West Basin Facility Plan Project 7054

TECHNICAL MEMORANDUM 18

Hillsboro Implementation Plan

FINAL / August 2025

Produced by: carollo

Clean Water Services

Clean Water Services

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Abbreviations

AWW	average wet weather
CAMP®	Concentrated Accelerated Motivated Problem-Solving
CIP	capital improvement plan
District	Clean Water Services
HHPS	high-head pump station
MDWW	max day wet weather
MHWW	max hour wet weather
MMWW	max month wet weather
N/A	not applicable
PHF	peak hour flow
TM	technical memorandum
UV	ultraviolet
WRRF	Water Resource Recovery Facility

TM 18 HILLSBORO IMPLEMENTATION PLAN

18.1 Background

The capacities of existing unit processes at the Hillsboro Water Resource Recovery Facility (WRRF) were established in Technical Memorandum (TM) 11[1]. Evaluations of the condition of the existing Headworks facility and potential hydraulic bottlenecks were documented in TM 13[2] and TM 15[3], respectively. This memorandum presents the recommended implementation plan to address capacity and condition-related limitations identified during the planning process and to provide the required capacity through the 2045 planning horizon. The plan includes preliminary project scopes, planning-level cost estimates, and required site space.

18.2 Summary

As part of the capacity analysis completed for the Hillsboro WRRF, the capacities of the following unit process were evaluated through the 2045 planning period and buildout:

- Influent pumping.
- Influent screening.
- Grit removal.
- Primary clarification.
- Secondary treatment.
- Ultraviolet (UV) disinfection.
- Effluent pumping.
- Outfall.
- High Head Pump Station (HHPS).

Table 18.1 provides a summary of projects identified as required to provide capacity at the Hillsboro WRRF through the planning period and buildout. Unit processes not listed were determined to have sufficient capacity through buildout.

[1] Carollo Engineers, Inc. (July 2025). TM 11 - Hillsboro WRRF Capacity Evaluation, West Basin Facility Plan Project 7054.
[2] Carollo Engineers, Inc. (Forthcoming). TM 13 - Hillsboro WRRF Headworks and Grit Removal Evaluation, West Basin Facility Plan Project 7054.
[3] Carollo Engineers, Inc. (July 2025). TM 15 - Hillsboro Hydraulic Analysis, West Basin Facility Plan Project 7054.

Table 18.1 Summary of Recommended Projects

Project		Driver	Parameter	Year Online	Project Cost (2025)	Description
1	Headworks Improvements	Condition	N/A	2025	$3M	Near term improvements to reliability and operability.
2	Headworks Replacement	Condition	N/A	2035	$47M	New headworks building.
3	UV System Replacement	Condition	N/A	2035	$4M	New open channel UV system.
4	Effluent Pump Station/Outfall	Capacity	MDWW/ MHWW	2038	$1M	+1 effluent pump.
5	HHPS	Capacity	MHWW	2038	$0.6	Increased pump capacity.
6	Primary Clarification(1)	Capacity	MMWW	Buildout	--	+2 larger primary clarifiers.
7	Influent Pump Station	Capacity	MDWW	Buildout	--	Increased pump capacity.

Notes:
(1) Optional project within the buildout phase to address existing capacity limitation in the existing primary clarifiers currently alleviated by bypassing primary influent flow straight to the secondary process.
MDWW - max day wet weather; MHWW - max hour wet weather; MMWW - max month wet weather; N/A - not applicable; UV - ultraviolet.

18.3 Recommended Improvements

18.3.1 Preliminary Treatment

Influent Pump Station Improvements - By the year 2073, it is projected that additional capacity will be required in the influent pump station to meet MDWW conditions with the largest unit out of service.

Headworks Improvements - Improvements to the existing headworks are required to address equipment reliability and working conditions. As part of the Headworks and Grit Removal Evaluation the following critical improvements were identified for inclusion in this project: upgrades to the ventilation system, electric actuation of the existing slide gates, and replacement of the original grit piping, hydrocyclones, grit classifiers, and the remaining original grit pump, all of which have reached the end of their useful life.

Headworks Replacement - A more substantial headworks project will likely be necessary to fully address reliability and working conditions at the headworks in 2035 and will include the construction of a new headworks facility in the location of the existing operations building. Clean Water Services (District) would need to plan a new location for operations and administration, possibly a new separate structure or an existing structure on land to the north of the existing facility site.

