DATE: October 26, 2022

TO: Council Infrastructure Committee

FROM: Director of Public Works

SUBJECT: Water Pollution Control Facility Improvements - Phase II Project Update

RECOMMENDATION

That the Council Infrastructure Committee (CIC) reviews and comments on this report.

SUMMARY

This report is presented to update the CIC on significant projects that will be undertaken at the Water Pollution Control Facility (WPCF) over the next 8-year period. The WPCF Improvements – Phase II Project (Phase II Project) includes upgrades to the treatment process to limit discharge of nutrients to the San Francisco Bay in compliance with the Regional Water Quality Control Board's (Water Board) upcoming 2nd Watershed Permit. Excess nutrient loading is harmful as it can cause algal blooms that can lead to fish kills such as the massive fish kills resulting from the "red tide" algal bloom that happened recently in the San Francisco Bay. The City has committed to nutrient reduction in advance of upcoming regulatory requirements as an early adopter and has begun design of improvements that will enhance the treatment process and further protect the Bay.

The WPCF treats an average flow of approximately eleven million gallons per day (MGD) and meets current regulatory requirements for discharge of treated effluent to the deep waters of the San Francisco Bay. In May 2019, the Water Board announced upcoming regulatory requirements limiting discharge of nutrients (nitrogen) to the San Francisco Bay. In June 2020**,** the City completed a comprehensive master plan update, the WPCF Phase II Facilities Plan (Facilities Plan), to identify improvements required for the WPCF to upgrade its treatment process to incorporate nutrient reduction in the treated effluent to meet the upcoming requirements. On July 5, 2022, Council authorized an agreement with Brown and Caldwell (B&C) to begin preliminary design services for the Phase II Project. The preliminary design phase will build upon the Facilities Plan to further refine the project elements including process selection, hydraulic analysis, layout of facilities, and other tasks as required. Following preliminary design, staff will pursue funding and environmental reviews of the project and begin final design.

BACKGROUND

In 2009, the City completed construction of the WPCF Improvements Phase I Project that improved the reliability and efficiency of the WPCF's secondary biological treatment and clarification processes. The major element of the Phase I project was conversion of the secondary treatment process (fixed film reactor) to a trickling filter/solids contact (TF/SC) process. This upgrade to the secondary treatment process was necessary to replace the poorly performing fixed film reactor/fluidized bed reactor process. Since the 2009 Improvements Phase I Project was completed, the WPCF has been operating well and has been consistently meeting its discharge permit requirements.

In 2014, the City prepared an update to the WPCF Master Plan (2014 Master Plan Update), that included a comprehensive list of near-term and long-term improvement projects for the Capital Improvement Program (CIP) to address WPCF infrastructure needs. In addition, the Master Plan identified possible future upgrades that would be needed to meet more stringent regulatory requirements related to the discharge of ammonia, total nitrogen, and other constituents of concern. The goal of the 2014 Master Plan Update was to provide a long-term plan for the WPCF to continue improving efficiency, while providing reliable treatment, and to plan for future regulatory requirements on discharges to the Bay. The following near-term projects identified in the 2014 Master Plan have been completed:

- WPCF Primary Clarifier Conversion Project that converted and old dissolved air flotation thickener into a fourth primary clarifier to provide additional clarification capacity.
- Whitesell Extension that included modifications to plant process piping crossing between the east and west sides of the plant, storm and site drains modifications, modifications to potable and fire water supplies, new fences, and security gates.
- WPCF Digester Improvements Project that included construction of new digester gas safety equipment and flow metering, a new digester sludge blending tank, mixing pumps, and feed pumps, improvements to the heating and mixing buildings, and construction of a new waste gas burner.
- WPCF Headworks Bar Screen Project included installation of bar screens, screenings conveyor, a washer compactor, and ventilation system improvements. This project was initially identified as a sludge screening project in the 2014 Master Plan and was further refined in the Facilities Plan to screen upstream of the primary clarification process.

Since the 2014 Master Plan Update was prepared, additional more stringent wastewater discharge regulations have been promulgated by the Water Board related to discharge of nutrients to the Bay. After reviewing the list of CIP projects related to nutrient reduction developed in the 2014 Master Plan Update, staff recommended initiating the Facilities Plan to review the recommendations and refine/modify the CIP plan. The primary goals of the Facilities Plan Project included:

- Determine the most appropriate and cost-effective technology that meets the nitrogen removal requirements;
- Develop a strategic plan which coordinates nutrient removal and water recycling;

- Perform a schematic design and site planning for the new Administration and Laboratory Building; and
- Identify project elements and costs for treatment facility upgrades to meet upcoming regulatory requirements for nutrient discharges to the Bay.

