



# Memo

**To:** Trent Epperson, City Manager  
**From:** Lorenzo Wingate, Director of Engineering & Public Works  
**CC:** David Sohns, Director of Utilities  
**Date:** September 14, 2023  
**Re:** SWTP Update

6/14/2023  
To: Mayor and City Council  
Update on the Surface  
Water Plan progress.  
Supply chain issues still  
impacting the project but  
significant progress towards  
completion has been  
accomplished over the past  
few months.  
-Trent

## Executive Summary

This memo provides information about the progress on the Surface Water Plant project's current financial and schedule status. The memo details the current progress of the start-up and commissioning phase. The project remains in budget, but the schedule is now rigid, in that any length of delay pushes back the schedule exactly as long as the delay without any avenues of regaining lost time. **The projected completion date (Water into the System) is now estimated for December 2023 with completion of the final construction activities estimated for February 2024.**

## 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 and ground water wells 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 storm hardened 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 impacting the GMP 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.

The manufacturer of the membrane system and components, H2O Innovations, is also having supply chain issues that are impacting the ability to obtain remaining components needed for testing the membrane system and sub-systems. Additionally, this firm's start up teams are in high demand with various projects around the State, so when components are delayed, leaving the membrane system partially assembled, H2O's start up staff gets re-assigned to other projects until all components are available, installed, and the full assembly is ready for testing. This scenario is inserting additional delays into completing sub-system assembly and check-out and consequently delaying overall completion of pre-start-up activities.

Other major components remain on the delayed delivery list. The delivery of the final generations package has once again been delayed until the end of September.

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. In other cases, a temporary non-AIS component has been used to complete a critical system likely requiring it to be replaced when the actual components become available. In one instance the City is relying on a de minimis exemption to allow minor components of a manufactured system to contain imported fittings. The City applied for and was granted two waivers, (in January 2023) for valves and check valves after the EPA confirmed domestic products meeting these specifications were not available in the current supply market. This issue also delayed the completion of construction of the transmission lines by about 6 months. Availability of American made valves and fitting are delaying work at both receiving water plants right now and increasing the cost of this work (increased costs will not impact the GMP).

**Due to these delays, introduction of produced water into the distribution system is now projected for December 2023 and Final Completion of Construction is projected for February 2024.**

### **Construction Progress**

Operations Building construction is complete, minus a final punch list.

The Administration Building (Admin) is complete, minus a final punch list.

Pumps and motors have been installed in the High Service Pump Room and all piping inside of the building is connected. Connections from the GST to the pumps and from the pumps' discharge piping to the transmission line will be completed once pressure testing is complete. This will leave flushing and chlorinating these lines to be done once the plant is producing drinking water.

The transmission lines from both receiving plants, back to the Surface Water Plant, are complete, and the sanitary force main is complete and in operation at this time.

The Chlorine Building gas evacuation system has been installed and only minor electrical systems for the chlorine alarms and the piping for the gas chlorinator system are needed for the building to be functionally acceptable for phased plant startup.

The GAC (Granulated Activated Carbon) filters and piping have been installed and will be flushed once the system is making clean water. The GAC media will not be installed until the plant is running, to avoid accidental damage to this material.

Dummy modules and plugs for commissioning have been installed within the membrane racks. Most of the pipe painting is complete. Airline routing and potable water supplies have been completed. The membrane manufacturer's technical representatives have begun system check outs to ensure proper installation and consulting on instrumentation in preparation of pipe flushing and initial testing procedures. This intermittent visitation is where the bulk of the delay lies. CMAR is continuing its startup of individual equipment and certification of proper installation.

The plant ethernet fiber has been terminated at the various buildings to create the supervisory control and data acquisition (SCADA) system. SCADA engineers are checking equipment and instrumentation connections, programming programmable logic cards (PLCs), and continuing to write the operational logic for the plant. Recent completion of the plant's MDF/Server Room and fiber connection to the City's network has allowed on-site work to begin. The Operations team is currently reviewing and submitting feedback to the SCADA engineers about concerns or ease of use issues found within the system.