18.3.2 Primary Treatment

Primary Clarification - The existing primary clarifiers are currently out of capacity based on a maximum surface overflow rate of 1500 gallons per day per square foot under MMWW conditions and have been identified as a potential hydraulic limitation at 2045 MHWW conditions. Both limitations are currently alleviated by allowing the primary influent flow to bypass the primary clarifiers via the existing passive bypass in the influent splitter structure. The existing secondary treatment process was determined to have sufficient capacity to treat bypassed flow through the planning period.

18.3.3 UV Disinfection/Effluent Pumping/Outfall

UV Disinfection – As detailed in the Hillsboro Capacity Evaluation[4], the existing UV system has sufficient treatment capacity through buildout, assuming firm capacity under average wet weather (AWW) flow conditions. However, this system, installed in 2013, will be nearing the end of its useful life in 2035; as such, replacement of the existing equipment with a new open-channel system and associated modification to the existing channels and level control weir has been factored into the capital improvement plan (CIP) within the planning period.

Effluent Pumping/Outfall - The existing effluent pump station was determined to be out of capacity under MDWW flow conditions with one unit out of service by 2028. Additionally, the outfall is expected to be hydraulically limited under peak hour flow (PHF) conditions in 2036. However, because flow can be diverted upstream via the HHPS, the trigger year for improvements to these facilities has been deferred to 2038 to align with the HHPS improvements. The preliminary project scope includes the addition of a third effluent pump to address the effluent pumping limitation. The District will also evaluate the condition of the outfall to verify existing conditions and determine what additional improvements may be required to address the hydraulic constraint.

High Head Transfer Pumping - Additional pump capacity will be required in the HHPS to meet MHWW flows in 2038. The District has recently completed improvements to this pump station to provide improved operability; thus, the estimated project costs shown are for nominal improvement to increase pump station capacity.

The recommended improvements will provide the required capacity through the 2045 planning period but will not change the process configuration. The current and future process flow diagram is shown in Figure 18.1 and the hydraulic profile at the 2045 PHF condition is shown in Figure 18.2. Note the hydraulic profile is based on the existing headworks; future hydraulic modeling will be required to determine the profile through a new headworks should the District proceed with that project.

[4] Carollo Engineers, Inc. (July 2025). TM 11 - Hillsboro WRRF Capacity Evaluation. West Basin Facility Plan Project 7054.