On February 27, 2018[1], Council approved execution of a professional services agreement (PSA) with Black & Veatch (B&V) to develop the Facilities Plan to identify improvements needed to meet upcoming regulatory requirements. The Facilities Plan was completed in July 2019 and included development of a nutrient management strategy and related capital improvements.

Regulatory Requirements for Nutrient Reduction in Discharges to the Bay

Continued nutrient loading in the Bay is a growing concern for the Bay Area water quality community. Recent data indicate an increase in algae biomass in many areas of the estuary, suggesting that the Bay's resilience to the effects of nutrients may be declining due to a variety of contributing factors. These include natural oceanic oscillations that bring in colder waters to the Bay resulting in a reduction in the Bay's clam population that feeds on algae. In addition, decreases in sediment inflows from mining operations and cleaner wastewater discharges have resulted in increased light penetration in the waters of the Bay further contributing to algae growth. Decreased fog levels and drought conditions may also be contributing factors further stressing the Bay's resilience to nutrients in wastewater discharges. These and other factors likely contributed to the recent algal bloom (red tide) and massive fish kills in the Bay and surrounding estuaries.

In the Bay, nitrogen has a large influence on algae growth and the Bay's municipal wastewater dischargers (Dischargers) accounts for 65 percent of nitrogen loading into the Bay. To protect the Bay from the harmful effects of nitrogen, the Water Board issued the first Nutrients Watershed Permit, adopted in 2014, that required Dischargers to support scientific studies to evaluate the Bay's response to current and future nutrient loads and to evaluate opportunities to remove nitrogen through treatment plant improvements or optimization.

Nutrient Management Strategy (NMS)

An important task of the Facilities Plan was to develop a nutrient management strategy (NMS) to meet future regulatory requirements. Prior to embarking on the Facilities Plan, the City was implementing infrastructure upgrade projects recommended in the 2014 Master Plan. The recommendations included replacement of the West Trickling Filter (WTF). The WTF, originally installed in 1982, has reached the end of its useful life and is in need of replacement. The CIP included $19.5 million (in 2014 dollars) for replacing the WTF.

As previously stated, the existing secondary treatment process (TF/SC) has provided an effective and reliable treatment. However, the trickling filter technology is incapable of removing nitrogen. If nitrogen load limits are established when the Water Board issues the

[1] https://hayward.legistar.com/LegislationDetail.aspx?ID=3354003&GUID=015931F3-41B1-45E5-8345-F8440FF11A26&Options=&Search=

3rd Nutrients Watershed Permit in 2024 (which is highly likely), the nitrogen levels in the WPCF's discharge will exceed the anticipated load limit by 2027. The future nitrogen limits necessitate the WPCF to upgrade the existing secondary process to reduce the nitrogen load in the wastewater discharge to the Bay.

Rather than replacing the WTF that will not help with nutrient management, the City engaged B&V to prepare a Facilities Plan that evaluated alternative technologies and selected the most suitable biological nutrient removal (BNR) technology for the NMS to be incorporated into the WPCF Improvements Phase II Project. The selected NMS includes incorporating the existing east trickling filter (ETF) into a hybrid TF with integrated BNR process. The approach allows the City to cost effectively continue to use assets installed in the Phase I project while incorporating a BNR technology that can together meet the load limits established in the 2nd Water Shed Permit. The selected process is also adaptable and flexible to meet more stringent nitrogen limits in the future, if necessary. The improvements recommended in the Facilities Plan outlines a strategy for the City to achieve 30% nitrogen load reduction in the treated effluent in compliance with load limits outlined in the 2nd Water Shed Permit.

2nd Water Shed Permit & Early Actor Status for Nutrient Reduction in Discharges to the Bay

On May 8, 2019, the Water Board adopted the 2nd Nutrients Watershed Permit (Order No. R2-2019-0017) for managing nutrient discharges to the Bay. This Order, which went into effect on July 1, 2019, requires Dischargers to conduct additional scientific studies on the impacts of nutrients on the Bay. It also indicates that a load-cap based nitrogen regulatory framework (i.e., limits on kilograms of nitrogen in WWTPs discharges) will be utilized for establishing future nitrogen limits when issuing the 3rd Nutrients Watershed Permit in 2024.

Several agencies, including the City of Hayward, with plans to substantially reduce nutrients are recognized in the 2nd Watershed Permit Fact Sheet. The benefits of being recognized as an early actor would likely mean that should the Water Board impose future more stringent load limits or concentration-based limits on total inorganic nitrogen (TIN), early actors will not be required to make further reductions during the design life of capital improvements assuming others who did not act to reduce nutrients can make reductions to get below future sub-embayment load caps. The Water Board, in recognition of the time it takes to obtain funding and to complete design and construction of improvements will grant early actors additional time under a compliance schedule to meet the 2024 3rd Nutrients Watershed Permit requirements.

