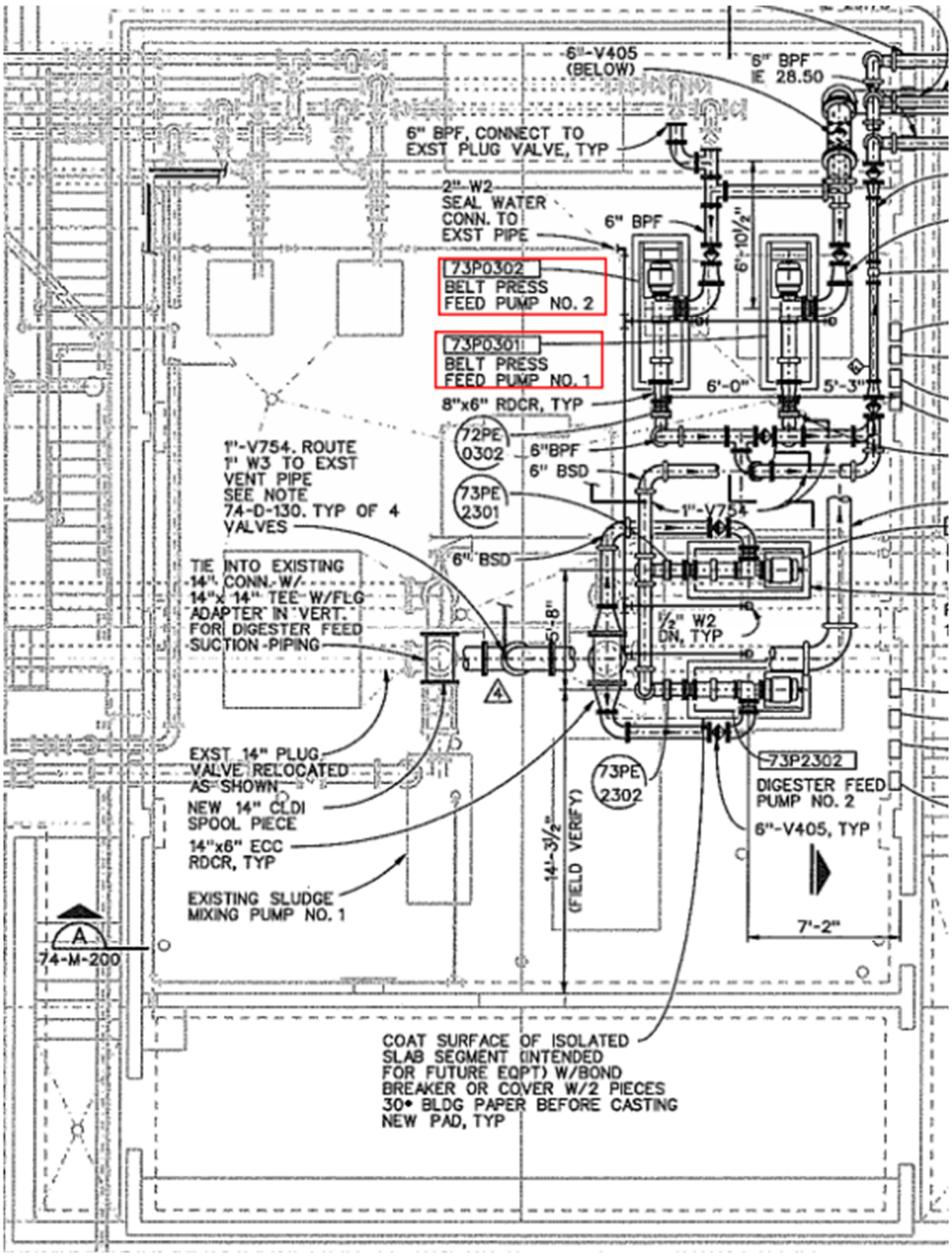

Figure 3. Existing belt filter press feed pumps on main level of digester control complex

8.3 Biosolids Day Tank

Digested biosolids from the two existing anaerobic digesters overflow to the biosolids day tank. The Biosolids day tank is a converted anaerobic digester provisioned with a mixing pump. From this tank, digested sludge is pumped to the dewatering process through one of two existing feed pumps. The flow rate of these pumps is adjustable and is monitored by dedicated flow meters.

8.4 Existing Dewatering Equipment

There are two existing 2-meter BFPs. Each BFP has a maximum rated capacity of 1,200 pounds per hour of solids. The BFPs historically have been operated during a weekly shift (5 days per week, 8 hours per day). The BFPs initially produced cake of approximately 18 percent solids, but after several years of operation, their performance declined, and they now produce cake of approximately 13 percent solids (annual average from 2017-2022). Additionally, the capture rate of the equipment has varied from between 70 percent to 75 percent over the last 5 years, which is less than the rated performance of 95 percent capture rate. The decline in performance is believed to be a result of several contributing factors, including wear and tear of the existing BFPs, process changes that have reduced dewatering characteristics of the digested sludge, and pressate recycle to gravity belt thickeners instead of the primary clarifiers. Further investigation into the poor dewaterability characteristics is recommended to improve projected dewatered biosolids cake percent.

8.5 Dewatering Appurtenances

The existing dewatering system is supported by a polymer storage, conditioning, and feed system; a pressate recycle system; a high-pressure wash water system; sludge feed pumps; dewatered cake conveyors; a pressurized air supply; and an odor control system. Dewatered cake is conveyed to the building's exterior and stored temporarily in bays until loaded for hauling.

The sludge feed pumps are variable-speed, progressing-cavity type, each with a capacity of 90 to 200 gallons per minute. The sludge feed pumps are integrated with the dewatering equipment controls. The condition of the existing pumps is not satisfactory; therefore, new sludge feed pumps, along with dedicated flow meters, will be installed as part of this project.

The existing polymer system will be used to feed the proposed screw presses. The system consists of a storage tank for liquid polymer, liquid polymer transfer pumps, a day tank for feeding polymer, and variable-speed polymer feed pumps with dedicated flow meters to deliver conditioned polymer to the dewatering process. The existing polymer pumps are integrated with the existing dewatering equipment controls. Existing polymer pump sizing will be confirmed for appropriate sizing based on the basis of design dewatering equipment and polymer feed requirements. The polymer system's overall capacity will also be confirmed to determine expected timing of capacity shortfall.

The pressate recycle pumps and dewatered cake transfer screws have sufficient capacity for the upgraded facility and will be retained. The existing wash water pumps were recently replaced and will be evaluated to determine if the pressure and flow range are satisfactory for the screw press requirements.

Dewatered cake is conveyed from the BFPs through existing 16-inch transfer screws. Two short sections fitted with hoppers receive dewatered cake directly from the BFPs. Both short conveyors discharge to a longer inclined section of conveyor located outside the building, which discharges to the cake storage hopper. Depending on the basis of design screw press equipment selected, one or both of the existing transfer screws will be replaced with new equipment to transport dewatered cake to the inclined screw conveyor.

Section 9: Proposed Layout of New Equipment

The physical characteristics of the FKC and Schwing screw presses were evaluated for placement on the upper level of the Solids Processing Facility. The Schwing screw press model is lighter and has a small overall footprint, which provides some flexibility in layout configuration. By comparison, the FKC screw press is significantly larger and heavier than the Schwing screw press. As part of the preliminary engineering effort, the structural capacity of the Solids Processing Facility's was evaluated and has capacity to support the new screw press equipment.

The preliminary layouts of the FKC and Schwing screw presses are shown in the attachments as Figure 2 and Figure 3, respectively. The major difference from a layout perspective is that the FKC screw press is longer and must be oriented north-south to fit in the room. The Schwing screw presses can be oriented north-south or east west. If required for maintenance, the upper section of each screw press can be removed and the screw lifted straight up, which eliminates the need for additional access space in front of the presses. Selection of the preferred screw press layout orientation will be determined during the next project phase.

The existing sludge feed line, polymer feed line, and process drain lines serving the BFPs will be re-routed to serve the screw presses. Structural modifications to the existing sumps will be required to provide support for the proposed screw presses. New grating or checker plate over the existing sumps and an elevated walkway will be required to provide a walking surface around the screw presses for access.

Section 10: Dewatering System Components

A flow schematic showing the equipment related to the operation of the screw presses is shown in the attachments as Figures 5 and 6. Table 8Table 8 lists the equipment shown on the schematics, their function, and whether it is new or existing. All equipment listed in Table 8 will be integrated with the controls for the new screw presses.