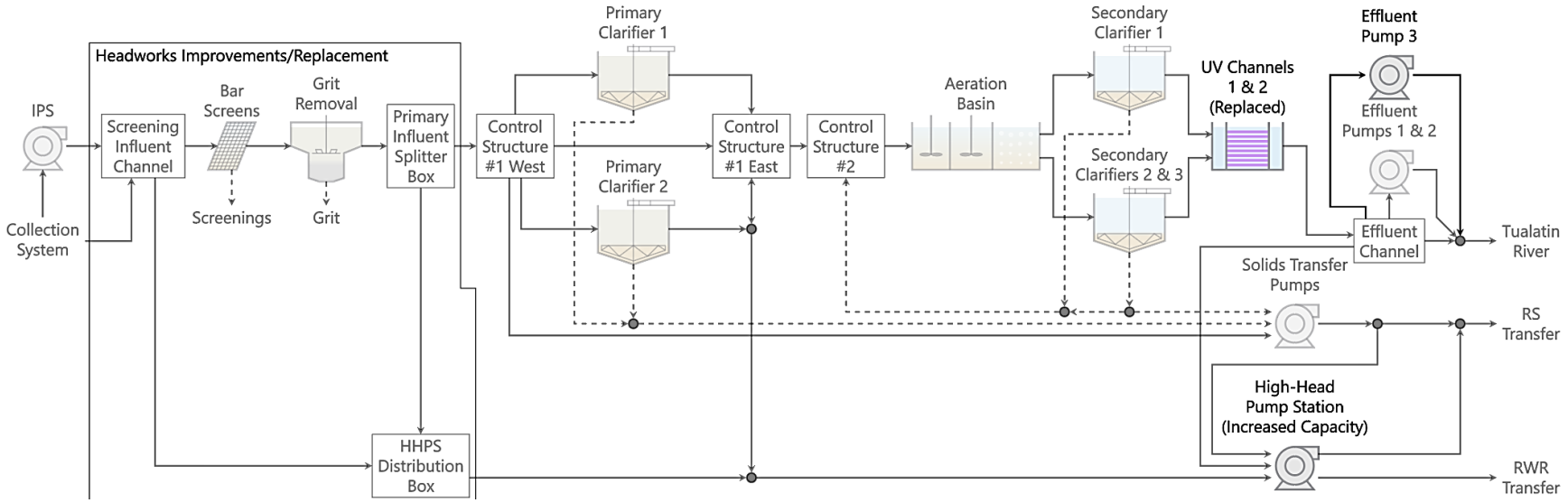

Figure 18.1 Hillsboro WRRF Simplified Process Flow Diagram

Fig_18.2.pdf

Figure 18.2 Hillsboro 2045 PHF - 20.4 mgd Plant Hydraulic Profile

18.4 Planning Level Cost Estimate

The estimated project costs have been developed for the projects identified in Table 18.1. These estimates are based on Association for the Advancement of Cost Engineering Class 5 cost estimates. Class 5 estimates are generally prepared based on very limited information and consequently have wide accuracy ranges. For these estimates, engineering is typically from 0 percent to 2 percent complete. The estimate is intended for strategic planning purposes, market studies, assessment of viability, project location studies, and long-range capital planning only. It was developed using stochastic estimating methods such as cost curves, capacity factors, and other parametric techniques. The expected accuracy ranges are from -20 percent to -50 percent on the low side and +30 percent to +100 percent on the high side. Ranges could exceed those shown in unusual circumstances.

Project markup factors applied to each estimated cost are shown in Table 18.2 and the project costs, in 2025 dollars, are shown for each project in Table 18.3.

Table 18.2 Project Cost Markup Factors

Parameter	Value	Notes/Reference
Contingency	30%	West Basin Alternatives CAMP®
Contractor General Conditions	10%	West Basin Alternatives CAMP®
Contractor Overhead and Profit	12%	West Basin Alternatives CAMP®
Engineering, Legal and Administration	20%	West Basin Alternatives CAMP®

Table 18.3 2045 CIP Cost Summary

Project		Preliminary Scope	Estimated Project Cost (2025)
1	Headworks Improvements	▪ Ventilation improvement, including redesign of duct work to optimize space utilization and odor control efficiency. ▪ Electric actuation of slide gates for remote operation. ▪ Replacement of aging grit piping, hydrocyclones, grit classifier and the remaining original grit pump.	$3M
2	Headworks Replacement	▪ New headworks building in the location of the existing operation building.	$47M
3	UV Disinfection	▪ Replacement of the existing UV system with a new open-channel UV system with associated modifications to the existing channels and level control weirs.	$4M
4	Effluent Pump Station/ Outfall Improvements	▪ Addition of a third effluent pump. ▪ Evaluation of existing outfall condition and potential improvements.	$1M
5	HHPS	▪ Nominal improvements to increase pump station capacity.	$0.6M

18.5 Project Schedule and Triggers

For each of the unit processes evaluated in the treatment capacity analysis, trigger plots were developed based on unit process design criteria and flow and load projections provided by the District[5].
Table 18.4 summarizes the trigger conditions for each improvement project, including those driven by capacity and those based on asset condition. For capacity-driven projects, the table identifies the specific trigger condition and the corresponding "trigger year", or the year the completed project is required to maintain required capacity. For condition-driven projects, the trigger year reflects the anticipated end of useful life or other operational concerns. In the case of the effluent pump station and outfall improvements, the trigger year was aligned with that of the high-head pump station, given that until that point, limitations at the effluent pump station and outfall can be temporarily managed through diversion of flows via the HHPS.

Table 18.4 Planning Period Project Triggers

Project	Driver	Flow Condition	Redundancy	Trigger Year
Headworks Improvements	Condition	N/A	N/A	2025
Headworks Replacement	Condition	N/A	N/A	2035
UV System Replacement	Condition	N/A	N/A	2035
Effluent Pump Station/ Outfall Improvements	Capacity	MDWW/MHWW	One unit out of service/ N/A	2038
HHPS Improvements	Capacity	MHWW	N/A	2038

A summary timeline of triggered projects is shown graphically in Figure 18.3. For some projects, a range of trigger years is shown. This is due to observed flow and loads increasing at a slower rate than originally projected, allowing for flexibility in the timing of the project.