It is also worth noting that the renewed Nutrient Watershed Permit requires the major dischargers to the Bay to evaluate options for nutrient discharge reduction by water recycling. Water recycling directs nitrogen discharge load to land, which can reduce the nitrogen load to the Bay. Implementation of the recycled water project offers an additional avenue for the City to reduce the nitrogen load, therefore help increasing the time before the load limit to the Bay is exceeded. The selected NMS upgrades half of the secondary process to a BNR process while continuing to use the TF-SCT process. This provides the City flexibility in the future to manage further reductions in discharges of nitrogen either by increasing water recycling or implementing a full flow (100%) BNR.

Summary of Capital Improvement Projects

The following table presents a summary of recommended projects from the Facilities Plan, as well as other projects from the City's CIP that are directly related and therefore are also included in the project. The Phase II Project includes the nutrient upgrades (with current estimated construction cost of $70,000,000), along with other projects recommended in the Facilities Plan and/or prior master plans prepared for the WPCF.

Table 1 – Summary of Capital Improvement Projects for the WPCF Included in the Phase II Project[1]

CIP Project Number	Project Element	FY 22 CIP	FY 23 CIP	FY 24 CIP	FY 25 CIP
Preliminary Treatment Improvements					
612-07534	WPCF Headworks Hydraulic Forcemain Improvement			$1,100,000	
612-07712	WPCF Grit Removal System		$500,000	$4,900,000	
Primary Treatment Improvements					
612-07749	New Primary Equalization Basin		$300,000	$10,900,000	
Secondary Treatment Improvements					
612-07760	WPCF Nutrient Upgrades Design[2]	$5,400,000	$2,600,000		
Unfunded	WPCF Nutrient Upgrades Construction[2]			$70,000,000	
612-07750	New Final Clarifier		$ 1,500,000	$14,900,000	
612-07767	WPCF Final Clarifier Dewatering System	$463,000			
Non-Process Facilities Improvements					
612-07786	WPCF New Administration Building and Laboratory			$20,000,000	

Table 1 – Summary of Capital Improvement Projects for the WPCF Included in the Phase II Project[1]					
CIP Project Number	**Project Element**	**FY 22 CIP**	**FY 23 CIP**	**FY 24 CIP**	**FY 25 CIP**
612-07770	WPCF Installation of New Double Check Detector Assemblies (DCDAs) on Fire Water Piping	$281,000			
611-07649	WPCF Access Road Rehabilitation			$500,000	
611-07653	WPCF Site Waste Pump Station Improvements			$200,000	$900,000
611-07674	WPCF Cross Connection Prevention			$300,000	
Total Combined Funds 611 and 612 in Base Scope		$6,144,000	$4,900,000	$122,800,000	$900,000
Total Phase II Project Estimated Cost (FY22-25): $134,744,000					
Optional Project Elements[3]					
611-07772	WPCF Final Clarifier No. 2 Wall Repairs		$ 200,000		
611-07756	WPCF Coating of Final Clarifier No. 2 Sludge Collector (Tow-Bro)		$ 300,000		
612-07682	WPCF Polymer Blending Unit Relocation and New Solids Line			$60,000	
Total Optional Services CIP Budget			**$500,000**	**$60,000**	
Total Phase II Project Estimated Cost with Optional Project Elements (FY22-25): $135,304,000					
Notes: (1) CIP funds for each project except the nutrient upgrades design and construction costs.					

Table 1 – Summary of Capital Improvement Projects for the WPCF Included in the Phase II Project[1]					
CIP Project Number	**Project Element**	**FY 22 CIP**	**FY 23 CIP**	**FY 24 CIP**	**FY 25 CIP**
(2) The nutrient upgrades include construction of biological nutrient removal (BNR) basins, modifications to the existing solids contact tanks (SCT), a primary effluent pump station, a new blower building with electrical substation and motor control centers, modifications to the existing blower building, demolition of the west trickling filter (WTF) and related site work. (3) Inclusion of optional project elements will be determined following preliminary design work. (4) Third party construction management costs of the Phase II project are not included in the current CIP.					

The upcoming regulatory requirements and cost of implementing BNR facilities is not unique to the City. Other agencies are also implementing similar improvements including the City of Palo Alto (estimated construction cost of $118 million), City of Sunnyvale (estimated construction cost $150-250 million), and Union Sanitary District (planning level cost $390 million for their secondary treatment upgrades).

