Memo

To: Clay Pearson, City Manager
From: Robert D. Upton, PE, Director of Engineering and Publi
CC: Trent Epperson, Deputy City Manager
Jameson Appel, Assistant Director – Capital Projects

Date: November 17, 2022
Re: SWTP Update

17 November 2022
To: Mayor and City Council members
Update on the 10 MGD surface water treatment plant that will provide reliable and self-reliant source water for the essential needs of Pearland now and going forward. Still tracking for water into system in July 2023; many supply delays being overcome as new ones arise. Budget remains on track. Clay

Executive Summary

This memo provides information about the progress on the Surface Water Plant project's current financial and schedule status. This memo details description of the forthcoming start-up process. The project remains in budget, but the schedule remains fluid as it continues to be impacted by supply chain issues. **The projected completion date (Water into the System) remains estimated for June 2023 with completion of the final construction activities estimated for October 2023.**

Background

The project entails the design and construction of the City's 10 million gallon per day (MGD) surface water treatment plant intended to supplement the City's drinking water supply to meet current and future demands. The project includes the construction of approximately five miles of water transmission line to supply water to the Kirby Water Plant and the FM521 Water Plant on the west end of town allowing the Alice Street system to manage the east end demands. The project also includes the extension of the City's fiber network to provide operational connectivity to these receiving plants and a redundant Data Center to be housed in the Surface Water Plant's Operations Building. The project is being delivered through the Construction Manager At Risk (CMAR) process with PLW Waterworks performing CMAR activities. The last Change Order (#8) to the CMAR's contract was approved by Council in March 2022 and consisted of Owner requested Work Change Directives (WCD's) 1, 2 and 3 increasing the total contract Guaranteed Maximum Price (GMP) to $137,075,681. **There are no change orders at this time**.

Schedule Update

The schedule remains fluid with new material and equipment delays identified almost weekly and this trend remains the primary concern for the project and one that occupies a great deal of time and effort from the project team to generate work-arounds. Recently, the project team received word that three of the six generators, required to be on-line for plant testing, would be delayed past February 2023. Subsequent discussions with the manufacturer determined that temporary generators would be provided if the delivery schedule continues to slide. On November 8 the team was informed that one of the delayed generators would be delivered before the end of the year.

Similarly, the Chlorine building exhaust fan and chlorine scrubber was delayed at the last moment by the unavailability of a critical fiberglass blower housing. The project team met with DeNora, the manufacturer, and requested that DeNora explore a wide range of alternatives to supply a temporary blower. A week later DeNora found a substitute blower housing that could be temporarily installed to allow gas chlorine to be delivered in time for plant start up.

Within this same chlorine evacuation system, the fiberglass exhaust duct, provided by a separate manufacturer, has been delayed. A temporarily replacement duct was identified and ordered to allow the system to be complete and functional in time for the phased plant start up.

The team was informed in late October that the three Variable Frequency Drives (VFDs) for the High Service Pump Station (HSPS) and two VFDs that will run the two large fire pumps (HFP) would not meet their delivery date scheduled for the end of October. Complex electrical equipment has been particularly hard hit with supply chain delays. With some encouragement the manufacturer was able to find the missing parts in other factory inventories and the three VFDs for the HSPS were delivered November 14th and the two Fire Pump VFDs will be delivered by the end of November.

IT equipment components continue to be long lead time items with shifting delivery dates. This is occurring within the Server/ Data Center equipment (supplied by sub-contractors) and the Data Vox contract with the City. This phase of work is now becoming a critical issue as the fiber network and programing of the plant SCADA are progressing well and the full network will be required during the phased startup. The impact of these delays is the need for SCADA systems during the various phases of startup. Again, the team is pursuing the use of temporary parts and equipment to mitigate or avoid these delays.

The project continues to struggle with the availability of American Iron and Steel (AIS) compliant pipe, valves and fittings. In locations where it was possible and with the engineers' agreement, some of this material has been replaced with HDPE or in some cases with a temporary non-AIS component that will have to be replaced when the actual components become available later next year. Pipe fitting availability is the main issue delaying the completion of the transmission line along the FM521 segment and will likely delay tying the new line into the Shadow Creek Plant once that work begins.