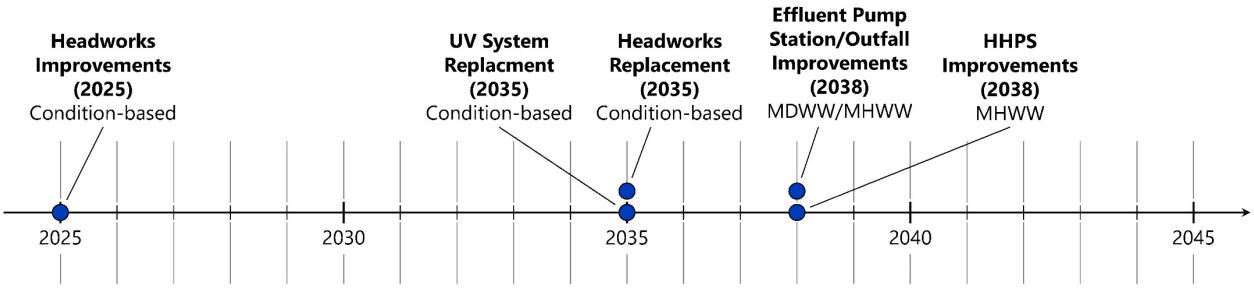

Figure 18.3 Triggered Project Timeline

Project design and construction durations were standardized based on estimated construction costs, as summarized in Table 18.5. These durations were used to develop the CIP timeline in Figure 18.4, which illustrates the distribution of projects at the Hillsboro facility over the planning period.

[5] Jacobs (2022-02-08). Flow and Load Projections Memorandum, West Basin Master Planning Preliminary Work.

Table 18.5 Project Duration Assumptions

Estimated Construction Cost	Design Duration (Months)	Construction Duration (Months)	Total Duration (Months)
< $10M	14	20	34
$10M to $30M	18	24	42
$30M to $50M	20	30	50
> $50M	24	36	60

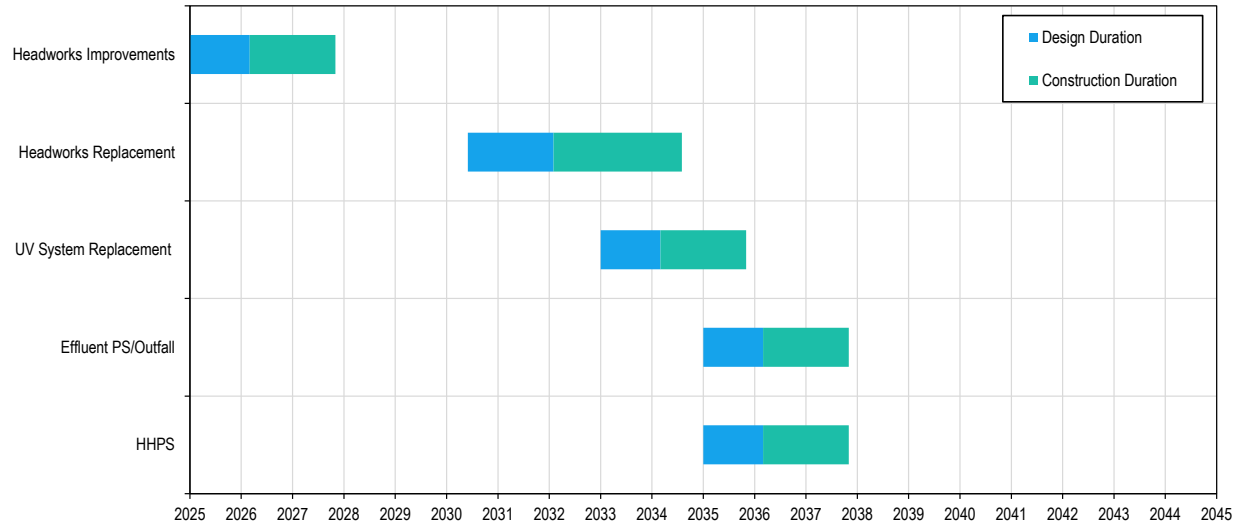

Figure 18.4 Hillsboro WRRF CIP Timeline

18.6 2045 Capital Improvements Plan

The estimated cash flow for the recommended improvements over the 20-year planning horizon is presented graphically in Figure 18.5 and summarized in Table 18.6. CIP costs shown in Figure 18.5 and Table 18.6 are escalated to the anticipated midpoint of construction based on the CIP timeline shown in Figure 18.4.