Table 8. Dewatering System Equipment

Item	Function	New or Existing
Screw Press Motor	Turns screw to convey solids through the press and facilitates dewatering	New[a]
Wash Water Solenoid	Opens to initiate cleaning cycle	New[a]
Wash Water Pump	Supplies water to equipment for washing cycle	Existing[b]
Sludge Feed Pump and Flow Meter	Pumps and meters sludge from the biosolids day tank to the screw press	New
Polymer Dosing Pump and Flow Meter	Pumps and meters conditioned polymer from the polymer day tank to the screw press	Existing
Dilution Water Solenoid	Dilutes polymer solution prior to its introduction in the sludge feed pipe	Existing
High-pressure Air Compressor	Controls the pressure within the screw press by actuating the pressure (control) cone	Existing[c]
Dewatered Cake Hopper and Conveyors	Receives the dewatered cake from the screw press and conveys it to the existing storage hopper	New and Existing
Controls	Controls and monitors screw press and ancillary equipment	New[d]
Pressate Recycle Pumps	Pumps pressate from wetwell in Solids Processing Center back to thickening equipment feed piping	Existing[e]

a. *Part of manufacturer-supplied package.*
b. *Existing wash water pumps were recently replaced; capacity will be confirmed based on new dewatering equipment demand.*
c. *For Schwing screw presses only.*

d. Controls could be from a manufacturer-supplied panel or provided by the plant's existing programmable logic controller/SCADA system.
e. Pressate pump sizing will be confirmed based on new dewatering equipment design criteria developed during detailed design

Section 11: Electrical and Controls

Power requirements for the screw presses are similar to the existing loads for the BFPs they will replace; therefore, significant electrical improvements are not anticipated to be required. The screw presses and appurtenances can be operated from a local control panel provided by the manufacturer or controlled from the plant's supervisory control and data acquisition (SCADA) system if preferred. A programmable logic controller (PLC) will be used to integrate the screw presses with the sludge feed pumps, the polymer feed pumps, the pressate pumps, the cake conveyors, and other miscellaneous devices.

Section 12: Control Strategy

The sequence below describes the control strategy in general. A more specific control strategy will be developed during detailed design that is tailored to the manufacturer's and SCTP's specific requirements. The general control strategy is as follows:

1. Upon initiation, the controls will check for faults and equipment status to ensure that the screw press, polymer feed and dilution system, sludge feed pump, cake conveyors, and other appurtenances are ready.
2. The screw press, polymer feed and dilution system, sludge feed pump, and the conveyors will start.
3. The operator will set the sludge flow rate based on the quantity of material to be dewatered. The polymer feed rate can be varied manually in response to sludge conditions and paced automatically to adjust to varying feed rates.
4. The screw press will periodically initiate a cleaning cycle (applicable to both screw press manufacturers) to clear debris from the screen surrounding the screw.
5. Upon termination of a dewatering session, the screw press will clear itself of sludge and initiate a cleaning cycle. The conveyor will continue to run for a preset period to convey residual sludge to the storage hopper.

The controller will monitor the sludge feed pump, polymer feed system, pressate pumps, conveyor system, and pressure within the screw press. If a fault occurs, the controller will provide a signal to terminate sludge and polymer feeding.

Section 13: Preliminary Opinion of Probable Construction Costs and Project Funding

13.1.1 Capital Costs

Capital cost estimates for both equipment technologies were prepared in 2023 as a Class 5 estimate per Association for the Advancement of Cost Engineering International criteria with an accuracy of -50 to +100 percent. A comparison of resulting capital costs in shown below in Table 9.

Table 9. Capital Cost Comparison			
	Upper Range	Estimated Cost in 2023 dollars	Lower Range
	+100%		-50%
Screw Presses	$12,304,000	$6,152,000	$3,076,000
Centrifuges	$11,148,000	$5,574,000	$2,787,000

Table 10 provides a preliminary estimate of capital and overall project costs for the proposed upgrade. The estimate assumed a cost for elements expected to be part of final design, such as modifications to existing piping, structural improvements, installation of miscellaneous metals, and electrical upgrades. The capital costs were prepared as a Class 5 estimate per Association for the Advancement of Cost Engineering International criteria with an accuracy of -50 to +100 percent. The capital cost estimate includes a 40 percent contingency to cover costs unidentified at this level of design.

The original Class 5 estimate for the screw press alternative was prepared in 2023 for two 700 lb./hr. units. Further refinement resulted in the 900 lb./hr. unit being selected as it better aligned with space availability and loading projections. The 2023 screw press estimate was manually adjusted to reflect the higher equipment cost for the increased unit size. Mechanical, structural, and electrical improvement estimates remained the same. Consistent markup and contingency percentages were applied to result in the revised screw press capital estimate presented in Table 10.

Table 10. Dewatering Improvement Project Cost Summary	
Description	Screw Press[a]
Screw Press and Appurtenances – Installed Costs	$1,344,000
Mechanical, Structural, and Electrical Improvements	$1,066,000
Contractor Labor, Overhead, and Profit, General Conditions, Start-up, Insurance, Bonds, Escalation	$1,661,000
Subtotal	$4,071,000
Contingency at 40 percent	$1,628,000
Sales Tax on Equipment and Labor at 8.5 percent	$453,000
Total Capital Costs[b]	$6,152,000
Engineering – Design and Permitting	$633,000
Engineering – Construction Management, Startup, O&M Manuals[c]	$275,000
Estimated Project Cost	$7,060,000

a. *All values are rounded*
b. *See Attachment B*
c. *Assumed fee for engineering services during construction*

13.1.2 Net Present Value

The NPV or life-cycle cost of the proposed dewatering upgrade is a function of both the capital costs and the present value of the annual O&M costs. The annual O&M costs in Table 11Table 11 assumed the average loading conditions for the 20-year planning period.

Table 11. 20-year NPV Estimate (Annual Costs for Screw Press O&M)	
	Screw Press[a]
Annual Labor[b]	$1,900
Annual Repair and Replacement[c]	$4,400
Annual Power[d]	$2,160
Annual Polymer[e]	$425,000
Annual Biosolids Beneficial Use[f]	$778,000
Total Annual O&M	$1,212,000
20-year NPV for O&M Costs[g]	$25,798,000
Total Capital Cost	$6,152,000
Estimated NPV for Project	$31,950,000

a. Values are rounded.
b. Assume one hour of maintenance every week.
c. Annualized repair and replacement cost per FKC.
d. Assuming $0.049/kilowatt hours, operating 9 hours per day, 365 days per year.
e. Based on 89.5 lb./dry ton total polymer demand from 2023 FKC lab sampling.
f. Biosolids beneficial use estimated at $60 per wet ton assuming all dewatered biosolids are hauled to and applied at Natural Selection Farms.
g. 20-year NPV for O&M costs assume 4 percent inflation rate and 3.5 percent discount interest rate.

13.1.3 Funding Mechanism

The capital expenditures portion of proposed project will be funded through the District's Repair and Replacement reserve account. This account accumulates funds from service area rate payers in the Alliance service areas and establishes the means for financing the replacement of plant-in-service and other depreciable assets.

The O&M costs associated with labor, power, chemicals, and replacement parts for the proposed equipment will be similar to the O&M costs for the existing dewatering equipment. Due to the poor capture rate and dewatered solids concentration of existing dewatering equipment, a significant portion of biosolids is being recycled back into the plant through the filtrate off the BFPs. Hauling costs for dewatered biosolids will be reduced over the lifespan of the new dewatering equipment when compared to continued operation of existing BFPs at their current performance.

Section 14: Staffing Requirements

The proposed project will not increase staffing requirements at SCTP. The degree of operator attention required for the proposed equipment is generally accepted to be less than required for the current equipment due to the absence of washdown requirements and reduced maintenance demand.

Section 15: Environmental Impacts

The proposed project will provide a net environmental benefit. Electric power and chemical requirements will be similar to that of the existing dewatering equipment. Odors originating from the dewatering process will be contained primarily within the enclosed screw press equipment; stray odors will be captured by the

existing odor control equipment in the dewatering room. The existing odor control system, updated in 2021, will not be modified and will maintain the current air changes per hour in the dewatering room. Further evaluation will occur during design to determine whether the new dewatering equipment should be directly connected to the odor control system to further reduce odors. The project will result in a reduction in the quantity of biosolids hauled from the SCTP, along with a concurrent reduction in diesel fuel usage for this purpose.

Section 16: Project Schedule

Fabrication and delivery of the screw presses and appurtenances will take approximately 32 to 46 weeks. The District plans to pre-purchase the dewatering equipment during the detailed design phase due to long lead times. Project bidding will occur after an equipment manufacturer has been awarded the contract and after equipment procurement has started. Using these assumptions, a preliminary schedule was developed that shows a total project duration of 65 weeks. This includes approximately 16 weeks for demolition and construction activities, during which both of the existing BFPs will be out of service and temporary dewatering will be online. A start date for the project has not yet been determined. The preliminary project schedule, included in the attachments as Figure 7, shows a placeholder start date of April 2025 for the construction period. This start date assumes that detailed design will occur in 2024.

Section 17: Permitting and Regulatory

In accordance with Revised Code of Washington (RCW) 90.48.110, all engineering reports, plans, and specifications for new construction or improvements to existing sewage treatment systems shall be submitted to and approved by Ecology before construction may begin. RCW 90.48.110 also allows delegation of this authority to local authorities that meet Ecology's criteria.

For the proposed project, the following approval and permitting steps are anticipated:

- Submittal of this Engineering Report for review and approval by Ecology.
- Submittal of final plans and specifications for review and approval by Ecology.
- Submittal of a Construction Quality Assurance Plan for review and approval by Ecology.
- Submittal of the approved Engineering Report and supporting documentation to Clark County for a determination of the potential for environmental impact as required under the State Environmental Policy Act (SEPA). Determination of Non-Significance is anticipated because all work will be performed within the existing Solids Dewatering Building.
- Submittal of plans, specifications, calculations, and supporting documentation to the Clark County Commercial Building Permit Department for review and approval.