Despite the nearly daily identification of new material and equipment delivery delays, the Water into the System schedule remains projected for June 2023 and Final Completion of Construction projected for October 2023.

Construction Progress

Building construction is progressing with the installation of exterior metal panel siding, window glass and exterior doors. Interior work is progressing well: electrical rough in is complete, drywall has been hung, taped, and floated and the painters have largely completed their initial coatings. Flooring has been installed in the Operations Building (Ops) and ceiling grid has been installed.

In the Administration Building (Admin) the decorative floor area in the public access area has been ground in preparation for the high polish coating. In the High Service Pump Room, the discharge header has been installed and pump equipment foundations are beginning. The overhead crane has been installed which will be used to install the high service pumps.

The Chlorine Building roof membrane has been installed and received Windstorm inspections. Equipment can now begin to be installed inside. Outside of the building bulk storage tankage is being installed. With the temporary substitution of the of an alternative scrubber blower housing, mentioned above, this facility will be ready to receive gaseous chlorine by the time the plant startup process requires this on site.

GAC (Granulated Activated Carbon filters) have been installed on their foundations and piping is being installed.

Membrane Racks have been installed within the membrane building along with raw water strainers, pumps and pipping work has begun.

Site work is still progressing well. The sanitary lift station wet well structure has been completed and has been coated along with sanitary manholes throughout the site. The storm drainage outfall has been constructed tying the site drainage into Mustang Bayou. The paving contractor has begun subgrade preparation for the plant roadways, concrete paving for the north plant entrance area started on November 18, 2022.

Throughout the process areas: Raw Water Lift Station, Pre-Treatment and Solids Handling (wash water recovery, gravity thickener, belt presses) equipment is being started up and inspected by the manufacturer's representatives to provide Certification of Proper Installation (COPI). These vendors, while onsite conducting COPI certifications are also performing vendor training for the City's plant operations and maintenance staff for these components. Those equipment components that require routine exercising are being run routinely to meet manufacturer's requirements.

Budget Update

There are no pending Change Orders or additional Owner Directed Changes with the CMAR at this time. As noted below in the Budget table, the Original Project budget was $175,500,000. Current expenditures total $168,310,822 and potential future expenditures of $1,976,570 totaling $170,287,392 leaving a project contingency of $5,212,608. As of the September Pay Estimate the project is 83% complete by pay with $113,950,199 paid to date and 87% complete by time with 1249 days used out of 1431.

See budget table below

Funding Sources	Series	To Date	Future	Total Budget
W/S Revenue Bonds	2017B	6,012,500		6,012,500
Impact Fee - Debt	2017B	6,012,500		6,012,500
W/S Revenue Bonds	2018A	4,325,000		4,325,000
Impact Fee - Debt	2018A	4,325,000		4,325,000
W/S Revenue Bonds	2019A	10,500,000		10,500,000
Impact Fee - Debt	2019A	10,500,000		10,500,000
W/S Revenue Bonds	2020A	53,800,000		53,800,000
Impact Fee - Debt	2020A	53,800,000		53,800,000
W/S Certificates of Obligation	2022C	10,490,000		10,490,000
Impact Fee - Debt	2022C	10,490,000		10,490,000
W/S Certificates of Obligation	TBS 2023		2,622,500	2,622,500
Impact Fee - Debt	TBS 2023		2,622,500	2,622,500
Cash				-
Other Funding Sources				-
Total Funding Sources		**170,255,000**	**5,245,000**	**175,500,000**

Expenditures	To Date	Future	Total
PER	8,773,058		8,773,058
Land	164,136		164,136
Design	16,335,173	300,000	16,635,173
Construction	136,121,717	1,500,000	137,621,717