DISCUSSION

The main goal of the Phase II Project is to construct improvements necessary for nutrient removal in compliance with the Water Board's 2nd Nutrient Watershed Permit early actor provisions. The design services contemplated for this project includes funding assistance and environmental documentation, preliminary design, final design, engineering services during construction, startup assistance, and preparation of an Operations and Maintenance Manual.

On July 5, 2022, Council authorized entering into a contract with Brown and Caldwell (B&C) for preliminary design services for the Phase II Project. Preliminary design activities are briefly summarized in Table 2:

Table 2-- Preliminary Design Activities		
Task		**Description**
01	Wastewater Characterization	Sampling and diurnal flow and load monitoring to use in modeling software to optimize process design.
02	Planning Horizon	The Facilities Plan assumed a planning horizon through 2040 for the upgrades which results in a design life of 12-years following completion of construction in 2028 which is not sufficient for a project of this magnitude. Consultant will evaluate flow and load projections and provide

Table 2-- Preliminary Design Activities		
Task		**Description**
		recommendation on the planning horizon or design life of facility following completion of construction.
03	Flows and Loads	Flow and load projections presented in the Facilities Plan will be reviewed and updated based on more current 2020 census data, information from ABAG, and the City planning department.
04	Preliminary Treatment	The impacts of the revised flow and load projections on the preliminary treatment evaluation presented in the Facilities Plan will be evaluated. In addition, a grit characterization study and an alternatives analysis between grit removal technologies will be evaluated with the best alternative selected.
05	Primary Treatment	The primary effluent flow stream will be tested to see if chemically enhanced primary treatment should be employed to improve primary clarifier performance. Enhancing clarifier performance may enhance nutrient removal and provide redundancy to the East Trickling Filter process should the ETF be out of service for maintenance.
06	Secondary Treatment	The sizing of the secondary treatment process will be evaluated to determine if higher influent nitrogen concentrations observed by the City in recent years will impact the ability of the Facility Plan's selected nutrient removal facilities to meet a target effluent discharge limit. A sensitivity analysis will be performed to quantify the impact of increased influent nitrogen concentrations on the recommended nutrient removal facilities.
07	Permit Assistance	Permit assistance is required to position the City with other East Bay Discharge Authority (EBDA) members to allocate the proper load limits for the combined effluent discharged to the Bay. In addition, B&C will assist the City with permit revisions required with the Water Board.
08	Hydraulic Modeling	B&C will perform hydraulic modeling for the gravity-driven and pumped flows through the liquid stream process to represent hydraulic grade line (HGL) profiles for both average dry weather flow (ADWF) and peak wet weather flows (PWWF) for the liquid stream process. Hydraulic modeling must be performed prior to beginning design work to establish elevations and grades of new facilities.
09	Site Layout and Access Roads	Preliminary design activity to identify and layout nutrient removal facilities, layout of major piping systems, and

Table 2-- Preliminary Design Activities		
Task		**Description**
		layout of access roads and other site improvements. Design of facilities to establish grades and elevations while considering future sea level rise.
10	Miscellaneous Upgrades	Upgrades to potable water, utility water, reclaimed water, storm water, backflow preventers, and replacement of existing critical gates that no longer function properly and included. In addition, site waste pump station capacity evaluation and upgrades is also included.
11	PE Equalization Basin Sizing	The equalization basin (EQ Basin) must be relocated to make room for the new nutrient removal treatment processes. B&C will evaluate historical use of the EQ Basin and determine sizing needed for the relocated facilities.
12	BAAQMD Regulatory Requirements	B&C will evaluate new and modified existing facilities and determine what facilities need to be permitted by BAAQMD. In addition, B&C will prepare the required Authority to Construct applications for submittal to BAAQMD prior to start of construction.
13	New Administration and Laboratory Building	The Facilities Plan provided a summary of building programming for laboratory and administration needs that resulted in a preliminary design and layout of a building with a proposed area of just under 20,000 square feet. B&C will review the programming needs assessment with City staff to confirm previous assumptions are still valid and confirm overall building size. B&C will prepare a cost estimate to confirm scope of proposed building is within City's budget.
14	Electrical Systems Upgrades	A comprehensive list by motor control center will be developed for existing loads and new loads to evaluate impacts on existing PG&E service, existing 12 kV main switchgear, and ability of the WPCF to accommodate the additional loads. B&C will also evaluate if the additional loads will require additional standby power capacity for the plant. Also included will be a review of what upgrades are required to operate the cogeneration system in island mode so that the City is less reliant on the diesel standby power engine in the event of a loss of utility power.
15	Instrumentation & Controls System	An evaluation of the City's existing Supervisory Control and Data Acquisition (SCADA) equipment, including programmable logic controllers and related equipment will be performed with recommendations on needed upgrades