The design of this project will incorporate applicable design requirements from National Fire Protection Agency (NFPA) Standard 820 for space ventilation and Ecology's Criteria for Sewage Works Design for sludge dewatering systems.

Section 18: WAC 173-240-060 Cross-reference Checklist

Additional supporting information regarding the SCTP service area and treatment facility can be found in the 2013 GSP (CH2M, 2013) and Engineering Report for 2021 Phase 5B2 ER (Jacobs, 2021).

For the reviewer's convenience, Table G1-1 Requirements for Engineering Reports, taken from Ecology's Criteria for Sewage Works Design, is included as Table 12. The table provides a comprehensive list of the information required for engineering reports and facilities plans, and the location where the information is provided.

Table 12. Table G1-1. Requirements for Engineering Reports

Element	Requirement	Location or Reference
Site Description and Map	Well documented	Work for this project will occur within the existing Solids Processing Building. Layouts of the existing dewatering equipment and proposed modifications are shown in Figures 1 through 3 of the Engineering Report attachments.
Problem Identification	Well documented	Refer to Section 3 of the Engineering Report for the Project Description. For additional information regarding the dewatering requirements at SCTP, refer to the 2013 GSP (CH2M Hill, 2013) and 2021 5B2 ER (Jacobs, 2021).
Description of Discharge Standards	Well documented	Refer to the 2013 GSP (CH2M Hill, 2013) and 2021 5B2 ER (Jacobs, 2021).
Background Information	Existing Environment • Water, air, sensitive areas • Flood plains • Shorelines • Wetlands • Endangered species • Public health • Demographic and Land Use • Current population • Present wastewater treatment • AWT need evaluated • I/I studies • CSOs • Sanitary surveys for unsewered areas	Refer to the 2013 GSP (CH2M Hill, 2013) and 2021 5B2 ER (Jacobs, 2021).
Future Conditions	Demographic and Land Use • Projected population levels • Appropriateness of population data source • Future domestic and industrial flows, and flow reduction options • Future flows and coding • Reserve capacity • Future environment without project	Future biosolids projections are provided in Table 4 of the Engineering Report. These projections are based on information presented in the 2013 GSP and plant historical data. For additional information regarding Future Conditions, refer to the 2013 GSP (CH2M Hill, 2013).
Alternatives	• List specific alternative categories including "no action" • Collection system alternatives • Sludge management/use alternatives • Flow reduction • Costs • Environmental impacts • Public acceptability • Rank order • Recommended alternative	Biosolids dewatering alternatives and the recommended alternative are discussed in Section 4 of the Engineering report. For additional information regarding collection system and treatment alternatives, refer to the 2013 GSP (CH2M Hill, 2013).

Table 12. Table G1-1. Requirements for Engineering Reports		
Element	**Requirement**	**Location or Reference**
Final Recommended Alternative	Site layout	Refer to Figures 1 through 3 of the Engineering Report attachments.
	Flow diagram	Refer to Figures 4 and 5 of the Engineering Report attachments.
	Sizing	Refer to Sections 5, 6, and 7 of the Engineering Report.
	Environmental impacts	Refer to Section 15 of the Engineering Report.
	Design life	Refer to Section 7 of the Engineering Report.
	Sludge management	Refer to the 2013 GSP (CH2M Hill, 2013).
	Ability to expand	Refer to Section 9 and Figures 2 and 3 of the Engineering Report.
	O&M staffing needs	Refer to Section 14 of the Engineering Report.
	Design parameters	Refer to Section 5 of the Engineering Report.
	Feasibility of implementation	Refer to Sections 8 and 9 of the Engineering Report.
Financial Analysis	• Costs • User charges • Financial capability • Capital financing plan • Implementation plan	Refer to Section 13 of the Engineering Report.
Other	• SEPA approval • Required permits • Water quality management plan	Refer to section 17 of the Engineering Report for information regarding SEPA approval and permitting. For information regarding a Water Quality Management Plan, refer to the 2013 GSP (CH2M Hill, 2013).

References

Reports

Brown and Caldwell (BC), 2011. *Salmon Creek Treatment Plant Dewatering Equipment Replacement Project Engineering Report.*

Ch2M, 2013, *Wastewater Facilities Plan/General Sewer Plan Amendment for Salmon Creek Wastewater Management System.*

Jacobs, 2021. *Engineering Report for Phase 5B Phase 2 – Secondary Treatment Process Improvements Project.*

Attachment A: Figures

FILE LOCATION: CV01:/PRJ/SALMONCK/108015/DRAWINGS/DAT/

EXISTING

7'-2"

ODOR SCRUBBER

2'-6"

5'-0"

72M9002
JIB CRANE
JIB CRANE BOOM NOT SHOWN FOR CLARITY

EXISTING ROLL UP DOOR

50'-9"

21'-7¾"

7'-6"

21'-7¾"

5'-7½"

72CS2402
¾" HPHW TO QUICK DISCONN. 4'-0" AFF

72CS8202
HOT WATER CLEANING SYSTEM CONTROL STATION

¾" HPHW FROM HOT WATER CLEANING SYSTEM

9'-5"

72M2402
BELT FILTER PRESS NO. 2 (RELOCATED)

72M4001
CAKE COLLECTION SCREW NO. 2

8"-TEE-DOWN W/ 8x6 BUSHINGS. FOR CONTINUATION SEE 72-M-130

72M2401
BELT FILTER PRESS NO. 1

72M4201
CAKE COLLECTION SCREW NO. 1

8"-TEE-DOWN W/ 8x6 BUSHINGS. FOR CONTINUATION SEE 72-M-130

72CS2401

6" BPF

6" BPF

12" FRP/VENT THROUGH ROOF SEE DET 7006 SIM W/NEOPRENE BOOT

3" BWW

6" F, SEE NOTE 1

3" BWW

6" F, SEE NOTE 1

1½" CCS

¾" HPHW TO QUICK DISCONN. 4'-0" AFF

3" BWW

L
72-M-203

MATCH LINE, SEE DWG 72-M-200

M
72-M-203

UPPER LEVEL PLAN

1/4"-1'-0"

RECORD DRAWINGS

Revisions Drawn By R. COWAN Date 8/98

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

The Contract Document Drawings are the printed documents dated MAR 1996 (date on drawing), as subsequently amended, which define the scope, extent, and character of the work. The original Contract Document drawing was sealed and signed by (name of sealer) CRAIG W. MASSIE, State of Washington PE No. 31,682 (state's PE No.)

CH2M HILL

DSGN	B ENGLESON		
DR	KL McCOY SC72M140.DLV		
CHK	C MASSIE		
APVD	H FRICKE		

NO.	DATE	REVISION	BY	APVD
5	8/98	RECORD DRAWINGS	RKC	SBR
4	4/97	CIR #251	RKC	SBR
3	2/97	CIR #200	RKC	SBR
2	1/97	CIR #173	RKC	SBR
1	1/97	CIR #165	RKC	SBR

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

SALMON CREEK WWTP
CLARK COUNTY, WASHINGTON
PHASE 3 EXPANSION

SOLIDS PROCESSING CENTER
UPPER LEVEL PLAN

SHEET	270
DWG NO.	72-M-140
DATE	MAR 1996
PROJ NO.	108015.TP

NOTES:

1. CONTRACTOR SHALL CONNECT FILTRATE PIPING FROM BELT FILTER PRESS DRAIN TRAYS TO 8" FILTRATE PIPE BELOW PRESS.

FIGURE 1

SF-48

FILE LOCATION: CVO1:/PRJ/SALMONCK/108015/DRAWINGS/DAT/

FKC SCREW PRESS
900 PPH

7'-2"

ODOR SCRUBBER

LCP

LCP

2'-6"

5'-0"

72M9002
JIB CRANE
JIB CRANE BOOM NOT SHOWN FOR CLARITY

EXISTING ROLL UP DOOR

FUTURE

¾" HPHW TO QUICK DISCONN. 4'-0" AFF

72CS8202
HOT WATER CLEANING SYSTEM CONTROL STATION

¾"-HPHW FROM-HOT WATER CLEANING SYSTEM

FLOCC TANK

FLOCC TANK

72CS2401

6" BPF

12" FRP/VENT THROUGH ROOF SEE DET 7006 SIM W/NEOPRENE BOOT

¾" HPHW TO QUICK DISCONN. 4'-0" AFF

L
72-M-203

3" BWW

MATCH LINE, SEE DWG 72-M-200

M
72-M-203

UPPER LEVEL PLAN
1/4"=1'-0"

LEGEND:
MAINTENANCE AREA AROUND EQUIPMENT

NOTES:

1. CONTRACTOR SHALL CONNECT FILTRATE PIPING FROM BELT FILTER PRESS DRAIN TRAYS TO 8" FILTRATE PIPE BELOW PRESS.

FIGURE 2

RECORD DRAWINGS

Revisions Drawn By R. COWAN Date 8/98

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CH2M HILL

DSGN	B ENGLESON
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2	2/97	CIR #200	RKC	SBR
1	1/97	CIR #173	RKC	SBR
0	1/97	CIR #165	RKC	SBR

