15 September 2022
To: Mayor and City Council members
Good update on progress and outline of future for energizing new Surface Water Treatment Plant over the next six months. Clay

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

Date: September 15, 2022
Re: SWTP Update

Executive Summary

This memo provides information about the progress on the Surface Water Plant project's current financial and schedule status. This memo also contains a detailed description of the forthcoming start up process. The project remains in budget, but the schedule continues to be impacted by supply chain issues. With the recent receipt of several critical electrical components portions of the work schedule have improved. **The most recent 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 a 10 million gallon per day (MGD) surface water treatment plant to supplement the City's drinking water supply to meet demands of current and future population growth. The work includes the construction of approximately five miles of water transmission line to bring water from the plant north along Kingsley (CR48) to Broadway and from there to the Kirby Water Plant to the east and the FM521 Water Plant on the west end of town. The work also includes the extension of the City's fiber network to provide connectivity to these plants and a redundant Data Center to be housed in the plant's Operations Building. The project is being delivered through the Construction Manager At Risk (CMAR) process with PLW Waterworks acting as the CMAR. 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 and increased the total contract Guaranteed Maximum Price (GMP) to $137,075,681. There are no additional change orders envisioned at this time.

Schedule Update

The schedule remains fluid with new material delays identified almost weekly and this trend remains the primary concern for the project. Although portions of the electrical switch gear were finally received in June 2022 and incorporated into the work within a matter of a few days, key components of the remaining electrical gear are still unavailable at this time. The CMAR and its electrical subcontractor have developed several work-arounds allowing many portions of the plant to be powered up for testing and preparation for start-up activities. Currently the second electrical service is tentatively scheduled for meter installation in October pending receipt of the missing components. Key materials still missing are now largely confined to select unique piping fittings and valves for several of the systems. The CMAR is moving forward with the acquisition and installation of temporary components in order to mitigate these schedule impacts as much as possible. This strategy has allowed the construction team to turn its attention to developing the plant start-up plan that has been presented at City budget meeting. What follows in the Start-Up discussion below is a brief outline of the steps or phases of the Start-Up process and a rough schedule for the initiation of each phase.

Budget Update

There are no pending Change Order or additional Owner Directed Changes with the CMAR at this time.

Separate from the CMAR contract, the City will need to amend the existing contract with Ardurra, as previously noted, to extend Owner's Representative Services through the end of the extended construction process as this firm continues to perform critical roles in construction, start up and initial operations.

Delays to the construction and completion schedule is not the only or even an isolated impact to the project. The delays mean that engineering consultant contracts for construction phase services, originally based on the construction completion schedule in December 2022 and water introduction in January 2023 will need to be extended. In January 2022 a contract extension of the Ardurra contract for Task 5, Engineering Services During Construction was approved that as anticipated to have the project completed by June 2023. With the continued supply chain challenges an additional extension for continued assistance coordinating with TWDB on funding and payment issues, Construction Phase Services including facilitating additional progress meetings with the CMAR and sub-contractors/ Vendors, coordination and ad-hoc meetings, additional meetings with design engineers, continued submittal control and coordination, continued management of requests for information and responses to those, continued inspection, documentation and record keeping and provision of a second inspector for this extended duration and continued budget tracking and analysis. The contract extension will be till December 2023 when the project is completed and all paperwork is submitted.

This amendment will include the addition of a Not to Exceed fee for the City's former Assistant Director, Skipper Jones to provide City Representative services. Mr. Jones will be acting on the City's behalf as the project manager and will be reporting to the Director of Engineering and Public Works. The amendment will also include a Not to Exceed fee for a Plant Start Up Expert to lead the CMAR and City operations Staff through the Start-Up process. This is a benefit to the City as it will have temporary SWTP start up experts assist the City Staff to start up and test the plant that will 1) assist communication between the CMAR, Vendor and City to make sure equipment is in working order, 2) assist staff in verifying that all knowledge is transferred and understood how each piece of equipment works and operates in the treatment process, and 3) provides the start-up experienced knowledge to make sure that the plant is operating efficiently.

The exact scope and fee for this extension is being finalized but is estimated at $1,107,494 and scheduled to be brought to Council at the September 26 meeting for consideration of an award of an amendment to extend these services.

Start-Up Planning

The Planning phase for plant start-up is nearing completion and the acquisition of needed materials phase is in beginning stages. The Owner's Representative, Ardurra Group, responsible for developing and overseeing the implementation of plant start-up, has completed the development of a phased plan and the CMAR is now working with vendors and subcontractors to acquire the temporary piping and valves required to implement the process. The process utilizes the plant's internal fire water loop to supply clean well water to each process unit sequentially for testing prior to introduction of raw canal water. The Start-Up process will begin in October with the filling of the Ground Storage Tank (GST) from one or both of the existing wells on site. The plan requires the installation of five temporary piping "loops" that will supply, initially, clean well water, from the

GST to the individual units for the initial start-up. Each “Loop” represents a separate and distinct “phase” of the start-up process

Loop 1

Beginning in October, starting with filling the GST from the wells and once temporary piping is in place will then supply clean well water to the Raw Water Pump Station. The Raw Water Pumps will be brought online to circulate water through the static chemical mixers and into the Pre-Treatment unit and then return back to the Raw Water Pump Station. This allows for pump and flow control and measurement to be adjusted and demonstrate the mechanical function of the vertical screens, flocculation mixers and plate settlers. This is a closed loop simply recirculating the water back to the Raw Water Pump Station while these parameters are adjusted and flow meters checked. 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.