In keeping with the City’s IT Department’s request, the CMAR and the SCADA programmers have completed the work revising the plant’s IP addressing scheme to make it a Level Three scheme. This affords the plant a higher level of data security and makes internal communications more efficient. City IT has recently completed coordination with GCWA’s IT team to allow raw water intake meter data to flow directly to GCWA. Once installed, the Filtrate (return flow) meter will also provide data on quantities of water returned to the canal from the process, generating an accurate account of water used.

Site work is progressing well. The storm drainage outfall has been constructed, tying the site drainage into Mustang Bayou. The paving contractor has completed all the roadway and most of the sidewalks throughout the plant. The plant’s north entrance has been upgraded with the completion of the left turn lane on County Road 48 (Kingsley).

Within the process units: Raw Water Lift Station, Pre-Treatment, and Solids Handling (wash water recovery, gravity thickener, belt presses) equipment has been started-up and inspected by the manufacturer’s representatives to provide Certification of Proper Installation (COPI). The membrane system, high service pump station, and the chlorine system are the remaining systems left for completion and training. The vendors, while onsite conducting COPI certifications, are also performing vendor-based training for the City’s plant operations and maintenance staff for these components. Operations equipment that was being exercised is now in use and no longer requires separate exercise schedules to meet manufacturer’s requirements.

Connections and metering stations into water receiving facilities, Shadow Creek Ranch and Kirby, are being prepped for material delivery and construction activities to commence. Current plans for work in these operating plants revolve around no impact to operations. However, it is possible, given unforeseen circumstances, that short duration shut-downs might be required. The team is in constant contact and coordinating efforts with Water Operations Staff.

**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 \$169,320,054 and potential future expenditures of \$1,976,570 (for additional GST at Kirby receiving plant) totaling \$171,296,624 leaving a project contingency of \$ 4,203,376. As of the June 2023 Pay Estimate, the project is 94% complete by pay, with \$129,276,568 paid. Approximately 99% of the construction time has been expended (1522 days of 1556 day contract time). Additional contract time (through December 2023) is expected to be provided, via a zero-dollar change order, to accommodate the remaining project scope.

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
	TBS			
W/S Certificates of Obligation	2023		2,622,500	2,622,500
	TBS			
Impact Fee - Debt	2023		2,622,500	2,622,500
Cash				-
Other Funding Sources				-
<b>Total Funding Sources</b>		<b>170,255,000</b>	<b>5,245,000</b>	<b>175,500,000</b>

<b>Expenditures</b>	<b>To Date</b>	<b>Future</b>	<b>Total</b>
PER	8,773,058		8,773,058
Land	179,598		179,598
Design	16,375,496		16,375,496
Construction	142,546,976		142,546,976
Construction Management/Inspection	5,100,448		5,100,448
Construction Materials Testing	462,860		462,860
FF&E	1,315,620		1,315,620
<b>Total Expenditures</b>	<b>174,754,056</b>	<b>-</b>	<b>174,754,056</b>

<b>Project Contingency</b>	<b>0.4%</b>	<b>745,944</b>
<b>Project Balance</b>		<b>(0)</b>

## Start-Up Planning

The activities of **Loops 1 and 2** were completed using raw water from the canal and returning that water to the canal. This tested out the Raw Water Pumps, vertical screens, raw water piping and portions of the Pre-Treatment structure and chemical treatment equipment.

### Loop 4

This Loop, which was completed in early September, introduced coagulant through the static mixers upstream of Pre-Treatment to produce settled water. The process produced sludge allowing the CMAR to begin testing the solids handling and removal systems. The settled canal water was then cycled back to the GCWA canal. Once settled water reached the sustained required 2 Nephelometric Turbidity Unit (NTU) or less it can be used in the Loop 3 process to flush the membrane system piping, but not the membranes themselves. Upon reaching the turbidity goal and with the piping system flushed of all construction debris, the water will be suitable for feeding the membranes.