Table 2-- Preliminary Design Activities		
Task		**Description**
		to be incorporated into the Phase II project. In addition, B&C in conjunction with City staff will develop programming and human machine interface (HMI) screen graphic standards to incorporate into the design. These standards will become a living document that can be used on future WPCF projects.
16	Nature Based Solution Feasibility Study	B&C will evaluate the feasibility and cost of implementing a nature-based solution aspect into the Phase II Project or a future project should regulatory requirements become more stringent. Nature-based solutions incorporate open wetlands or horizontal levees to further reduce nutrient levels in the treated effluent before discharging to the bay while at the same time providing benefits of resilience to sea level rise, and habitat protection.
17	Preliminary Design Report	B&C will prepare a preliminary design report that will include technical memorandums for each of the areas outlined above, as well as the following: • Structural basis of design • Mechanical basis of design • Building mechanical • Architectural • Landscaping • Opinion of Probable Construction Cost for Entire Project • Construction schedule • 30% Drawing set

The project will be split into three separate bid packages. The Administration and Laboratory Building will be the first project, followed by the Primary Equalization Basin (EQ Basin) Relocation Project, and then the WPCF Improvements Phase II Project. The primary advantage of constructing the Administration and Laboratory Building as a separate project includes being able to attract building contractors who specialize in building and laboratory construction specifically bidding as the prime (general) contractor thereby avoiding subcontractor markups. In addition, by starting the building early, Operations and Maintenance staff can move into the new building early minimizing impacts to staff during construction of the Phase II Project.

Because most of the project improvements are in the footprint of the WPCF's current EQ Basin, a separate project to relocate the EQ Basin is included to shorten the overall duration of the Phase II project by clearing the way for construction of the new improvements ahead of

the start of that project. Shortening the overall construction duration will save overall project costs.

New Administration and Laboratory Building

The existing Administration and Laboratory Building was originally constructed in 1970. In 1995, the building was expanded to accommodate additional space needs for the laboratory. In recent years, the WPCF has seen increased staffing levels due to increased regulations and required operation and maintenance activities. Engineering staff are currently housed in a temporary trailer at the WPCF site. Staffing levels are anticipated to continue to increase with the recycled water system as well as the expansion of the treatment process to incorporate nutrient reduction. Consequently, the existing facilities can no longer accommodate the space needs and functional requirements of current and future daily operations. In addition, the laboratory area is inadequate to support the projected growth of laboratory operations and to house the new equipment needed for future regulatory compliance.

As part of the Facilities Plan, the space needs of the WPCF staff and laboratory were evaluated and multiple design alternatives developed. A schematic design and site plan for a new 19,750 square foot Administration and Laboratory Building was presented to the Council Infrastructure Committee on October 23, 2019[2]. In July, 2022, the preliminary design phase of the WPCF Improvements Phase II Project began which included review of the programming needs assessment with City staff to confirm the previous assumptions are still valid and to confirm the overall building size. Staff identified an additional 1,500 square feet of space was required to accommodate a mechanical room, fire riser, electrical room, SCADA/IT room, a slightly larger control room, and an additional office for engineering staff. The revised building total area is 21,250 square feet. In addition, the location of the building was shifted on the site to avoid conflict with essential medium voltage ductbanks that provide power to both the main switchgear and the East Trickling Filter substation. This resulted in a reconfiguration of the building and layout on the site. The revised building layout is included in Attachment A. A design workshop is scheduled at the end of November for City Staff to evaluate and select the visual character of the facility for design. Some preliminary elevations that were evaluated and short listed in the Facilities Plan are also included in Attachment 2.

Final Design Scope of Services

The following paragraphs briefly describe the base scope and optional services tasks.

Preliminary Treatment Improvements

1. WPCF Headworks Hydraulic Forcemain Improvement – Project No. 612-07534: The Headworks influent pump station is currently unable to pass peak hour flows during wet weather events. The project includes review and design of improvements to resolve the hydraulic bottleneck.

[2] https://hayward.legistar.com/LegislationDetail.aspx?ID=4199607&GUID=A563E6F4-8E79-4E24-8515-DB7B78F67824&Options=&Search=

2. WPCF Grit Removal System – Project No. 612-07712: The Facilities Plan recommended replacing the existing North Vacuator with a new grit facility designed to treat peak wet weather flows. The North Vacuator, constructed in 1958, functions to remove scum, floatable materials, and grit from the influent waste stream. The North Vacuator provides satisfactory performance under dry weather conditions, however due to hydraulic restrictions, it is not capable of treating the entire plant flows under wet weather conditions. In addition, the process is highly corrosive, and previous condition assessments have identified significant improvements required to extend its useful life including application of interior coatings, concrete repair, and new interior rake arms and scum beach. A new grit facility will be designed to treat the peak wet weather flows and will enable the City to discontinue use of the North Vacuator.

