



Memo

To: Clay Pearson, City Manager

From: Andrea Brinkley, Assistant Director, Public Works

Cc: Jon Branson, Deputy City Manager
Trent Epperson, Assistant City Manager
Cynthia Pearson, Finance Director
Robert Upton, P.E., Director of Engineering
Eric Wilson, Public Works Director
Skipper Jones, Assistant Director, Public Works

4/13/2017

To: Mayor and City Council members

Updates on the several intricate and complex design efforts associated with developing surface water treatment and transmission. Clay

Date: April 10, 2017

Re: Surface Water Plant – Preliminary Engineering Design for Package No. 1, 2, 3 and Owner’s Representative Task Order No. 3

Below is a detailed description of the Surface Water Plant preliminary engineering design effort, which has been allocated into three integral and concurrent efforts (packages) which will be performed in coordination with one another and overseen by the City and the City’s Owner’s Representative. The preliminary design package contracts will be presented to Council for consideration on April 24th.

Package No. 1: Raw Water System

Package 1 is referred to as the Raw Water System and includes the intake connection to the Gulf Coast Water Authority American Canal, the Pre-Sedimentation Basin and the Raw Water Pump Station. The selected prime consultant is Freese Nichols Inc (FNI) who has a local office in Pearland with sub-consultants: C.L. Davis & Company (Survey); Geotest Engineering, Inc. (Drilling and Laboratory); Griffin Dewatering, LLC (Pump Tests); Shrader Engineering (Electrical Design) and Nathelyne A. Kennedy (General Civil). The cost for Package No. 1 is \$1,246,507.

The Package No. 1 tasks to be performed are considered Preliminary Engineering Design services, include a Preliminary Engineering Report and 30% plans and specifications for: a screened intake structure at the American Canal, a conveyance system from the canal intake across Mustang Bayou to the existing large pond. The existing large pond will be fully or partially lined to create a pre-sedimentation basin (PSB) that will provide initial water quality improvement by settling suspended solids. The PSB will be designed to provide desilting or dredging operations in the future. A small adjacent pond will be evaluated for beneficial use for backwashing or sedimentation removal. The work will also include a 20 MGD raw water pump station structure with 10 MGD initial capacity that can be expanded in the future. The raw water pump station will pump the water from the PSB to the Water Treatment Plant.

The preliminary design work will also include a study of the existing groundwater table and a feasibility study of potential use of adjacent properties. The groundwater study will review the interaction between the existing large pond, American Canal, Mustang Bayou and surrounding

abandoned and active sand mining sites. Findings from the groundwater model will be utilized to better understand the effects that groundwater may have on the PSB. A feasibility task will include a conceptual review to indicate if City should consider future locations for long term water demand strategy. The feasibility task will consider the following aspects: additional storage volume, beneficial use during construction such as care of water/storage of water during dewatering operations, and maintenance operation activities including sediment management.

Package No. 2: Water Treatment Plant

Package 2 includes the Water Treatment Plant and facilities up to the air gap into the Potable Water Ground Storage Tank(s). The selected prime consultant is CDM Smith with sub-consultants: Azcarate & Associates Consulting Engineers LLC (Professional HVAC, Plumbing and Fire Protection); Carollo Engineers, Inc.(Bench Scale Testing, Pilot Plant & Investigation, Flavor Profile Analysis); Cobb, Fendley & Associates, Inc. (Survey); Kalluri Group, Inc. (Electrical); 5engineering LLC, (Drain Lift Station and Pilot operation assistance); Xenco (Laboratory). The cost for Package 2 is \$ 4,602,979, of which approximately \$2,500,000 is allocated for the required pilot plant construction, treatment units and report.

These tasks include Process Evaluation, Development and Preliminary Design, along with engineering support services such as geotechnical and survey, pilot plant operations and investigation services. The consultant team will evaluate alternative treatment processes based on treatability of the raw water, water quality goals, a present worth cost analysis and noneconomic factors, and recommend the treatment process that will meet the City's project goals. The recommended treatment process will then be piloted and be fully developed in the Preliminary Design and will yield a report and 30% level plans and specifications, which includes approximately 100 plan sheets.