### Loop 3



Loop 3 will use settled water, generated in Loop 4, to flush the membrane supply piping and begin to test membrane rack functions, without the membranes installed. This test will exercise all the functions of the membrane racks and associated equipment without jeopardizing the membranes themselves, including all three versions of membrane cleaning, the cleaning chemical systems and tanks, and the GAC backwash system. This loop was scheduled to begin in the beginning of September but was slightly delayed by the installation of the Compressed Air System piping (material delays) and the membrane manufacturer's technician availability. Loop 3 testing will also return water to the canal after flushing the downstream piping.

Loop 3 represents the largest hurdle to surmount prior to making drinking water, as it will also include testing backwash processes, the GAC vessels, and their cycles, as well as the plant water loop and its pumps and SCADA controls of all these systems.

### **Loop 5**

This loop, now scheduled to begin in October 2023, is the finished water storage/disposal loop. Upon completion of the Loop 3, the membrane modules will be installed. The membranes will then undergo performance testing and cleaning checks and the manufacturer will begin proving the system meets chemical and energy performance requirements, in compliance with the specifications. At this point the plant will be producing potable water. Once the water meets drinking water quality, water will be stored in the GST and used to flush the transmission lines. Once all three racks are in production, the plant will be making about 3 to 4 million gallons of water during an 8 to 10 hour operational day, and water that cannot be stored or used in 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 obtain clear biological tests. This water will be distributed from the Surface Water Plant to the receiving plants at Kirby and Shadow Creek (FM521). The flushing process will require dechlorination at the receiving plants and then spilling out to drainage systems. 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.

Once the plant water quality has been accepted by TCEQ as meeting drinking water quality standards the project will produce water for final introduction into the distribution system. This is scheduled for late December 2023.

This schedule represents the evolving start up process and is subject to delays as equipment operation is refined and fine-tuned and troubleshooted to resolve operational challenges. The date of introduction of produced water into the distribution system presented above is a conservative estimate, contingent upon 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 September 1<sup>st</sup>, as follows:

- Surface Water Treatment Plant Manager – Hired
- Process Control Supervisor – Hired
- Operator II – Hired
- Operator I – Hired
- Lab Tech – Hired
- Maintenance Coordinator – Hired
- Plant Mechanic – Hired
- Plant Mechanic – Hired
- Instrument Technician – Hired
- Electrician – Application hold
- Operator II – Taking applications
- Operator I – Taking applications
- Operator I – Taking applications