Construction Management/Inspection	5,100,448		5,100,448
Construction Materials Testing	462,860	30,000	492,860
FF&E	1,353,430	146,570	1,500,000
Total Expenditures	**168,310,822**	**1,976,570**	**170,287,392**

Project Contingency	**3.0%**	**5,212,608**
Project Balance		**0**

Start-Up Planning

The planning for a phased plant start-up is complete with some minor modifications to the plan since the last report. The activities of **Loops 1 and 2** have been consolidated and will begin with raw water from the canal. This makes efficient use of the time and materials required and eliminates the need for some temporary piping and allows for immediate testing of the raw water pumps and vertical screens as well as static mixers, flocculation mixers and the plate settlers all at one time. These operational tests provide the opportunity for hands-on operator training for the pumps, screens, flow meters and flow controls as well as SCADA operation of the units. The consolidation of Loops 1 and 2 allows the entire process to shift later into the schedule. The effort has been rescheduled to December allow GCWA to install the canal gates in the raw water bay in late November. The former **Loop 2** activities are included to commission the solids handling units including the sludge splitter, gravity thickener, wash water recovery and belt presses to remove the solids that are generated in pretreatment. This allows the testing and adjustment of the water recycle/ recovery system and solids removal processes which will require the ability to inject sludge thickening polymers and testing of the Belt Presses. This broadens the training opportunities for Operational staff and the Lab Tech.

Loop 3

This loop**,** now scheduled to begin in February 2023, will temporarily connect the fire water main to the process piping immediately upstream of the membrane feed pumps to supply clean water to the membrane strainers, membranes, Granular Activated Carbon (GAC) reactors and circulate back to the ground storage tank. This system allows the membrane manufacturer to test the membrane through-put and cleaning systems. The phase is initially anticipated to require about 4 to 6 weeks of run time to fully demonstrate flow, filtration and cleaning processes but is largely dependent on the Membrane Supplier's schedule and satisfaction of the operational requirements. The schedule is largely set by the membrane manufacturer who will then demonstrate the maximum production rates to meet purchase specification requirements. The GAC reactors will not contain media during these tests to avoid an accidental contamination.

Loop 4

This Loop, now scheduled to begin in March 2023, will introduce flocculation chemicals and chlorine through the Pre-Treatment mixers and then into the plate settlers to produce settled water. The process will produce sludge to begin testing the solids handling and removal systems. The settled canal water will be cycled back to the GCWA canal until it reaches the required 2 Nephelometric Turbidity Unit (NTU) or less. Once that is reached and testing confirms compliance, regular reporting to TCEQ for acceptance of the Pre-Treatment process can begin. TCEQ acceptance can take up to 60 days for paperwork to catch up with activities. The 2 Ntu or less settled water is required for introduced to the membranes.

Loop 5

This loop, now scheduled to begin in April 2023, is the Finished Water storage/ disposal loop. Upon completion of the clean water membrane flow and cleaning tests and approval of the Pre-Treatment unit's settled water quality, the membrane manufacturer will approve the introduction of Settled Water to the membranes. The membranes will then undergo another round of testing and cleaning checks and the manufacture will begin proving the system meets chemical and energy performance requirements in compliance with the specifications. At this point the plant is making Clean Water. Once the water meets drinking water quality it will be stored in the GST and used to flush the transmission lines. The plant will be making about 4 to 6 million gallons during the 8 to 10 hour operational day and water that cannot be stored for the flushing will be de-chlorinated and released into Mustang Bayou. The transmission line flushing process will require several flushes to clean the lines of construction debris and this water will be pushed through from the Surface Water Plant to the receiving water plants at Kirby and Shadow Creek (FM521). The flushing process will require dichlorination at the receiving plants and then spilling out to drainage systems prompting the need to notify the public that this is a purposeful activity and not a leak. The flushing process provides the opportunity to adjust plant processes to fine tune water quality while ensuring the transmission lines are free of debris, chlorinated and fully tested.