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

SALMON CREEK WWTP
CLARK COUNTY, WASHINGTON
PHASE 3 EXPANSION

SOLIDS PROCESSING CENTER
UPPER LEVEL PLAN

SHEET	270
DWG NO.	72-M-140
DATE	MAR 1996
PROJ NO.	108015.TP

SF-48

FILE LOCATION: CV01:/PRJ/SALMONCK/108015/DRAWINGS/DAT/

SCHWING SCREW PRESS 900 PPH

ODOR SCRUBBER

LCP

LCP

FLOCC TANK

FLOCC TANK

72CS2402

¾" HPHW TO QUICK DISCONN. 4'-0" AFF

72CS8202

HOT WATER CLEANING SYSTEM CONTROL STATION

¾"-HPHW FROM HOT WATER CLEANING SYSTEM

2'-6"

5'-0"

72M9002

JIB CRANE

JIB CRANE BOOM NOT SHOWN FOR CLARITY

EXISTING ROLL UP DOOR

FUTURE

72CS2401

6" BPF

12" FRP/VENT THROUGH ROOF SEE DET 7006 SIM W/NEOPRENE BOOT

¾" HPHW TO QUICK DISCONN. 4'-0" AFF

3" BWW

MATCH LINE, SEE DWG 72-M-200

72-M-203

72-M-203

LEGEND:

MAINTENANCE AREA AROUND EQUIPMENT

UPPER LEVEL PLAN

1/4"=1'-0"

NOTES:

1. CONTRACTOR SHALL CONNECT FILTRATE PIPING FROM BELT FILTER PRESS DRAIN TRAYS TO 8" FILTRATE PIPE BELOW PRESS.

FIGURE 3

RECORD DRAWINGS

Revisions Drawn By R. COWAN Date 8/98

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

The Contract Document Drawings are the printed documents dated MAR 1996 (date on drawing), as subsequently amended, which define the scope, extent, and character of the work. The original Contract Document drawing was sealed and signed by (name of sealer) CRAIG W. MASSIE, State of Washington PE No. 31,685 (state's PE No.

CH2M HILL

DSGN	B ENGLESON
DR	KL McCOY SC72M140.DLV
CHK	C MASSIE
APVD	H FRICKE

NO.	DATE	REVISION	BY	APVD
	8/98	RECORD DRAWINGS	RKC	SBR
4	4/97	CIR #251	RKC	SBR
3	2/97	CIR #200	RKC	SBR
2	1/97	CIR #173	RKC	SBR
1	1/97	CIR #165	RKC	SBR

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

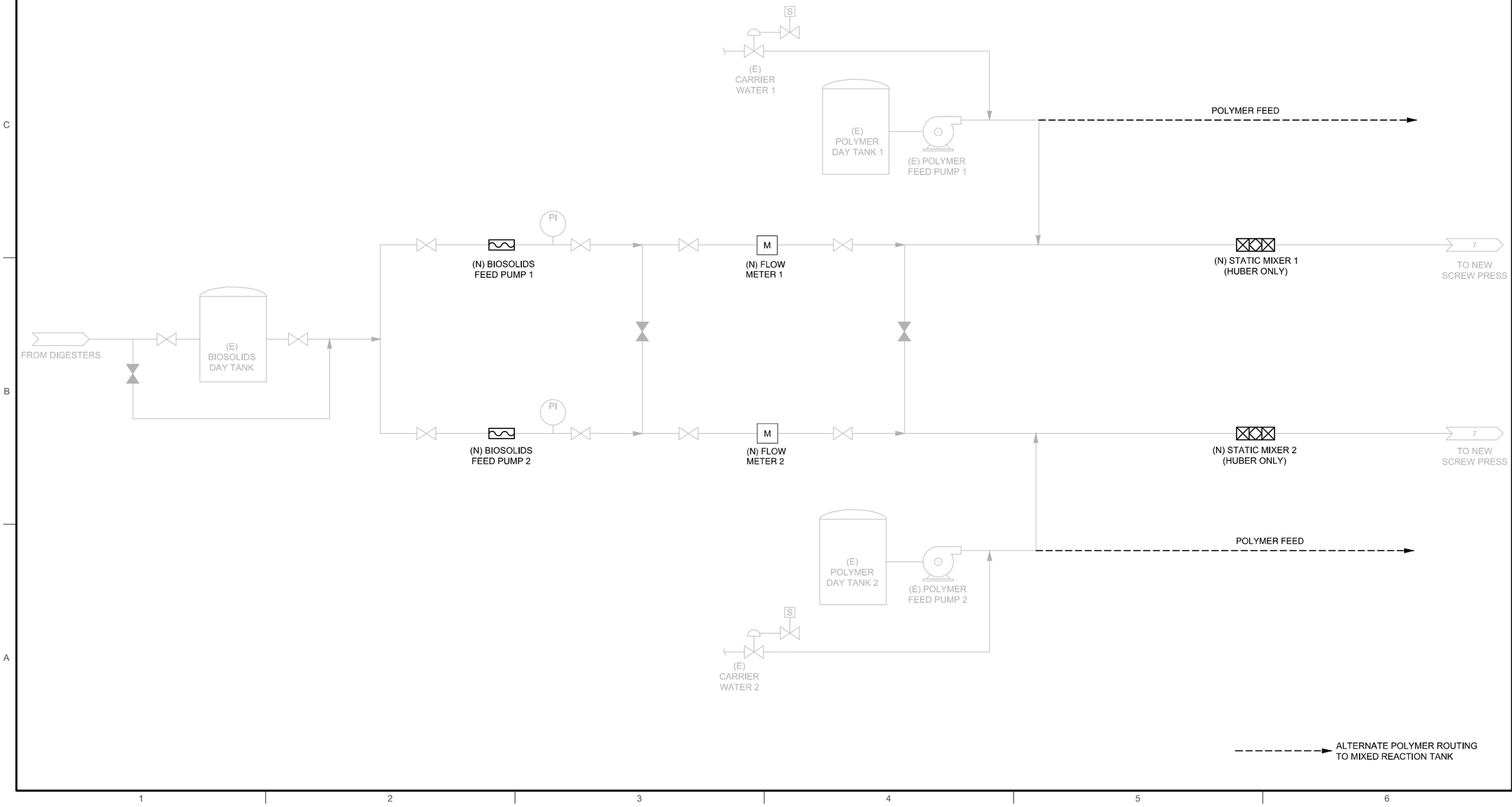
SALMON CREEK WWTP
CLARK COUNTY, WASHINGTON
PHASE 3 EXPANSION

SOLIDS PROCESSING CENTER
UPPER LEVEL PLAN

SHEET	270
DWG NO.	72-M-140
DATE	MAR 1996
PROJ NO.	108015.TP

SF-48

CONTROL PANEL



Brown AND Caldwell

THIS DRAWING IS NOT VALID FOR CONSTRUCTION PURPOSES UNLESS IT BEARS THE SEAL OF A DULY REGISTERED PROFESSIONAL

DISCOVERY CLEAN WATER ALLIANCE ~ CAPITAL PROGRAM PROJECT ~

DEWATERING EQUIPMENT REPLACEMENT PLAN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: Q. BEHNKE
DRAWN: T. DIMICELI
CHECKED:
CHECKED:
APPROVED: Q. BEHNKE