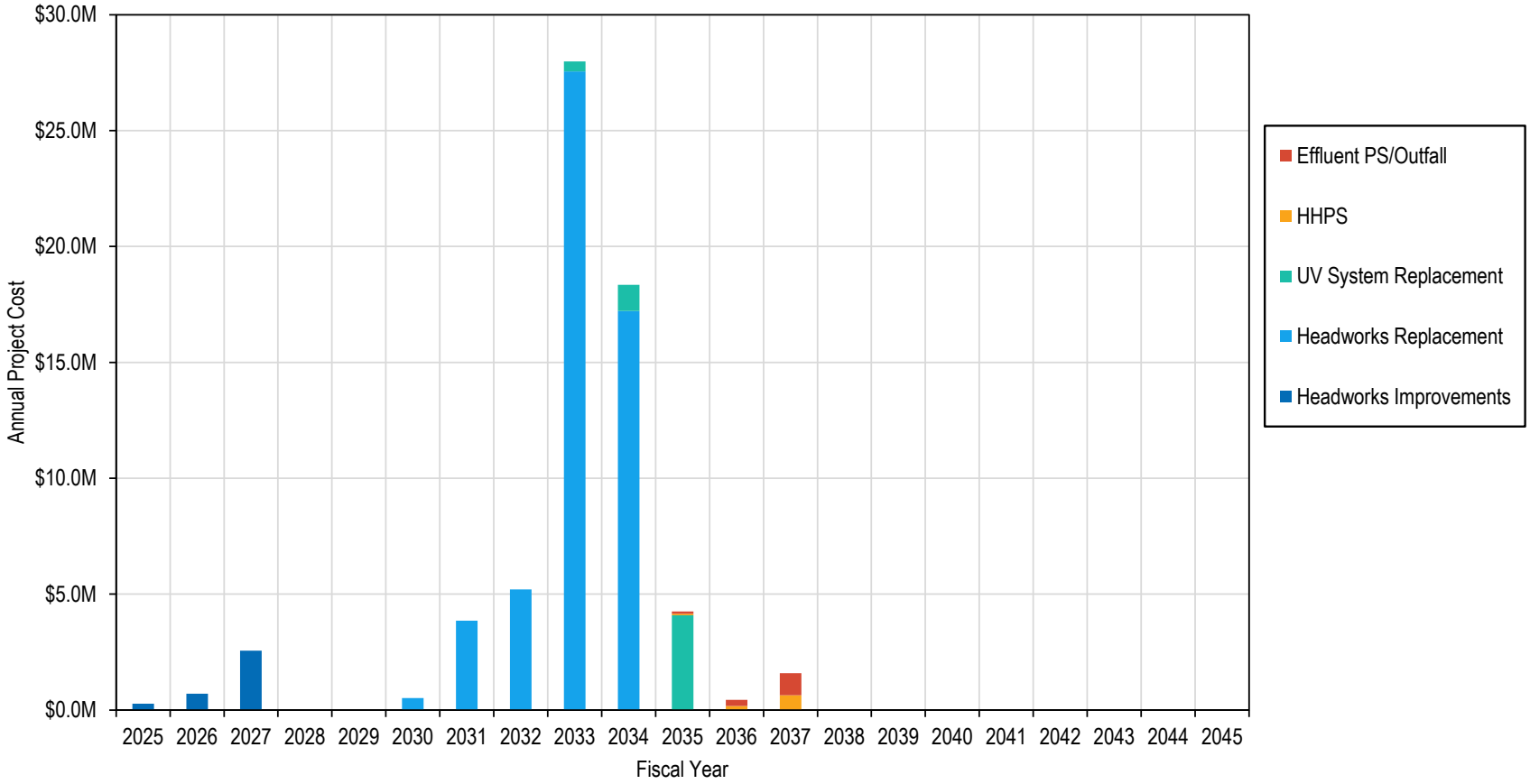

Figure 18.5 Hillsboro WRRF CIP Cashflow

Table 18.6 Tabulated CIP Cashflow[1]