Loop 2

In late October, the Loop 2 opens the Pre-Treatment sedimentation basin and the solids handling system to the clean water from the Raw Water pumps pushing clean water through the Sludge Splitter into the Gravity Thickener and Wash Water Recovery units and back to the Raw Water Pump Station. The water is then circulated back to the Raw Water Pump Station closing the loop. 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 loop also provides a training opportunity for Operational staff and the Lab Tech.

Loop 3

This loop, scheduled to begin in November, will temporarily connect the fire water main to the process piping immediately behind the membrane feed pumps and 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. Each membrane rack will run individually for approximately one week prior to engaging the next rack and ultimately the third. This will incorporate the automation for membrane cleaning systems and calibration of these chemical feed pumps, Chlorine dioxide generator, and the Chlorination and Scrubber systems as well as the High Service pumps. This phase is initially anticipated to require about 4 weeks of run time to fully demonstrate flow, filtration and cleaning processes. The GAC will not contain the carbon filtration media during these tests to prevent the accidental contamination of that material during testing. The schedule is largely set by the membrane manufacturer who will then demonstrate the maximum production rates to meet purchase specification requirements. This provides a ground floor opportunity for Operator training on the automation of the membranes and secondarily the granulated carbon contactors (GAC). At this time the plant operational staffing will require the Plant Electrician, the Lab Tech and a Plant Mechanic.

Loop 4

The loop, scheduled to begin in December, will introduce Canal Water (dirty) to the Raw Water Pump Station and from there through the Pre-Treatment unit where flocculation chemicals and chlorine will be injected through the mixers and then go through the plate settlers. This will begin to produce sludge from the raw water and the resulting materials will be pushed through the solids handling system tested previously in Loop 2. This process will require plant operations to begin sludge drying and removal by haul off. The settled

canal water will then be cycled back to the GCWA canal. The Pre-Treated water will be monitored for compliance with the State's required settled water quality of 2 Nephelometric Turbidity Unit (Ntu) or less. Once that is reached and testing confirms compliance regular reporting will begin and the plant will apply for TCEQ acceptance of the initial settled water quality (requiring up to 60 days). The operation will provide operational training as well as require plant operations staff and laboratory technician to provide daily reports to TCEQ.

Loop 5

The loop**,** scheduled to begin in January 2023, is the Finished Water storage/ disposal loop. Upon completion of the flow and cleaning tests of the membranes and satisfaction of the membrane manufacturer's testing requirements and approval of the Pre-Treatment unit's settled water quality, the membrane manufacturers will approve the introduction of Canal Water (dirty) 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 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 February and March the plant will run to refine the final water quality and continue to flush the transmission lines as necessary. This also provides time for the final performance testing of the membranes and 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 into the distribution system.

By April the team anticipates the plant operations stabilizing and with full operational staff and ongoing reporting the plant will apply for TCEQ approval.

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.

Budget Info:

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 Revenue Bonds	TBS 2022	13,112,500		13,112,500
Impact Fee - Debt	TBS 2022	13,112,500		13,112,500
Cash				-
Other Funding Sources				-
Total Funding Sources		**175,500,000**	**-**	**175,500,000**

Expenditures	**To Date**	**Future**	**Total**
PER	8,773,058		8,773,058
Land	173,394		173,394
Design	16,335,173	300,000	16,635,173
Construction	137,121,691	1,500,000	138,621,691
Construction Management/Inspection	4,100,474	1,107,494	5,207,968
Construction Materials Testing	462,860		462,860
FF&E	1,353,430	146,570	1,500,000
Total Expenditures	**168,320,080**	**3,054,064**	**171,374,144**

Project Contingency	**2.4%**	**4,125,856**
Project Balance		**0**

Schedule Info:

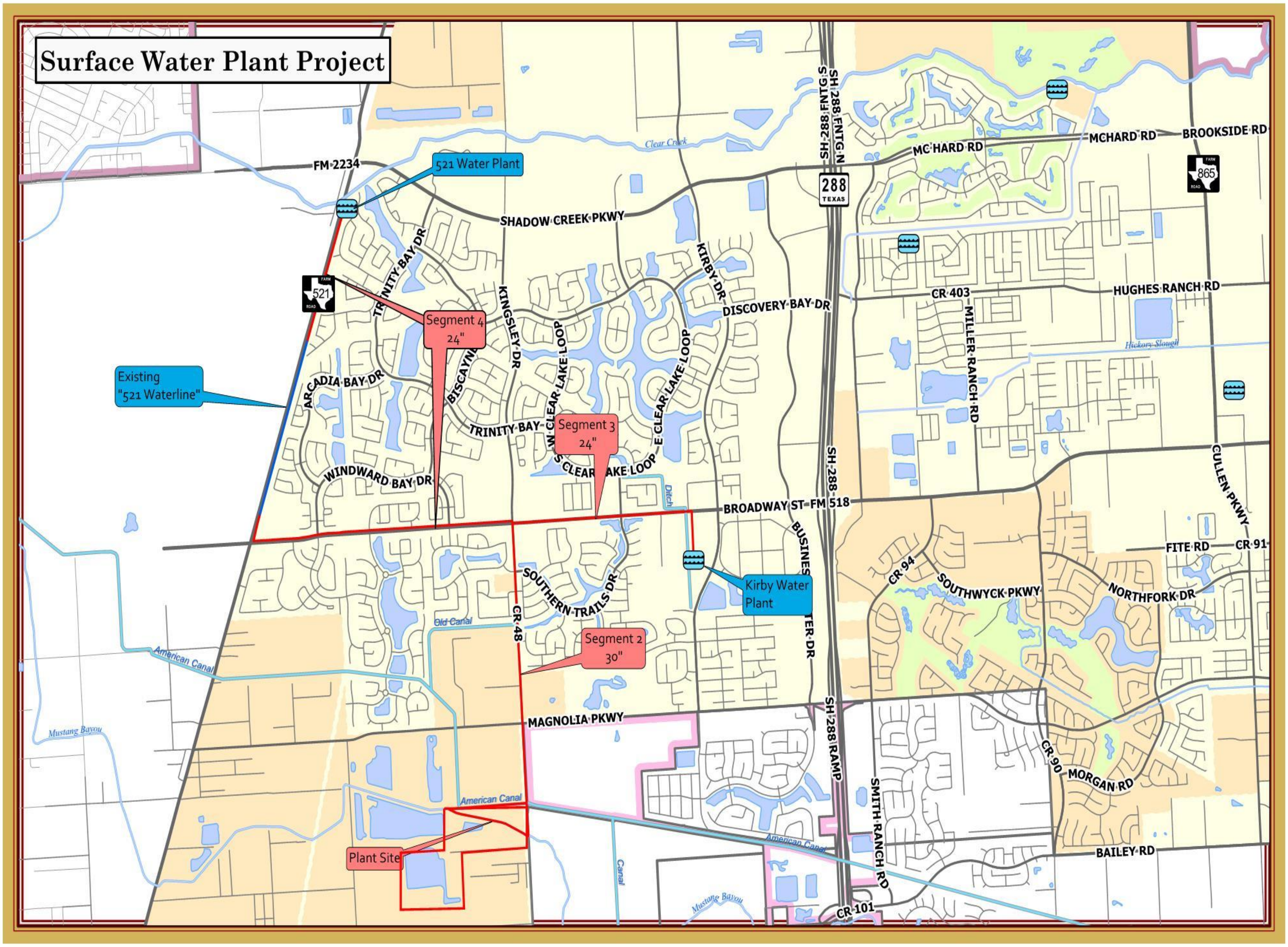
	Base Line	***Current***
Design Start - Package 1	August-19	September-19
Design Start - Package 2	February-19	March-19
Design Start - Package 3	August-19	September-19
Bid Start	March-20	January-19
Construction Start	May-20	June-20
Construction Completion	December-22	June-23

*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

Project Map:


Surface Water Plant Project
521 Water Plant
Existing
"521 Waterline"
Segment 4
24"
Segment 3
24"
Segment 2
30"
Plant Site
Kirby Water
Plant
FM 2234
SHADOW CREEK PKWY
MC HARD RD
MCHARD RD
BROOKSIDE RD
HUGHES RANCH RD
CR 403
DISCOVERY BAY DR
TRINITY BAY DR
ARCADIA BAY DR
WINDWARD BAY DR
KINGSLEY DR
KIRBY DR
BROADWAY ST FM 518
SOUTHERN TRAILS DR
CR 48
MAGNOLIA PKWY
SOUTHWYCK PKWY
NORTHFORK DR
FITE RD
CR 91
CR 94
CR 90
MORGAN RD
BAILEY RD
SMITH RANCH RD
CR 101
CULLEN PKWY
MILLER RANCH RD
SH 288
American Canal
Old Canal
Mustang Bayou
Clear Creek
Hickory Slough

Project Photos:

Aerial View of the back side of the Administration Building

Sanitary Lift Station to service the Plant

View looking north at the Membrane Building.

View looking at the Operations Building.

View of the Pre-Treatment system

View looking east of the sludge press building and sludge thickners

View of the Chlorine Treatment and Storage Building

View looking North at the Raw Water Pump Station