Between May and July, the plant will run to refine the final water quality and produce water to flush the transmission lines as necessary. This provides time for the final performance testing of the membranes, working bugs out of the other process equipment and continue operator training. Once the plant water quality has been accepted by TCEQ as meeting drinking water quality standards and test records demonstrate this, the project will apply for TCEQ approval and final introduction of treated water into the distribution system.

This schedule represents the anticipated start up process and is subject to delays as equipment operation is refined and fine-tuned, problems are encountered and resolved. The Water into the System date presented above is a conservative estimate of receipt of TCEQ's final approval of the plant and the water quality.

Staffing Update:

Staffing for the plant is proceeding as planned with recruitment and hiring as of November 14th, as follows:

Plant Mechanic – started 11-14-2022
Plant Mechanic – awaiting approval to extend offer
Electrician – awaiting approval to extend offer
Operator I – awaiting approval to extend offer
Operator II – awaiting approval to extend offer
Process Control Supervisor – taking applications
Operator I – taking applications
Lab Tech – taking applications starting 11-21-2022
Operator I – budgeted April 1st start
Operator II – budgeted April 1st start

Schedule Info:

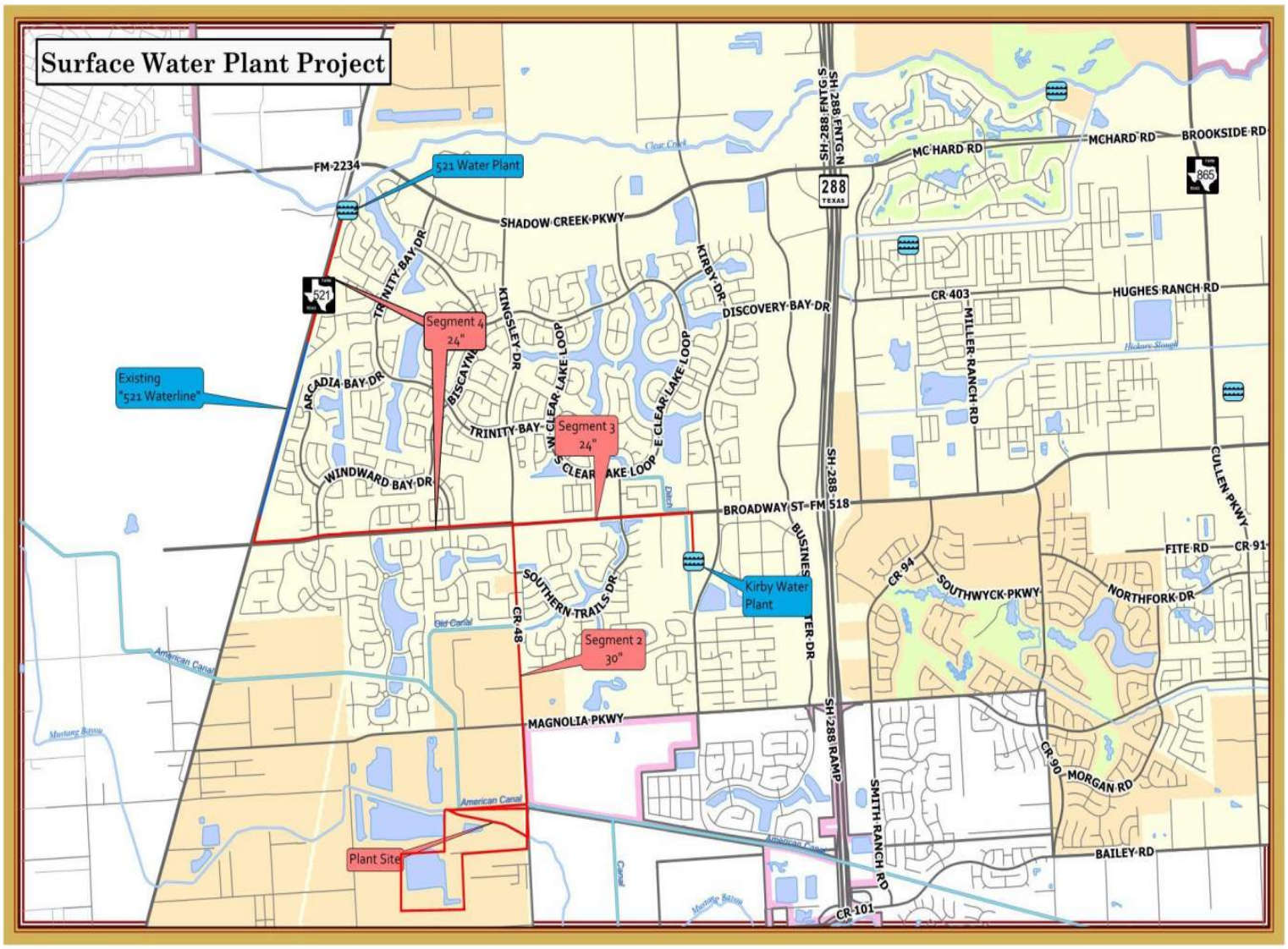
	Base Line	***Current***
Design Start - Package 1	August-19	September-19
Design Start - Package 2	February-19	March-19
Design Start - Package 3	August-19	September-19
Bid Start	March-20	January-19
Construction Start	May-20	June-20
Construction Completion	December-22	June-23