Fiscal Year	Headworks Improvements	Headworks Replacement	UV System Replacement	HHPS	Effluent Pump Station/Outfall	Total[2]
2025	$300,000					**$300,000**
2026	$700,000					**$700,000**
2027	$2,600,000					**$2,600,000**
2028						**$0**
2029						**$0**
2030		$500,000				**$5,000,000**
2031		$3,900,000				**$3,900,000**
2032		$5,200,000				**$5,200,000**
2033		$27,600,000	$400,000			**$28,000,000**
2034		$17,200,000	$1,100,000			**$18,400,000**
2035			$4,100,000	$100,000	$100,000	**$4,300,000**
2036				$200,000	$300,000	**$400,000**
2037				$600,000	$1,000,000	**$1,600,000**
2038						**$0**
2039						**$0**
2040						**$0**
2041						**$0**
2042						**$0**
2043						**$0**
2044						**$0**
2045						**$0**
Total	**$3,500,000**	**$54,300,000**	**$5,600,000**	**$900,000**	**$1,300,000**	**$56,300,000**

Notes:
(1) Costs have been escalated to the mid-point of construction.
(2) Summation differences for totals are due to rounding.

18.7 Site Plan

A combined site plan is presented in Figure 18.6, highlighting the locations of recommended improvements through the planning period and buildout. If the District elects to proceed with the Headworks replacement project, the operations building may be relocated to an existing structure north of the current facility site, which is not currently part of the active operational footprint and therefore not shown, or to a new structure in the northeast portion of the existing site. Space has also been identified on the site for replacement of the primary clarifiers as an optional project that could be undertaken within the buildout phase.

Figure 18.6 Recommended 2045 and Buildout Site Plan

APPENDIX 18A

COST SUMMARIES

Near Term Improvements to Existing

		Estimate Class:	**5**
Project:	**7054 WBMP - HB Headworks & Grit Removal Evaluation**	**PIC:**	**BRM**
Client:	**Clean Water Services**	**PM:**	**BRM**
Location:	**Hillsboro, OR**	**Date:**	**5/28/2025**
Zip Code:	**97123**	**By:**	**SEW**
Carollo Job #	**200908**	**Reviewed:**	**ERA**

NO.	DESCRIPTION		TOTAL
1	Improved Influent Flow Measurement		$ 180,000
2	Replacement of Aging Grit Equipment and Piping		$ 1,170,000
3	Motorized Actuation of Channel Gates		$ 160,000
4	Grease Mitigation		$ 160,000
5	Ventilation Improvements		$ 70,000
6	Improvements to Access and Safety		$ 30,000
	TOTAL DIRECT COST		**$1,770,000**
	Contingency	30.0%	$531,000
	ESCALATED DIRECT COST WITH CONTINGENCY		**$2,301,000**
	General Conditions	10.0%	$230,000
	Subtotal		**$2,531,000**
	General Contractor Overhead and Profit	12.0%	$304,000
	Subtotal		**$2,835,000**
	TOTAL ESTIMATED CONSTRUCTION COST		**$2,835,000**
	Engineering, Legal & Administration Fees	20.0%	$567,000
	TOTAL ESTIMATED PROJECT COST		**$3,410,000**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Headworks Replacement

Project:	**7054 WBMP - HB Headworks & Grit Removal Evaluation**	**Estimate Class:**	**5**
Client:	**Clean Water Services**	**PIC:**	**BRM**
Location:	**Hillsboro, OR**	**PM:**	**BRM**
Zip Code:	**97123**	**Date:**	**6/10/2025**
Carollo Job #	**200908**	**By:**	**ERA**
		Reviewed:	**WK**