**Schedule Info:**

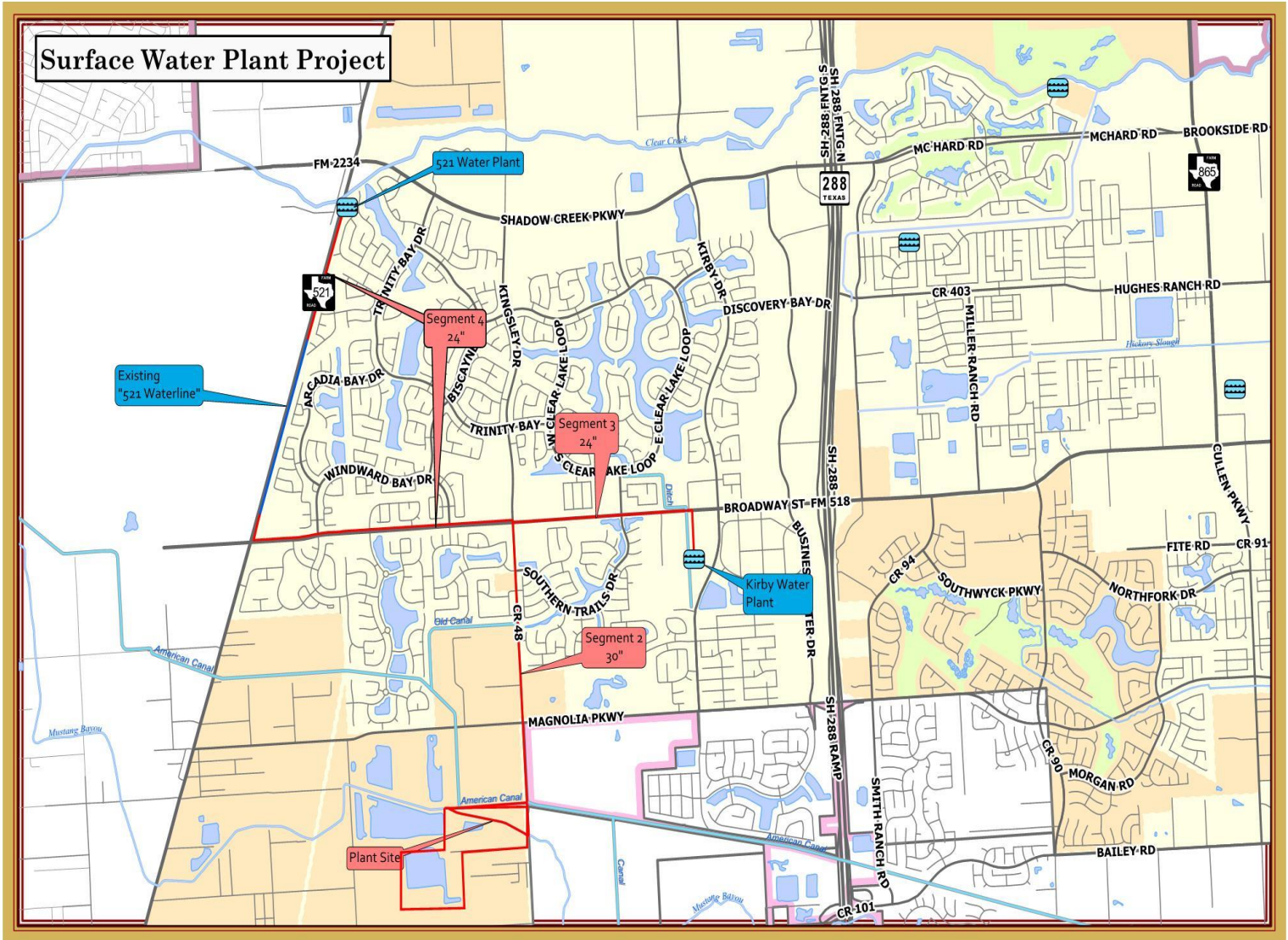
	<b>Base Line</b>	<b>Current</b>
<b>Design Start - Package 1</b>	August-19	September-19
<b>Design Start - Package 2</b>	February-19	March-19
<b>Design Start - Package 3</b>	August-19	September-19
<b>Bid Start</b>	March-20	January-19
<b>Construction Start</b>	May-20	June-20
<b>Construction Completion</b>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

\*December-2023 is current schedule for distribution of production water into the system, with substantial completion in February-2024.