*June-23 is current schedule for water in the system with substantial completion in Oct-23

Previous Memos:

6/16/16, 2/2/17, 3/9/17, 4/13/17, 3/29/18, 4/19/18, 1/10/19, 2/21/19, 3/28/19, 8/1/19, 8/8/19, 1/23/20, 3/05/20, 4/16/20, 9/17/20, 3/4/21, 6/10/21, 7/29/21, 11/4/21, 3/10/22, 4/14/22, 5/5/22, 7/14/22, 9/15/22

Project Map:


Surface Water Plant Project
521 Water Plant
Existing "521 Waterline"
Segment 4 24"
Segment 3 24"
Segment 2 30"
Kirby Water Plant
Plant Site
FM-2234
SHADOW CREEK PKWY
TRINITY BAY DR
KINGSLEY DR
KIRBY DR
DISCOVERY BAY DR
ARCADIA BAY DR
BISCAYNE
TRINITY BAY
WINDWARD BAY DR
W CLEAR LAKE LOOP
E CLEAR LAKE LOOP
S CLEAR LAKE LOOP
BROADWAY ST-FM 518
SOUTHERN TRAILS DR
CR 48
MAGNOLIA PKWY
American Canal
Old Canal
Mustang Bayou
SH 288 FNTG N
SH 288 FNTG S
SH 288
SH 288 RAMP
MC HARD RD
MCHARD RD
BROOKSIDE RD
CR 403
HUGHES RANCH RD
MILLER RANCH RD
CULLEN PKWY
FITE RD
CR 91
CR 94
SOUTHWYCK PKWY
NORTHFORK DR
CR 90
MORGAN RD
SMITH RANCH RD
BAILEY RD
CR 101
BUSINESS TER DR
288 TEXAS
521
865

Project Photos:

Overall Site from East looking West

Operations Building with Control Room Windows in front right corner

Back side of Administration & High Service Pump Bldg

Chlorine Bldg with site drainage outfall in construction inside Mustang Bayou on right

Raw Water end of Pre-Treatment showing supply piping for two settling trains

Feed Piping Settled Water from Pre-Treatment to Membrane Bldg.

Bulk Chemical Storage and Truck Unloading Area

Pre-Membrane Strainers installed inside Membrane Bldg.

Water piping to/ from membrane racks

Chemical Feed Pumps for Membrane cleaning

Membrane Racks awaiting the installation of Membrane Modules

Site showing Sanitary Lift Station in foreground Maintenance Bldg. far left Operations and GAC far right and Admin/ High Service Pump Bldg. in background

GAC Reactors and Piping

Raw Water Lift Station showing Intake Strainer and Vertical Screens

Initial subgrade preparation at Plant Entrance in preparation for beginning Plant Roadway Paving