Primary Treatment Improvements

1. New Primary Equalization Basin – Project No. 612-07749: The purpose of the Primary Clarifier Equalization Basin (EQ Basin) is to store primary effluent when wet weather flows exceed the secondary treatment capacity at the plant. Currently, flows are automatically diverted to the EQ Basin when flows exceed approximately 35 million gallons per day (mgd). Most of the secondary treatment improvements identified in the Facilities Plan are sited in the location currently occupied by the EQ Basin. Therefore, the EQ Basin must be relocated to make room for the new treatment facilities.

Secondary Treatment Improvements

1. WPCF Nutrient Upgrades Project – Project 612-07760: The Facilities Plan evaluated and recommended a BNR treatment process designed to achieve a 30% soluble total inorganic nitrogen (sTIN) load reduction as required by the 2nd Watershed Permit, or a sTIN concentration of less than 20 mg/L. To achieve this, the existing solids contact tanks must be modified to bio-flocculation basins, and a new extended biological nutrient removal (BNR) basin constructed. Ancillary facilities include a primary effluent pump station, a new blower building, modifications to the existing blower building currently serving the solids contact tanks, and a new 12-kV substation with switchgear and distributed power to new motor control centers. Demolition of the West Trickling Filter is also included.

2. New Final Clarifier – Project 612-07750: The Facilities Plan modeled the final clarifier capacity under dry weather maintenance conditions (when one unit is out of service) and determined the final clarifiers would be overloaded by 2025 which could lead to excessive solids leaving the WPCF. A third final clarifier is recommended to increase the WPCF firm capacity through the design life of the improvements (or 25-years). An associated return activated sludge and waste activated sludge pumping systems are also included.

3. WPCF Final Clarifier Dewatering System – Project 612-07767: The existing groundwater dewatering system for Final Clarifiers 1 and 2 installed in the 2009

Improvements Phase I Project have failed and are causing the final clarifiers concrete walls and slabs to crack. Cracking leads to reinforcement corrosion caused by migration of water through the concrete substrate which has caused the concrete to start to spall. This condition is exasperated when the clarifiers are taken out of service for annual maintenance. It has also been observed that the bottom slabs of the clarifiers have heaved due to groundwater pressure resulting in extensive cracking of the slabs. A groundwater dewatering system is required to relieve hydraulic pressure by allowing the surrounding groundwater to be lowered prior to dewatering the final clarifiers. The Phase II Project includes a hydrogeological study to evaluate the feasibility of installing a groundwater dewatering system. In addition, a structural evaluation is included to determine the best method to repair the clarifier spalled concrete and cracking in order to extend the operating life of the clarifiers. Optional services are included for concrete repairs pending outcome of the structural evaluations.

Non-Process Facilities Improvements

1. WPCF New Administration Building and Laboratory – Project 612-07786: The existing Administration and Laboratory Building was originally constructed in 1970 and subsequently expanded in 1994 to accommodate increased laboratory space requirements. Since it was last modified, the WPCF has seen increased staffing levels due to increasing regulatory requirements, and consequently the existing facilities can no longer efficiently accommodate the space needs and functional requirements of daily operations. The Facilities Plan included space planning for both the administration building and laboratory to adequately house WPCF staff and accommodate laboratory functions required in the future. The project includes construction of a two-story administration/operations building and a one-story laboratory building linked by a shared lobby space to accommodate the space need of 19,750 square feet. A preliminary design step will be performed to review and confirm the initial space planning needs, as well as to assess cost savings measures that should be incorporated into the design given the current building climate. An evaluation of a possible two-phased construction will be performed with essential building spaces included in the initial phase, and non-essential spaces deferred to a second phase.

2. WPCF Installation of New Double Check Valve Detector Assemblies (DCDAs) on Fire Water Piping – Project 612-07770: The City requires above ground DCDA's on all new fire supply services to ensure the city's potable water mains are protected against cross connections or backflows. The WPCF has three fire supply lines currently that are not protected by a DCDA. The Phase II Project will include provisions to add DCDAs on the existing fire lines.

3. WPCF Access Road Rehabilitation – Project 611-07649: The City's CIP includes funding for upgrades to the WPCF's access roads which are deteriorated and in need of repairs. It is expected most of the WPCF's interior access roads will be negatively impacted by construction of the upgrades. The Phase II Project includes provisions to rehabilitate

the existing WPCF access roads following substantial completion of the new improvements.