NO.	DESCRIPTION		TOTAL
1	Headworks Building + Mechanical		$ 14,700,000
2	E&IC (of Above Costs)	20.0%	$ 3,000,000
3	Yard Piping	10.0%	$ 1,800,000
4	Sitework	10.0%	$ 2,000,000
	TOTAL DIRECT COST		**$21,500,000**
	Contingency	30.0%	$6,450,000
	ESCALATED DIRECT COST WITH CONTINGENCY		**$27,950,000**
	General Conditions	10.0%	$2,800,000
	Subtotal		**$30,750,000**
	General Contractor Overhead and Profit	12.0%	$3,690,000
	Subtotal		**$34,440,000**
	Allowance for Operations/Administration Improvements		$5,000,000
	TOTAL ESTIMATED CONSTRUCTION COST		**$39,440,000**
	Engineering, Legal & Administration Fees	20.0%	$7,890,000
	TOTAL ESTIMATED PROJECT COST		**$47,300,000**

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UV Disinfection

Project:	**7054 WBMP**	**Estimate Class:**	**5**
Client:	**Clean Water Services**	**PIC:**	**BRM**
Location:	**Hillsboro, OR**	**PM:**	**BRM**
Zip Code:	**97123**	**Date:**	**4/28/2025**
Carollo Job #	**200908**	**By:**	**AC**
		Reviewed:	

NO.	DESCRIPTION		TOTAL
1	UV Equipment Replacement		$ 860,000
2	Equipment Installation (of above cost)	60.0%	$ 520,000
3	E&IC (of above cost)	20.0%	$ 280,000
4	Structural Modifications	25.0%	$ 420,000
	TOTAL DIRECT COST		**$2,080,000**
	Contingency	30.0%	$620,000
	ESCALATED DIRECT COST WITH CONTINGENCY		**$2,700,000**
	General Conditions	10.0%	$270,000
	Subtotal		**$2,970,000**
	General Contractor Overhead and Profit	12.0%	$360,000
	Subtotal		**$3,330,000**
	TOTAL ESTIMATED CONSTRUCTION COST		**$3,330,000**
	Engineering, Legal & Administration Fees	20.0%	$670,000
	TOTAL ESTIMATED PROJECT COST		**$4,000,000**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Effluent Pumping/Outfall

Project:	**7054 WBMP**	**Estimate Class:**	**5**
Client:	**Clean Water Services**	**PIC:**	**BRM**
Location:	**Hillsboro, OR**	**PM:**	**BRM**
Zip Code:	**97123**	**Date:**	**4/28/2025**
Carollo Job #	**200908**	**By:**	**AC**
		Reviewed:	

NO.	DESCRIPTION		TOTAL
1	Additional Effluent Pump		$ 250,000
2	Equipment Installation (of above cost)	60.0%	$ 150,000
3	E&IC (of above cost)	20.0%	$ 80,000
	TOTAL DIRECT COST		**$480,000**
	Contingency	30.0%	$140,000
	ESCALATED DIRECT COST WITH CONTINGENCY		**$620,000**
	General Conditions	10.0%	$60,000
	Subtotal		**$680,000**
	General Contractor Overhead and Profit	12.0%	$80,000
	Subtotal		**$760,000**
	TOTAL ESTIMATED CONSTRUCTION COST		**$760,000**
	Engineering, Legal & Administration Fees	20.0%	$150,000
	TOTAL ESTIMATED PROJECT COST		**$900,000**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

HHPS - Nominal Improvements

Project:	**7054 WBMP**	**Estimate Class:**	**5**
Client:	**Clean Water Services**	**PIC:**	**BRM**
Location:	**Hillsboro, OR**	**PM:**	**BRM**
Zip Code:	**97123**	**Date:**	**4/28/2025**
Carollo Job #	**200908**	**By:**	**AC**
		Reviewed:	

NO.	DESCRIPTION		TOTAL
1	Nominal Improvements		$ 300,000
	TOTAL DIRECT COST		**$300,000**
	Contingency	30.0%	$90,000
	ESCALATED DIRECT COST WITH CONTINGENCY		**$390,000**
	General Conditions	10.0%	$40,000
	Subtotal		**$430,000**
	General Contractor Overhead and Profit	12.0%	$50,000
	Subtotal		**$480,000**
	TOTAL ESTIMATED CONSTRUCTION COST		**$480,000**
	Engineering, Legal & Administration Fees	20.0%	$100,000
	TOTAL ESTIMATED PROJECT COST		**$600,000**

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