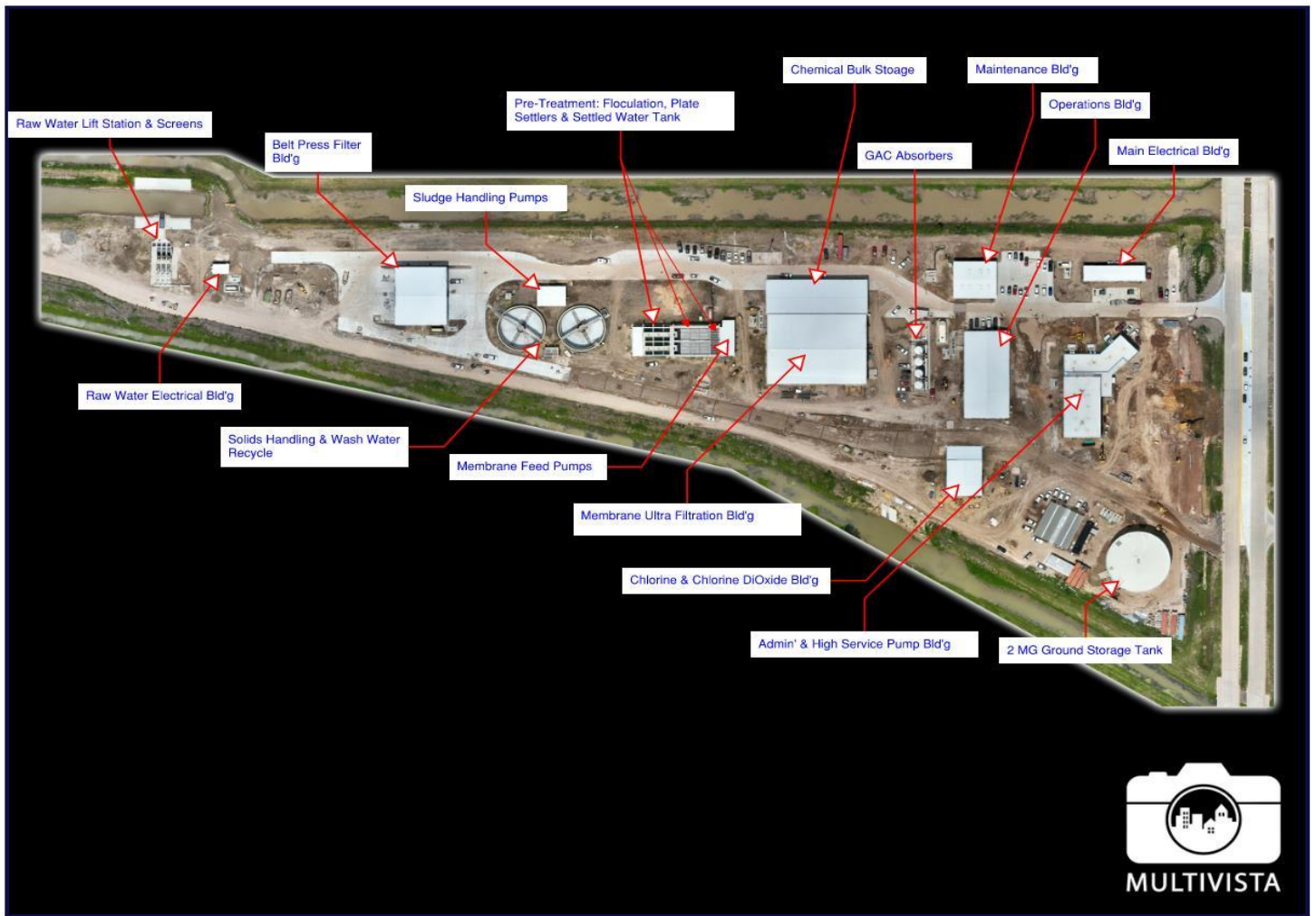
**Previous Memos:**

- 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, 11/17/22, 2/23/23, 4/10/23, 6/22/23

Project Map:



# Project Photos:



City of Pearland - Surface A Water Treatment Facility - Aerial Slideshows - April 11 2023 - Photo 28

## Site Facility Function Identification





Westerly view from County Road 48 showing roadway progression



Analyzer installations in High Service Pumping Station



Sidewalk completed around Membrane Building





View of plate settlers in action, creating settled water for flushing (Loop 4)



PreTreatment Unit with Flocculation Cells in foreground & Plate Settlers in background





Raw Water Lift Station paving