4. WPCF Site Waste Pump Station Improvements – Project 611-07653: The Site Waste Pump Station (SWPS) is designed to collect waste, drain, and storm water flows within the WPCF boundary, and pump back to the treatment process for treatment. The Phase II Improvements are expected to result in an increase in flows to the station due to new process drain flows, increased storm water flows from newly paved areas, and other waste flows being directed to the station. Pumping and piping improvements are included to handle the increased flows to the SWPS. In addition, concrete repairs and coatings are included to address on-going corrosion issues at the station.

5. WPCF Cross Connection Prevention – Project 611-07674: Potable water, non-potable water, and recycled water are used for various purposes at the WPCF. Typically, potable water is not cross-connected with non-potable water due to potential for cross-contamination. Currently the WPCF has potable water demands that are served by non-potable water sources that need to be re-plumbed to be on potable water only. The Phase II Project will be expanding the use of all three types of water systems throughout the treatment plant and fixing the existing cross connection issues will be included in the improvements.

Optional Services

1. WPCF Final Clarifier No. 2 Wall Repairs – Project Number 611-07772: Final Clarifier No. 2 was taken out of service in summer of 2019 for coating of the internal clarifier mechanism. Following completion of coatings it was noted that the concrete wall was spalling due to delamination or corrosion of the reinforcing steel caused by water intrusion through cracks in the concrete. The floor slab was also noted to have cracked extensively due to heaving. Pending the outcome of the structural evaluation of the concrete, optional services are included to design the repairs of the concrete.

2. WPCF Coating of Final Clarifier No. 2 Sludge Collector (Tow-Bro) – Project Number 611-07756: The internal surface of the sludge collector device (tow-bro) inside Final Clarifier No. 2 was observed to be in poor condition during a recent inspection and the need for coating was confirmed. It is anticipated this will result in a prolonged outage for Final Clarifier No. 2, therefore this work will be completed after implementing improvements to deal with the failed groundwater dewatering system.

3. WPCF Polymer Blending Unit Relocation and New Solids Line – Project Number 612-07682: The WPCF currently injects polymer into the waste sludge line from the anaerobic digesters prior to pumping to the sludge drying beds. Prior to the 2009 Improvements Phase I Project, the polymer dosing location was located much closer to the sludge drying beds. Polymer dosing into the sludge line is intended to promote solids to agglomerate and grow into larger solids that are easier to dewater. However, excessive pumping distances and turbulence in the pipeline can cause the solids to shear reducing the effectiveness of the polymer. Relocating the polymer facility closer

to the sludge drying beds will improve the effectiveness of the polymer dosing system and is anticipated to save operating (chemical) costs.

ECONOMIC IMPACT

Many of the Phase II improvements were identified in the 2014 Master Plan update and funded in the adopted Capital Improvement Program. Phase II has evolved to include the Nutrient Removal Strategy to address new regulatory requirements in the near term. This proactive approach will result in the City being identified as an "early actor" by the Water Board and provide protection against having to implement additional, potentially more costly improvements if the regulations change.

The total estimated construction cost for the project at the projected midpoint of construction (1/1/2027) is estimated to be between $125 to $169 million assuming 4% inflation, and allowing for a planning level factor of +35% over the estimated construction cost. The range is typical of planning level cost accuracy of -15% to +50%.

It is anticipated that these improvements will affect sewer service rates and sewer connection fees; however, the extent to which rates will need to be adjusted cannot be determined with certainty at this point, however it is anticipated that customers could see a significant impact of 20% or more over the current rates. Staff intends to aggressively pursue grants and low-interest loans to minimize the impact to customers. It is also worth noting that Hayward's sewer-related fees are currently among the lowest in the area and that all wastewater treatment facilities discharging to the San Francisco Bay will ultimately be required to implement nutrient removal technologies.

Funding assistance for the project is included in the consultants' scope of work. Funding efforts will include pursuing financing under both the California Clean Water State Revolving Fund (CWSRF) loan program and the U.S. Environmental Protection Agency (USEPA) Water Infrastructure Finance and Innovation Act (WIFIA) program. WIFIA funding is typically at a slightly higher interest rate than SRF; however, the payback period is deferred by up to 5 years after substantial completion of the project. SRF loans payback period begins one year after substantial completion. Up to 49% of the project cost is eligible under WIFIA funding, therefore staff will pursue both avenues of funding as part of this project.

In addition, because WIFIA utilizes federal funds, engineering services are included for the Consultant to provide environmental review and documentation (most likely CEQA+) in support of the funding applications.

Note that both SRF and WIFIA financing is available for a combination of projects under a master agreement, therefore financing would be available for all three bid packages. Application for funding cannot be completed until the project is well defined, typically after the preliminary design stage has been completed to allow a more accurate estimate of the project cost to be completed, and after the completion of the necessary environmental reviews of the project.