Under Preliminary Design, tasks will be completed to further develop the selected treatment process, design the main site power and distribution system, SCADA system architecture, site security, and include buildings that will house the main treatment trains and staff operations control and support. An evaluation of the various treatment processes and other facilities to be incorporated into the plant building which will result in recommended number and size of unit processes, standby equipment requirements, types of equipment to be used, and facility costs.

The regulatory approval of the facility is another major focus and this includes coordination with regulatory agencies such as the Texas Commission on Environmental Quality (TCEQ) and Texas Water Development Board (TWDB). The work that must be accomplished for regulatory approval includes bench scale testing to capture variable water quality conditions during different seasons, rain events and low canal flow conditions and the construction and operation of a Pilot Plant to evaluate treatment methods. The Pilot Plant will be constructed and the treatment units will include and evaluate:

- Coagulation for pretreatment.
- Powdered activated carbon (PAC) for taste and odor removal.
- Chlorine dioxide for manganese oxidation and disinfection.
- Ozone for disinfection.
- Chlorine and chloramines for disinfection.



The Pilot Plant will be constructed on the future project site and this will include pumps and piping of canal water to a temporary building which will be built to house the treatment units and a laboratory. The pilot plant will be staffed by 2 engineers for nine (9) months. The 9 month duration is recommended to capture as much hot and cold weather water characteristics as possible. The results from piloting will be evaluated to assist in the development of recommended treatment processes and associated design criteria and for validating treatment performance through seasonal variation in raw water quality.

A water flavor profile analysis with an interactive workshop for a control group and the public will be included with the purpose of providing a way to record the taste and odor characteristics of pilot treated water and provide the pilot treated water to be compared to the City's current water supplies. Public outreach for this component will be a team effort with the City. All of the above data will be compiled into a Pilot Study Report.

Package No. 3: Distribution System

Package 3 includes Ground Storage Tanks, a Potable Water Pumping Station, and approximately 60,000 linear feet of potable water distribution and supply line, and approximately 6,000 linear feet of sanitary sewer force main to serve the new surface water plant. The selected prime consultant is CDM Smith with sub-consultants: Lockwood, Andrews & Newnam, Inc. (Pump Station and Water/Sewer Line Design); JQ Infrastructure (Structural); Nathelyne A. Kennedy (Sanitary Line); Kuo & Associates Inc. (Survey); Geotest Engineering, Inc. (Geotechnical); Middleton Brown LLC (Environmental); RODS Subsurface Utility Engineering, Inc. (Utility Conflict Identification). The cost for Package 3 is \$ 1,100,272.10.

The scope for Package 3 includes the development of the plans and specification to the 30% level for the Ground Storage Tanks and Pump Station and a Route Study to identify a corridor alignment for the water and sanitary lines, which will be at a 10% design level. Ground Storage Tank sizing and configuration will identify the number, size and location of the tanks. The Pump Station preliminary design effort will include identification of pumps and size, piping and valves with electrical equipment room, pump mechanical room, reception area, visitors center, restrooms, control room, in one common, multi-purpose structure. Site improvements related to the public area along the project road frontage will include the front entrance gate, visitor parking, entrance road, site grading, landscaping and irrigation, site fencing and electronic security (to meet regulatory requirements), wastewater and water utility connections, site lighting, and facility signage.

A route study will include the identification of routes for comparison purposes for four (4) water line segments. General direction for the pipelines are listed below:

- Segment 1: from the project site continuing east along GCWA American Canal for approximately 28,100 LF to a connection point at FM1128 .

- Segment 2: from the project site continuing north along County Road 48 for approximately 8,100 LF to a take point just south of Broadway St.
- Segment 3: from Segment 2 at the intersection of County Road 48 and County Rd 59 and continue east to Kirby Rd for approximately 5,800 LF where the water line turns north for approximately 900 LF to a take point just south of Carson Ave.
- Segment 4: from Segment 2 at the intersection of County Road 48 and County Rd 59 and continue west for approximately 10,000 LF to Almeda Rd (FM 521). From Almeda Rd (FM 521), the water line will turn north and continue along Almeda (FM 521) for approximately 6,000 LF to a take point at Broadway St.

The hydraulic model for the water lines will be updated and finalized providing demand patterns for near term and ultimate demands. The route analysis will also provide a tool for final route selection which can be utilized for land acquisition in the next phase.