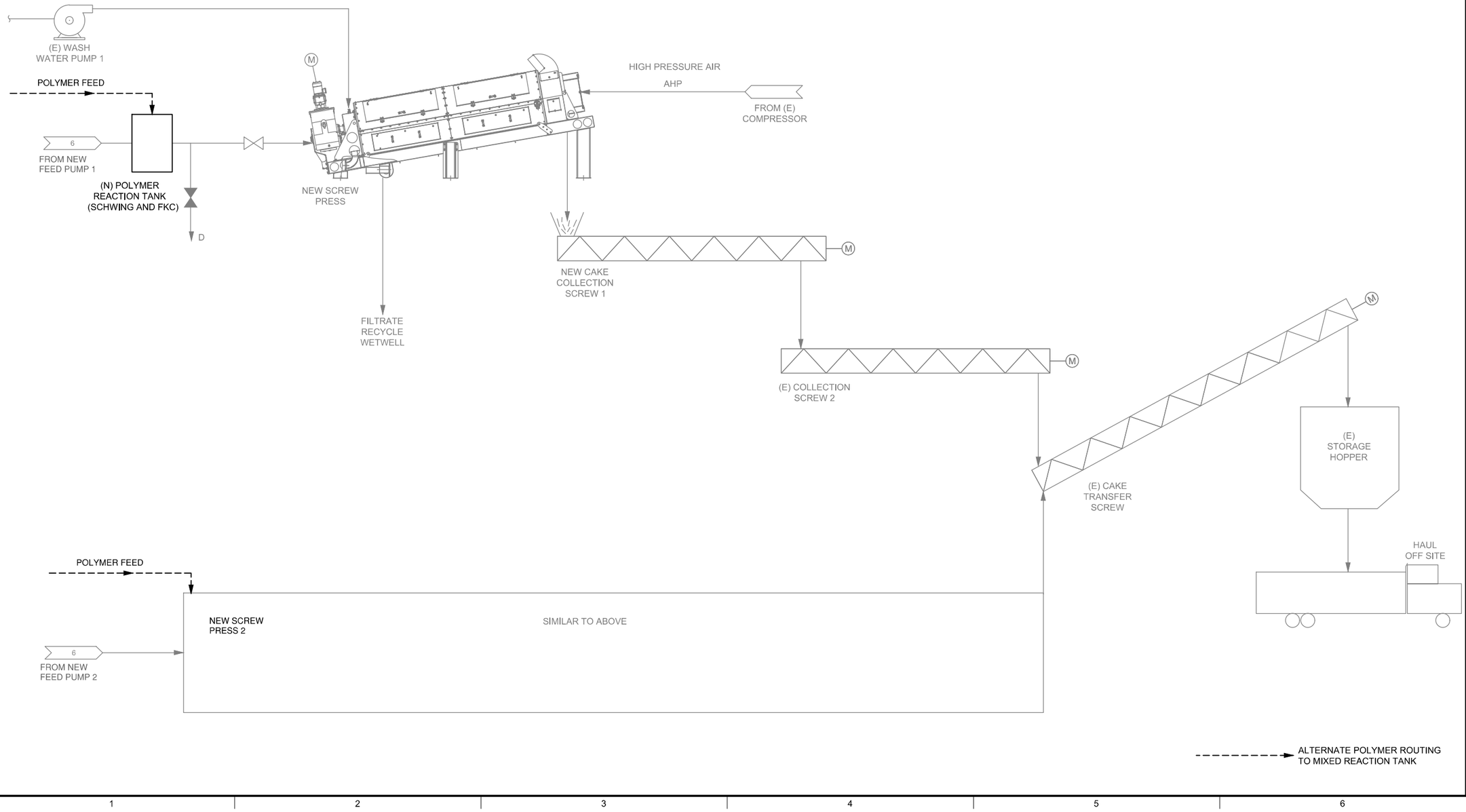
FILENAME
157062-FIG 5.DWG
BC PROJECT NUMBER
157062
CLIENT PROJECT NUMBER

SOLIDS DEWATERING FLOW SCHEMATIC 1

DRAWING NUMBER
FIGURE 4
SHEET NUMBER
OF

Path: C:\BCPW\D3140825 FILENAME: 157062-FIG 5.DWG PLOT DATE: 3/23/2023 2:28 PM CAD USER: TONY DIMICELI

CONTROL PANEL



Brown AND Caldwell

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DISCOVERY CLEAN WATER ALLIANCE ~ CAPITAL PROGRAM PROJECT ~

DEWATERING EQUIPMENT REPLACEMENT PLAN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: Q. BEHNKE
DRAWN: T. DIMICELI
CHECKED:
CHECKED:
APPROVED: Q. BEHNKE

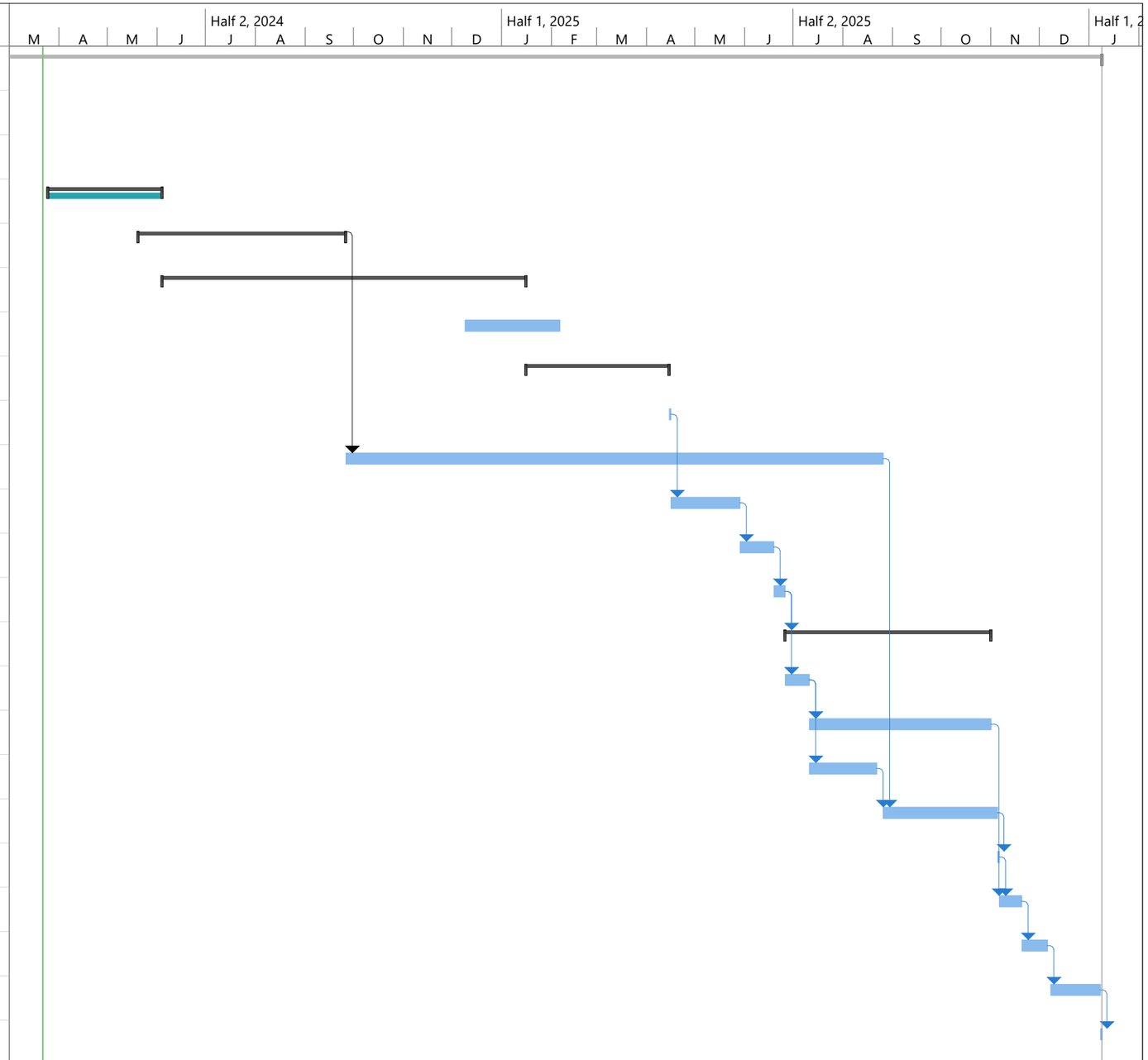
FILENAME
157062-FIG 6.DWG
BC PROJECT NUMBER
157062
CLIENT PROJECT NUMBER

SOLIDS DEWATERING FLOW SCHEMATIC 2

DRAWING NUMBER
FIGURE 5
SHEET NUMBER
OF

Path: C:\BCPW\D3140825 FILENAME: 157062-FIG 6.DWG PLOT DATE: 3/23/2023 2:27 PM CAD USER: TONY DIMICELI

ID	Phase No	Task No	Task Name	Start	Finish	Duration
0			**SCTP Dewatering Equipment Replacement**	**Tue 3/14/23**	**Thu 1/8/26**	**712 days?**
1	****		**Default**	**Tue 3/14/23**	**Tue 3/14/23**	**1 day?**
3			**Notice to Proceed**	**Tue 3/14/23**	**Tue 3/14/23**	0 days
4	**100**		**Basis of Design Report**	**Mon 3/25/24**	**Mon 6/3/24**	**50 days**
11	**200**		**Equipment Prepurchase Assistance**	**Mon 5/20/24**	**Wed 9/25/24**	**90 days**
15	**300**		**Detailed Design**	**Tue 6/4/24**	**Wed 1/15/25**	**155 days**
33	400		Permitting Assistance	Mon 12/9/24	Wed 2/5/25	8 wks
34	**500**		**Bid Period Services**	**Wed 1/15/25**	**Mon 4/14/25**	**62 days**
38			**Construction Notice to Proceed**	Tue 4/15/25	Tue 4/15/25	1 day
39			**Equipment Procurement**	Thu 9/26/24	Mon 8/25/25	230 days
40			**Submittal Preparation**	Wed 4/16/25	Wed 5/28/25	30 days
41			**Submittal Review**	Thu 5/29/25	Wed 6/18/25	15 days
42			**Mobilization**	Thu 6/19/25	Wed 6/25/25	5 days
43			**Temporary Dewatering**	**Thu 6/26/25**	**Fri 10/31/25**	**90 days**
44			Installation	Thu 6/26/25	Thu 7/10/25	10 days
45			Operation	Fri 7/11/25	Fri 10/31/25	80 days
46			**Demolition and Ancillary System Install**	Fri 7/11/25	Thu 8/21/25	30 days
47			**Installation of New Equipment**	Tue 8/26/25	Tue 11/4/25	50 days
48			**Substantial Completion/Start Warranty**	Wed 11/5/25	Wed 11/5/25	1 day
49			**Commisioning and Startup**	Thu 11/6/25	Wed 11/19/25	10 days
50			**Staff Training**	Thu 11/20/25	Fri 12/5/25	10 days
51			**Final Punch List**	Mon 12/8/25	Wed 1/7/26	20 days
52			**Final Completion**	Thu 1/8/26	Thu 1/8/26	1 day



Project: SCTP Dewatering Equip
Date: Fri 3/22/24

Task	Inactive Task	Manual Summary Rollup	External Milestone	Progress
Split	Inactive Milestone	Manual Summary	Deadline	Manual Progress
Milestone	Inactive Summary	Start-only	Baseline	
Summary	Manual Task	Finish-only	Baseline Milestone	
Project Summary	Duration-only	External Tasks	Baseline Summary	

Attachment B: Opinion of Probable Construction Cost

Item 1. Screw Press and Centrifuge OPCC

Memorandum

Date:	March 13, 2023
To:	Bryan Paulson, Portland
From:	Steve Payne, Atlanta
Reviewed by:	Bill Agster, Denver
Copy to:	Quinn Behnke, Portland
Project No.:	157062.002.****
Subject:	CRWWD SCTP Dewatering Equipment Replacement Plan Planning Level Design Completion Basis of Estimate of Probable Construction Cost

The Basis of Estimate Report and supporting estimate reports for the subject project are attached. Please call me if you have questions or need additional information.