FISCAL IMPACT

The not-to-exceed professional services contract amount will be $24,737,324. This is a multi-year contract that covers design through the completion of construction including startup assistance and training. This project is anticipated to take six years to complete. On July 5, 2022, Council authorized the City Manager to execute a PSA with B&C in an amount not-to-exceed $3,849,711 for preliminary design services for the Phase II Project.

The funding for this contract will be allocated from the Sewer Improvement Fund, 612-07660. A total of $8 million is available in design services in FY22-23. Staff will return in November 2022 to request partial authorization of final design services so that work can begin on the geotechnical investigation for the proposed facilities, and for final design services on the two early bid packages (Administration and Laboratory Building, and the EQ Basin Relocation. Following completion of preliminary design services, Staff will return in early 2023 to request award of the remaining portion of final design services for the Phase II Project.

As noted above, staff is planning to apply for a State Revolving Fund loan, and funding from WIFIA to finance the project. Both funding sources can be applied to fund multiple projects, as well as retroactively reimburse for engineering design services. As the design progresses, the estimated project cost is expected to be adjusted, especially as construction costs become better defined in the future as the design is more complete. Budget adjustments will be brought forward to Council through the annual budget approval process.

STRATEGIC ROADMAP

This agenda item supports the various goals of Council's Strategic Roadmap. The WPCF Improvements Phase II Project will address infrastructure needs and improvements to increase the reliability of the City's treatment plant, and construct process improvements to meet more stringent nutrient limits in accordance with upcoming regulatory requirements, while supporting the goals of the Council. Specifically, this item relates to the implantation of the following projects:

Confront Climate Crises & Champion Environmental Justice.

Mitigate Climate Crisis Impacts through Resilient Design and Community Engagement
Project C14b: Implement Shoreline Master Plan, including mitigating sea level rise in the industrial corridor through building requirements and outreach

Invest in Infrastructure.

Invest in Water Supplies, Sanitation Infrastructure & Storm Sewers
Project N19: Update Water Pollution Control Facility Phase II Plan

SUSTAINABILITY FEATURES

The WPCF Improvement Project Phase II will help maintain and improve the biology and health of the Bay which is vital for the region and the State. The Phase II Project will also satisfy the early actor requirements specified in the Water Board's 2nd Watershed Permit to reduce nitrogen loads to the Bay.

The effects and risks of rising sea water levels will be reviewed and incorporated into the design of the new facilities.

The Administration and Laboratory Building will be reviewed by the Building Division for conformance with State and local requirements related to sustainability (i.e., California Building Code, California Energy Code, etc.) which require a minimal level of energy efficiency, resource conservation, material recycling, etc. In addition, the building will be designed and constructed to meet Leadership in Energy and Environmental Design (LEED) standards for a Silver Certification, or better.

PUBLIC CONTACT

As part of the funding process, an environmental study (CEQA and/or Initial Study and Mitigated Negative Declaration) will be posted for public review and comment. In addition, a public hearing will be held to review the environmental study.

The project will include a web page to be hosted on the City's website with periodic updates throughout the multi-year duration of the project.

NEXT STEPS

The following schedule has been developed for this project:

Award of Professional Services Agreement – Approval for Authorization of Preliminary Design Services for the Phase II Project	July 5, 2022
City Council Authorization to Award Final Design Services for the Administration and Laboratory Building and Primary Effluent Equalization Basin Relocation Projects	November 2022
City Council Authorization to Award Final Design and Engineering Services During Construction for the Phase II Project	February 2023
Award of Professional Services Agreement for Third Party Construction Management including Value Engineering and Constructability Review for the Phase II Project	June 2023
Approval of Environmental Study – IS/MND or CEQA	December 2023
Approval of Plans and Specifications and Call for Bids for the Administration and Laboratory Building	December 2023
Approval of Application for WIFIA and SRF Loans	January 2024
Award of Construction Contract for the Administration and Laboratory Building Project	February 2024

Approval of Plans and Specifications and Call for Bids for the Primary Effluent Equalization Facility Relocation Project	May 2024
Award of Construction Contract for the Primary Effluent Equalization Facility Relocation Project	July 2024
Approval of Plans and Specifications and Call for Bids for the Phase II Improvements Project	July 2024
Award of Construction Contract for the Phase II Improvements Project	February 2025
Administration and Laboratory Building Project Construction Completion	December 2025
Primary Effluent Equalization Facility Relocation Project Construction Completion	June 2026
Phase II Improvements Project Construction Completion	July 2028

Prepared by: Suzan England, Senior Utilities Engineer

Recommended by: Alex Ameri, Director of Public Works

Approved by:

Kelly McAdoo, City Manager