Owner's Representative Task Order No. 3

The proposed Owner's Representative Task Order No. 3 will also be presented for Council approval on April 24th and is recommended to provide coordination and oversight assistance related to the TWDB requirements, three (3) design packages and a Water Master Plan update, all key to the Surface Water Plant program preliminary design engineering efforts. The work will be funded from two CIP projects, the Surface Water Plant (WA1605) and the Water System Master Plan Update (WA1705).

The last Water Master Plan was completed in 2008, and with the growth the city has experienced there have been many changes to the demands of the system and the upcoming Surface Water Plant which will provide up to 10 MGD of water, it is appropriate to update the Water Master Plan to model how the new water system will interact with the current water system.

Task Order No. 3 includes ten sub-tasks that can be generally grouped into activities related to funding assistance, water system master planning, and coordination and oversight of the concurrent preliminary design engineering work which will be ongoing in each of the upcoming design packages as outlined above.

The total amount for Task Order No. 3 services is a total of \$1,587,764 and the components that make up this total are detailed below.

Funding assistance: The first sub-task is related to ongoing TWDB funding assistance, which includes seeking approval on key design documents (sub-task 1; \$40,110). The second sub-task will include design consultant procurement assistance such as assistance with scoping of the work and scope/fee review of the three design packages (sub-task 2; \$77,126).

Water Master Plan Update: The third task is a Water Master Plan update, which is an evaluation and modelling effort of the existing water system and proposed flows and from the Surface Water Plant and city's buildout conditions and potential for regionalization can be evaluated and master planned for a period of ten years (sub-task 3; \$451,655). As noted above, work related to sub-task three will be funded by the CIP project WA 1705).



Package Nos. 1, 2, 3 Coordination and Oversight: The Owner's Representative will:

- Develop and implement an overall Basis of Design to the design package consultants, including regulatory, permitting and approval requirements as well as establishing treated water quality goals (sub-task 4; \$63,235).
- Provide direction and oversight of Pilot Plant operations, ensuring that the pilot work and report will meet the City's water treatment goals, and providing staff with operating and capital cost recommendations (sub-task 5; \$76,023).
- Review and develop a construction procurement methodology to deliver the overall project (sub-task 6; \$40,534).
- Develop the expected plant operational requirements and assist with planning associated with the plant facility personnel requirements for near term (sub-task 7; \$39,135).
- Coordinate the design packages deliverable reviews: pre-sedimentation basin, pilot plant test plan and report, process selection, and ground storage tank and water pipeline preliminary report (sub-task 8; \$81,281).
- Provide plans and specifications standards development to maintain consistent specifications and design details for all three packages (sub-task 9; \$137,546).
- Provide project management services related to overall program progress meetings, coordination and facilitation of topic specific workshops related to water quality, construction procurement and delivery, status updates on package progress, overall schedule coordination for all design packages (sub-task 10; \$548,330).

Funding

Currently available funding for the Water Treatment Plant project is \$6,223,866 and an additional \$451,655 is available for the full system Water Modeling. The award of all three Preliminary Engineering packages plus the Task Order #3 Contract totals \$8,537,522 and exceeds the currently available funding by \$1,862,001. The discrepancy is that in the current CIP the distribution lines in Package No. 3 were several separate projects with the design work occurring in future years of the CIP. With the extensive easement acquisition requirements, it was determined that we needed to accelerate the design of these lines to match the plant schedule. The TWDB loan schedule reflects this approach. Therefore, during the award process it will be necessary to appropriate an additional \$1,900,000 to the project from TWDB bonds proceeds that have already been sold.