Enclosures (2):

1. Basis of Estimate Report
2. Summary Estimate

Basis of Estimate Report

CRWWD SCTP Dewatering Equipment Replacement Plan

Introduction

Brown and Caldwell (BC) is pleased to present this opinion of probable construction cost (estimate) prepared for the Clark Regional WWD SCTP Dewatering Equipment Replacement Plan, Vancouver, WA.

Estimated Project Costs

Based on the typical accuracy of a Class 5 estimate, the expected ranges of costs are:

	Upper Range	Estimated Cost	Lower Range
	+100%		-50%
Alt 1 - Screw Presses	$ 9,362,000	$ 4,681,000	$2,341,000
Alt 2 - Centrifuges	$ 11,148,000	$ 5,574,000	$2,787,000

Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Allowances for known but undefined work
- Contractor and other estimate markups

Scope of Work

The project includes evaluating options to replace the existing belt filter press dewatering system at the Salmon Creek Treatment Plant. This estimate includes preliminary costs to replace the two existing units with one of the following alternatives:

- Two new screw presses
- Two new centrifuges

The new equipment will be installed in approximately the same location as the existing equipment.

Background of this Estimate

In a previously submitted planning level estimate dated January 2022, BC's estimating team presented an estimate of probable cost based on documents furnished to the Estimating and Scheduling Group (ESG), and on the overall market conditions at that time. As a result of refinements in the project, the size and scope of features in this project have changed. These changes are reflected in the current estimate.

The attached estimate of probable construction cost is based on documents dated December 2021 and updated equipment quotes dated January 2023, received by the Estimating and Scheduling Group (ESG). These documents are described as planning level stage based on the current project progression, additional or updated scope and/or quantities, and ongoing discussions with the project team. Further information can be found in the detailed estimate reports.

Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 5 estimate. A Class 5 estimate is defined as a Conceptual Level or Project Viability Estimate. Typically, engineering is from 0 to 2 percent complete. Class 5 estimates are used to prepare planning level cost scopes or evaluation of alternative schemes, long range capital outlay planning and can also form the base work for the Class 4 Planning Level or Design Technical Feasibility Estimate.

Expected accuracy for Class 5 estimates typically ranges from -50 to +100 percent, depending on the technological complexity of the project, appropriate reference information and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes and equipment pricing furnished either by the project team or by the estimator. The estimate includes direct labor costs and anticipated productivity adjustments to labor and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of Sage Construction and Real Estate 300 estimating software engine (formerly Timberline) using RS Means database, historical project data, the latest vendor and material cost information, and other costs specific to the project location.

Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel) and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and worker's compensation insurance are included in the labor rates. No trade discounts were considered.

Indirect Cost Development

Excise sales tax has been applied to the total probable contract value. A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data.

The contractor's cost for builder's risk, general liability and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost and are added after the net markups have been applied to the appropriate items.

Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Contractor's credentials, applicable to the type of project.
2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions or any other unplanned costs.
3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.
4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except that which will be performed by traditional specialty subcontractors as identified here:
   - Electrical
   - Temporary dewatering system

Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Temporary dewatering will be required for the duration of the project which is assumed to be six months for each alternative. A single 260-gpm centrifuge with chemical feed and conveyors will be adequate.
2. The existing grating will be replaced with aluminum grating. Any existing steel supports will be recoated.
3. New grating platforms will be aluminum with aluminum structural members.
4. New sludge and centrate/pressate piping will be A53 steel, Grade B, Sch40, grooved.
5. The existing rollup door on the south side of the building will be used to remove the existing equipment from the building and bring the new equipment in. No structural modifications will be required.
6. The new monorails may require minor structural modifications. The modifications will be based on a structural evaluation of the existing building which is not included in the construction cost.
7. The existing MCC and conduit will feed the new equipment. New cables, disconnects, and controls will be required for each unit.
8. Contractor performs the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift. No allowance has been made for additional shift work or weekend work.
9. Contractor has complete access for lay-down areas and mobile equipment.

10. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates, and/or rates contained in the estimating database.
11. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.
12. Major equipment costs are based on vendor supplied price quotes obtained by the project design team and/or estimators and on historical pricing of like equipment.
13. Process equipment vendor training using vendors' standard Operations and Maintenance (O&M) material is included in the purchase price of major equipment items where so stated in that quotation.
14. Bulk material quantities are based on manual quantity take-offs.
15. There is enough electrical power to feed the specified equipment.

Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.
2. O&M costs for the project except for the vendor supplied O&M manuals.
3. Utility agency costs for incoming power modifications.
4. Permits beyond those normally needed for the type of project and project conditions.
5. Impacts from COVID-19 including additional labor and management hours required to meet social distancing, personal protection, and cleaning routines, additional costs of protective equipment, supply chain impacts, and material shortages.

Allowances for Known but Undefined Work

The following allowances were made in the development of this estimate.

1. Electrical and Instrumentation - $175,000 per unit
2. Modifications to existing structure to accommodate monorail hoists - $10,000 per alternative

Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

Table 1. Estimate Markups

Item	Rate (%)
Net Cost Markups	
Labor (employer payroll burden)	15
Materials and process equipment	10
Equipment (construction-related)	10
Subcontractor	10
Material Shipping and Handling	2
Gross Cost Markups	
Contractor General Conditions	15

Start-up, Training and O&M	2
Construction Contingency	40
Builders Risk, Liability and Auto Insurance	2
Performance and Payment Bonds	1.5
Sales Tax (Excise-Gross Receipts-Contract Value)	8.5
Escalation to Midpoint of Construction	21

Labor Markup

The labor rates used in the estimate were derived from RS Means latest national average wage rate tables and city cost indexes. These include base rate paid to the laborer plus fringes. A labor burden factor is applied to these such that the final rates include all employer paid taxes. These taxes are FICA (which covers social security plus Medicare), Workers Comp (which varies based on state, employer experience and history) and unemployment insurance. The result is fully loaded labor rates. In addition to the fully loaded labor rate, an overhead and profit markup is applied at the back end of the estimate. This covers payroll and accounting, estimator's wages, home office rent, advertising, and owner profit.

These fully loaded national labor rates were then adjusted for local conditions using the RS Means City Cost Index for Vancouver, Washington.

Materials and Process Equipment Markup

This markup consists of the additional cost to the contractor beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

Equipment (Construction) Markup

This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all the equipment needed for the job, but to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is like the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup

This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Sales Tax (Excise-Gross Receipts-Contract Value)

This is the tax that the contractor must pay according to state and local taxation laws. The percentage is based on state, county, and local rates in place at the time the estimate was prepared. The percentage is applied to the total anticipated contract value.

Contractor Startup, Training, and O&M Manuals

This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup, and O&M manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and troubleshoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance

This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity and contractor's requirements and history. Instead of using numbers from a select few contractors, we believe it is more prudent to use a combined 2 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and the contractor's insurability at the time the project is bid.

Material Shipping and Handling

This can range from 2 to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paperwork, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the value of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies, e.g., oil, gaskets and bolts that may be missing from the equipment or materials shipped.

Escalation to Midpoint for Labor, Materials and Subcontractors

In addition to contingency, it is customary for projects that will be built over several years to include an escalation to midpoint of anticipated construction to account for the future escalation of labor, material, and equipment costs beyond values at the time the estimate is prepared. For this project, the anticipated rate of escalation is 3 percent per annum.

The estimated construction time for this project is 6 months, exclusive of unusual weather or site conditions delays. Construction is anticipated to start March 2028 and be completed by October 2028. The escalation factors used in this estimate are calculated from the date of this estimate to the anticipated midpoint of construction which is approximately 77 months from the implementation of the current database pricing.

Undesigned/Undeveloped Contingency

The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that cannot be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage and area factors, construction contingency can range from 10 to 50 percent.

Performance and Payment Bonds

Based on historical and industry data, this can range from 0.75 to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, contractor's historical record on similar projects, complexity and current bonding limits. BC uses 1.5 percent for bonds, which we have determined to be reasonable for most heavy construction projects.