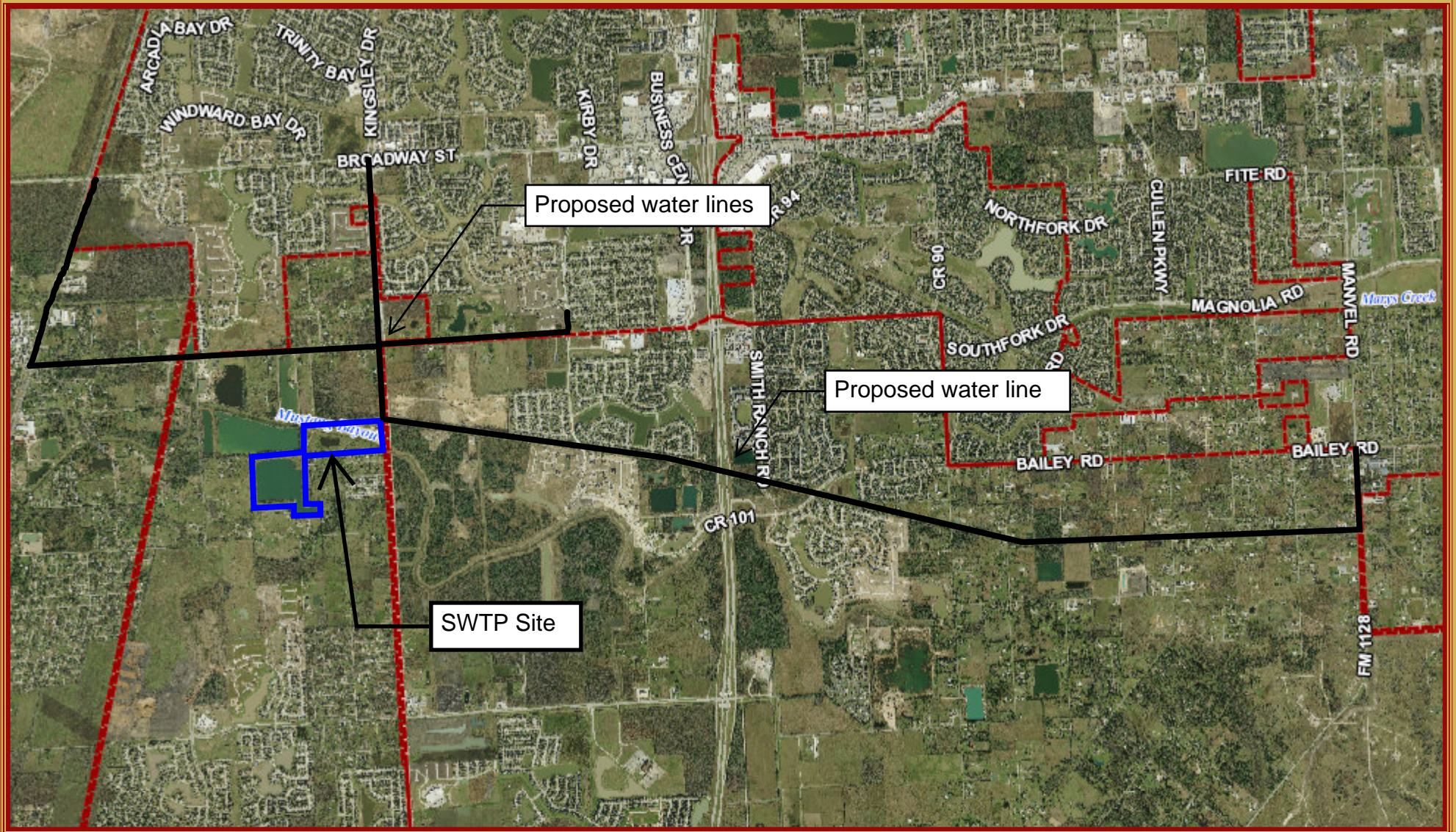
Schedule to complete the Preliminary Design Work

Once contracts are approved, the consultants will begin their tasks and this phase of the project work will progress over the next 16 months with anticipated completion of the Preliminary Engineer Reports by August 2018.

Next Steps after Preliminary Design Work is Completed

As we move to the review and final completion of the Preliminary Engineer Reports and decisions have been made regarding the PSB, site layout, treatment process, and pipeline routes, staff will begin negotiations with the consultants for the final design phase of the project. This will include final design and construction documents of each package and also begin any land acquisition that is needed for the pipelines. Final design work will occur from August 2018 to August 2019 with construction expected to start in early 2020 and a completion target of January 2023.

SURFACE WATER TREATMENT PLANT



1:48,000

1 inch = 4,000 feet



NORTH

This product is for informational purposes only and may not be prepared or be suitable for legal, engineering, or surveying purposes.

MAP PREPARED: APRIL 12, 2017
GIS DEPARTMENT