Estimate Summary Report

3/13/2023 6:03 PM

BC Project Number: 157062.002.****
Estimate Version Number: 1
Estimate Date: 02/21/2023
Lead Estimator: Steve Payne

SALMON CREEK TREATMENT PLANT, DEWATERING EQUIPMENT REPLACEMENT PLAN

CLARK REGIONAL WASTEWATER DISTRICT
SALMON CREEK TREATMENT PLANT, DEWATERING EQUIPMENT REPLACEMENT PLAN
CLASS 5 ESTIMATE

Estimator	Steve Payne
BC Project Manager	Bryan Paulson
BC Office	Portland
Est Version Number	1
QA/QC Reviewer	William Agster
QA/QC Review Date	02/21/2023
BC Project Number	157062.002.****

SALMON CREEK TREATMENT PLANT, DEWATERING EQUIPMENT REPLACEMENT PLAN

Phase	Description	Gross Total Cost with Markups
01 ALT 1 - SCREW PRESSES		
* unassigned *		
01 Demolition		95,942
03 Structural		463,690
04 Process		3,345,408
05 Electrical and I&C		776,124
* unassigned *		4,681,164
01 ALT 1 - SCREW PRESSES		4,681,164
02 ALT 2 - CENTRIFUGES		
* unassigned *		
01 Demolition		92,544
03 Structural		359,705
04 Process		4,345,303
05 Electrical and I&C		776,124
* unassigned *		5,573,675
02 ALT 2 - CENTRIFUGES		5,573,675

Prepared for Huber screw press. Equipment costs updated for FKC 900 lb/hr units and allowance/markups applied to new equipment cost.

Attachment C: State Environmental Policy Act (SEPA) Checklist

Item 1. SEPA Checklist

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization, or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. **You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown.** You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to **all parts of your proposal,** even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for lead agencies

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B, plus the Supplemental Sheet for Nonproject Actions (Part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in "Part B: Environmental Elements" that do not contribute meaningfully to the analysis of the proposal.

A. Background Find help answering background questions

1. Name of proposed project, if applicable:

Salmon Creek Treatment Plant Dewatering Equipment Replacement #93-2021-0058

2. Name of applicant:

Discovery Clean Water Alliance

3. Address and phone number of applicant and contact person:

8000 Northeast 52nd Court
Vancouver, WA 98665
(360)-719-1653
Attn: Robin Krause, P.E., Principal Engineer

4. Date checklist prepared:

April 10, 2024

5. Agency requesting checklist:

Discovery Clean Water Alliance (Alliance)

6. Proposed timing or schedule (including phasing, if applicable):

The Alliance anticipates project construction will last 2 years beginning in 2025 and ending in 2026.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

The Alliance does not propose further additions, expansion, or activity related to the proposed project.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

None known

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

None known

10. List any government approvals or permits that will be needed for your proposal, if known.

- Washington State Department of Ecology (Ecology):
  - Review and approval of engineering report per WAC 173-240-060
- Clark County :
  - Building permit
  - Mechanical Permit
  - Electrical Permit

11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

This project consists of replacing aging mechanical dewatering equipment for municipal biosolids at an operating municipal wastewater treatment plant. The existing equipment will be removed and two new mechanical dewatering units will be installed in the same location in the existing building. Minor updates to supporting systems will occur. A temporary, trailer mounted biosolids dewatering unit will be connected to the system, and installed on existing pavement adjacent to the existing building.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Solids Processing Building and Digester Complex Buildings, Salmon Creek Treatment Plant, 15100 Northwest McCann Road, Vancouver, WA 98685

B. Environmental Elements

1. Earth Find help answering earth questions

a. General description of the site:

Project scope will be contained within existing building structures and on existing adjacent pavement.

Circle or highlight one: Flat, rolling, hilly, steep slopes, mountainous, other: On existing pavement and within existing structures

b. What is the steepest slope on the site (approximate percent slope)?

Existing pavement slope is less than approximately 5%

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them, and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

This project will not involve disturbance of any existing soils.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

This project will not involve disturbance of any existing soils.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

This project will not involve any filling, excavation, or grading.

f. Could erosion occur because of clearing, construction, or use? If so, generally describe.

No

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

This project will not alter extent existing impervious surface area.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any.

Does not apply

2. Air Find help answering air questions

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

During construction of this project, construction equipment and vehicle traffic may generate particle pollution from emissions that include nitrogen oxides (NO_x) and carbon monoxide (CO) but this pollution will be temporary in nature.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

This project will be constructed within the boundaries of the existing wastewater treatment plant and will not be affected by off-site emissions or odor.

c. Proposed measures to reduce or control emissions or other impacts to air, if any.

Air emissions during construction will be within regulatory limits. Air emissions during construction could be managed, as needed, by carpooling, reducing engine idling, or other methods.

During operation and maintenance of this project, there will not be an increase in air emissions compared to existing.

3. Water Find help answering water questions

a. Surface Water: Find help answering surface water questions

1. **Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

Salmon Creek is adjacent to the existing plant site, flowing into the Lake River and then the Columbia River.

2. **Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

This project will not require any work over, in, or adjacent to the described waters.

3. **Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

This project will not include any filling or dredging.

4. **Will the proposal require surface water withdrawals or diversions? Give a general description, purpose, and approximate quantities if known.**

This project will not require and surface water withdrawals or diversions.

5. Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

This project does not lie within a 100-year floodplain.

6. Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

The SCTP discharges treated wastewater to the Columbia River. This treated effluent is a permitted discharge under NPDES Permit No. WA0023639, and meets all Washington regulatory requirements for water quality.

This project will alter the type or volume of treated wastewater discharged to the Columbia River.

b. Ground Water: Find help answering ground water questions

1. Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give a general description, purpose, and approximate quantities if known.

This project will not withdraw any groundwater or discharge any water to groundwater.

2. Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (domestic sewage; industrial, containing the following chemicals…; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

This project will not results in or require any discharge of waste materials to groundwater.

c. Water Runoff (including stormwater):

a) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Stormwater runoff from existing impervious surfaces within the wastewater treatment plant is collected and disposed of using the existing stormwater management infrastructure on the plant site. No new impervious surfaces will be constructed as part of this project.

b) Could waste materials enter ground or surface waters? If so, generally describe.

No waste material is expected to enter groundwater or surface water during construction or operation of the new dewatering equipment.

c) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

The project will not affect drainage patterns during construction or operation.

d) Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any.

During construction, runoff will be controlled by implementing a prudent erosion and sediment control plan.

4. Plants Find help answering plants questions

a. Check the types of vegetation found on the site:

- ☒ **deciduous tree: alder, maple, aspen, other:**
- ☒ **evergreen tree: fir, cedar, pine, other**
- ☒ **shrubs: willow species**
- ☒ **grass**
- ☐ **pasture**
- ☐ **crop or grain**
- ☐ **orchards, vineyards, or other permanent crops.**
- ☐ **wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other**
- ☐ **water plants: water lily, eelgrass, milfoil, other**
- ☐ **other types of vegetation**

b. What kind and amount of vegetation will be removed or altered?

This project will not remove or alter any vegetation.

c. List threatened and endangered species known to be on or near the site.

No threatened or endangered species are located within the project site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any.

This project does not include any new landscaping or alteration of existing landscaping.

e. List all noxious weeds and invasive species known to be on or near the site.

Table 3 lists known weeds and invasive species in the area around, but not necessarily within, the SCTP wastewater treatment plant.

Table 3. Noxious Weeds and Invasive Species at the Proposed Project Site.

Common Name	Scientific Name	Invasive Species[a]	Noxious Weed Class[b]	
			B	C
Canada thistle	*Cirsium arvense*			X
Common catsear	*Hypochaeris radicata*			X
Common St. Johnswort	*Hypericum perforatum*			X
Common teasel	*Dipsacus fullonum*			X
English hawthorn	*Crataegus mongyna*			X
English ivy	*Hedera helix*	X		X
Field bindweed	*Convolvulus arvensis*			X
Himalayan blackberry	*Rubus armeniacus*	X		X
Indigobush	*Amorpha fruticosa*		X	
Oxeye daisy	*Leucanthemum vulgare*			X
Reed canarygrass	*Phalaris arundinacea*			X
Tansy ragwort	*Tanacetum vulgare*			X
Wild carrot	*Daucus carota*	X		X

[a] Invasive Species: Washington law, RCW 79A.25.310, include non-native organisms that cause economic or environmental harm and can spread to new areas of the state. Invasive species do not include domestic livestock, intentionally planted agronomic crops, or non-harmful exotic organisms.

[b] Noxious Weeds: Washington law, RCW 17.10.140, requires landowners to control and prevent the spread of Class B and Class C noxious weeds. Class B noxious weeds are nonnative species whose distribution is limited to portions of Washington, but may be widespread in other parts. Class C noxious weeds are either already widespread in Washington or are of special interest to the agricultural industry.

5. Animals Find help answering animal questions

a. List any birds and other animals that have been observed on or near the site or are known to be on or near the site.

Deer, salmon, and heron are present in the area surrounding the SCTP plant site, but are not observed within the site area of this project.

Examples include:

- **Birds: hawk, heron, eagle, songbirds, other:**
- **Mammals: deer, bear, elk, beaver, other:**
- **Fish: bass, salmon, trout, herring, shellfish, other:**

b. List any threatened and endangered species known to be on or near the site.

None known within the scope are of this project.

c. Is the site part of a migration route? If so, explain.

The Pacific Flyway and migratory fish routes are in the general vicinity of the SCTP site, but are not impacted by the construction or operation of this project.

d. Proposed measures to preserve or enhance wildlife, if any.

This project is not anticipated to have any effect on animals found in the vicinity of the plant site.

e. List any invasive animal species known to be on or near the site.

None known

6. Energy and Natural Resources Find help answering energy and natural resource questions

1. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electrical energy and diesel will be used in the construction of the project. Operation of the new wastewater process equipment will use similar or less electrical energy when compared to the existing equipment.

2. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No, there are no known solar energy uses on adjacent properties.

3. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.

Smaller and more efficient equipment motors are anticipated as part of the project when compared to existing equipment.

7. Environmental Health Find help with answering environmental health questions

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur because of this proposal? If so, describe.

During construction, the mechanized equipment may use minor amounts of fuels, lubricants, adhesives, coatings, and other substances but are not anticipated to pose a significant risk of health hazard.

1. Describe any known or possible contamination at the site from present or past uses.

None known

2. Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

There are no known underground hazardous pipelines within the project area.

3. Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Construction equipment will use petroleum-based fuels and petroleum- or vegetable-based lubricants. The contractor will prepare and implement a spill prevention, control, and

countermeasures (SPCC) plan to avoid, minimize, and, if necessary, respond to fuel and lubricant releases during construction. Toxic or hazardous chemicals will be stored within containment. Fuel storage for construction equipment will not be allowed at the project site.

4. Describe special emergency services that might be required.

The need for emergency services is not anticipated for this project. Fire, medical, or cleanup services might be required during construction.

5. Proposed measures to reduce or control environmental health hazards, if any.

The contractor will use the SPCC for the construction duration to minimize the effects of an unintentional release of fuel, lubricants, or other hazardous materials during construction. The SPCC will be submitted to the project engineer before beginning construction activities. The plan will be updated as needed and include emergency notification telephone numbers. Spill control and containment kits will be kept at the construction site.

b. Noise

1. **What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**

There are no noise sources in the area that will affect the project. Noises generated from the existing SCTP operation are within allowable noise limits and will not affect the construction or operation of this project.

2. **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site)?**

Short term construction noise during weekday working hours is anticipated. Construction noise will be temporary and will vary based upon the equipment being used. This project will not require large earth-moving equipment during construction and most of the construction noise will be contained within the existing structures. Long-term noise from truck traffic will be similar to, or slightly less, than existing traffic from the plant site due to improved equipment performance.

3. **Proposed measures to reduce or control noise impacts, if any.**

The closest existing residences are approximately 875 feet to the south of the project area and may be affected by temporary construction noise. The Alliance will implement the following noise abatement methods during construction to minimize noise impacts on residents. These requirements will be incorporated into the contract documents:

- Operation of construction equipment will meet Clark County noise requirements.
- Operation of construction equipment will be prohibited within 1,000 feet of any occupied dwelling unit at night (8 pm through 6:30 am), on Sundays, and legal holidays.
- All engine-powered equipment will have mufflers installed according to manufacturer specifications and shall be required to comply with pertinent equipment noise standards of the U.S. Environmental Protection Agency.
- Limiting construction traffic to a maximum speed as posted within the SCTP plant site.

8. Land and Shoreline Use Find help answering land and shoreline use questions

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Current site is a municipal wastewater treatment plant (SCTP). There will be no changes to current land use as part of this project.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses because of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

This project will occur in a previously developed area and there will be no land conversion.

1. **Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how?**

This project will not affect or be affected by surrounding agricultural or forest lands.

c. Describe any structures on the site.

This project will be constructed within and adjacent to existing structures at SCTP. No major structure modifications are anticipated as part of this project.

d. Will any structures be demolished? If so, what?

This project will not require any structure demolition.

e. What is the current zoning classification of the site?

SCTP property is currently zoned Public Facilities (PF).

f. What is the current comprehensive plan designation of the site?

SCTP property is currently zoned Public Facilities (PF).

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

The area within SCTP, where the project will occur, is not classified as a critical area.

i. Approximately how many people would reside or work in the completed project?

None

j. Approximately how many people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any.

The project will not displace any residences or businesses.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.

None apply

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any.

This project will not have any impacts to agricultural or forest lands.

9. Housing Find help answering housing questions

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

This project will not construct any housing units. Not applicable.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

This project will not eliminate any housing units. Not applicable.

c. Proposed measures to reduce or control housing impacts, if any.

None proposed, as this project will not impact housing.

10. Aesthetics Find help answering aesthetics questions

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

This project will occur within existing structures. The height and exterior of the existing structures will not be altered by this project.

b. What views in the immediate vicinity would be altered or obstructed?

This project will no obstruct any views in the immediate vicinity.

c. Proposed measures to reduce or control aesthetic impacts, if any.

This project will not alter the aesthetics of any structures so no measures are proposed.

11. Light and Glare Find help answering light and glare questions

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

This project will not produce any new sources of light or glare.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No new sources of light or glare are included in the project.

c. What existing off-site sources of light or glare may affect your proposal?

No existing off-site sources will impact this project.

d. Proposed measures to reduce or control light and glare impacts, if any.

None proposed, as this project will not result in any change to light or glare of existing facility.

12. Recreation Find help answering recreation questions

a. What designated and informal recreational opportunities are in the immediate vicinity?

Salmon Creek is adjacent to the site and can be used for recreation

b. Would the proposed project displace any existing recreational uses? If so, describe.

No, this project will not displace any existing recreational uses.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any.

None proposed, as this project will not impact recreation.

13. Historic and Cultural Preservation Find help answering historic and cultural preservation questions

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

No, there are none within the project site.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No, there are none within the SCTP plant site and project site contained therein.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

None apply, as this project is contained within the existing site boundaries of the SCTP plant site.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

None proposed, as this project is contained within the existing SCTP plant site.

14. Transportation Find help with answering transportation questions

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

NW McCann Rd is a public street that runs through a neighborhood development and is the entrance to the plant. Access to NW McCann Road will be maintained throughout the project.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

C-TRAIN serves the Vancouver Urban Growth Boundary, but does not serve the project site.

c. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle, or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

The project will not require any new or improved roads, streets, or other public transportation facilities.

d. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No, the project will not use or occur in the vicinity of any water, rail, or air transportation.

e. How many vehicular trips per day would be generated by the completed project or proposal? If

known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Approximately 3 trips per week of biosolids haul trucks are anticipated with the completed project. The trip quantity is expected to be less than existing trips. Trip quantity projections were calculated using projected biosolids production quantities at an assumed volume hauled per trip.

Temporary construction traffic will vary based on the phase of construction, but is not anticipated to add more than 5 trips per day at most to existing traffic.

f. Will the proposal interfere with, affect, or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No, this project will not affect or be affected.

g. Proposed measures to reduce or control transportation impacts, if any.

None proposed, as the impacts from the two year construction period are expected to be minor.

15. Public Services Find help answering public service questions

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No, this project will not result in an increased need for public services.

b. Proposed measures to reduce or control direct impacts on public services, if any.

None proposed, as there are not anticipated to be any direct impacts on public services.

16. Utilities Find help answering utilities questions

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

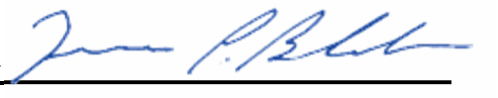
b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

No new utilities are needed for the project. The project will rely on existing utilities that service the SCTP without service upgrades. The existing electrical service is sufficient to operate the new mechanical equipment.

During construction, contractor may tie into existing lines at SCTP for temporary power. Contractor may also provide portable generators. A sanitary service will deliver and maintain portable toilets.

C. Signature Find help about who should sign

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

X 

Type name of signee: Quinn Behnke, P.E.

Position and agency/organization: Brown and Caldwell

Date submitted: 4/10/2024

D. Supplemental sheet for nonproject actions Find help for the nonproject actions worksheet

IT IS NOT REQUIRED to use this section for project actions.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. **How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**

No increase of the above categories anticipated after project completion. Short-term increase of diesel emissions is anticipated during project construction.

- **Proposed measures to avoid or reduce such increases are:**

None proposed

2. **How would the proposal be likely to affect plants, animals, fish, or marine life?**

Very unlikely

- **Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

None proposed due to low likelihood of impact

3. How would the proposal be likely to deplete energy or natural resources?

Not likely, as the electrical energy demand is anticipated to be equal to or less than the existing.

- **Proposed measures to protect or conserve energy and natural resources are:**

None proposed

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Very unlikely, as project is contained within existing site of SCTP.

- **Proposed measures to protect such resources or to avoid or reduce impacts are:**

None proposed

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Very unlikely, as project is contained within existing site of SCTP.

- **Proposed measures to avoid or reduce shoreline and land use impacts are:**

None proposed

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Very unlikely

- **Proposed measures to reduce or respond to such demand(s) are:**

None proposed

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

No conflicts