

4C.19 O.N. Stevens Water Treatment Plant Improvements (N-19)

4C.19.1 Description of Strategy

The O.N. Stevens Water Treatment Plant provides treated water supplies to the City of Corpus Christi (City) and its customers. The City is experiencing increasing municipal and industrial water demands due to a growing population, enterprise, and commerce. Despite the successful water conservation efforts of the City's industrial customers, raw and treated water demand is increasing due to increased manufacturing. Not only have manufacturers indicated that they will need increasing amounts of water in the coming years, other water users have approached the City about various efforts slated to come online in the next several years with increasing rates of water consumption over a 10-year period. The projected growth in manufacturing and steam-electric demand, in combination with municipal demand, requires that the City develop additional treated water supply over the next few years.

Although the O.N. Stevens WTP is currently rated at 167 MGD by the TCEQ, the City currently can produce only 159 MGD (or less) of treated water through the O.N. Stevens WTP (the sole source of treated water for the City of Corpus Christi municipal supply, various large industrial users, and the South Texas Water Authority)¹ due to a hydraulic bottleneck at the front end of the O.N. Stevens WTP. Re-designing the influent end of the plant will allow the plant, operating under acceptable TCEQ detention rates, to produce up to 200 MGD which would increase the amount of treated water supplies needed to meet increasing water demands for City customers and improve supply reliability. Additional system improvements to the water treatment plant will provide operational cost savings from increased reliability and functionality. The proposed O.N. Stevens Water Treatment Plant Improvements are as follows:

- **Raw Water Influent Improvements** – these improvements will address the current hydraulic bottleneck at the O.N. Stevens WTP front end that limits total plant capacity to 159 MGD (or less) in order to increase plant capacity to 200 MGD. These improvements are also required in order to accomplish the Chemical Feed Improvements (see next description), as well as to increase the security and serviceability of the plant.

¹ The City of Corpus Christi, STWA, and some industrial users rely solely on the O.N. Stevens WTP for treated water supplies, and do not have backup treatment plants or treated water furnished from other sources. However, SPMWD treats some CCR/LCC/Lake Texana system raw water supplies with their own water treatment plant.

- **Nueces River Raw Water Intake Pump Station Improvements** – these improvements will increase the reliability of water delivery to O.N. Stevens from the Calallen Pool.
- **O.N. Stevens WTP Solids Handling Facilities** – these improvements will allow thickening and dewatering of alum sludge from the sedimentation basins which would also employ vacuum recovery for the associated water which would be recovered and returned to the treatment train as a new raw water supply. Current practice is to evaporate the water from the sludge in holding ponds.

The Raw Influent Improvements would allow for blending and pre-sedimentation of 100% of the source water which would increase finished water quality, as well as allow for a more uniform treatment regimen which would save operational costs. Full blending and full pre-sedimentation will also accomplish the goal of increasing the quality of the partially treated water that is provided to local industry. Raw Influent Improvements will also increase security at the O.N. Stevens WTP as currently the influent pipelines emerge in an open top meter vault only a few feet from a major road, which is a security concern.

The Nueces River Raw Water Intake Pump Station Improvements will upgrade the pump station in order to increase the reliability of water delivery to O.N. Stevens WTP. The upgrades will also increase the operational capability of the pump station and provide operational cost savings from the increased reliability and capabilities of the improved pump station, including new pump motors and motor starters to be installed.

The O.N. Stevens WTP Solids Handling Facility will employ vacuum recovery of water that is currently evaporated. With these improvements, water would be recovered and returned to the treatment train as a new raw water supply.

In addition to the projects detailed above, the City of Corpus Christi anticipates the need for additional water treatment plant improvements so the chemical feed system, electrical distribution system, and process monitoring instrumentation and automation system. Such improvements are not fully discussed in this water management strategy and are not included in the cost estimate.

4C.19.2 Available Yield

Should Region N or the City develop additional raw water supplies in the next few years such as the Garwood Pipeline or the Off-Channel Reservoir, the industrial customers downstream of the O.N. Stevens WTP may face a supply deficit without the proposed O.N. Stevens WTP improvements as they depend on partially and/or fully treated supplies from O.N. Stevens WTP which currently has a hydraulic bottleneck at the front end of their treatment train that limits water treatment plant production. With raw water influent improvements, the O.N. Stevens WTP capacity will increase to 200 MGD (peak day).

The City has plans to re-use treated supplies that are currently being evaporated from their sludge handling ponds. With the O.N. Stevens WTP improvements in place, the new sludge handling facilities will provide a new reuse supply of water to the head of the treatment train of approximately $14.3 \text{ MGD}^2 = 16,000 \text{ ac-ft/yr}$. As this water is currently being evaporated, capturing it through this reuse strategy provides an additional 16,000 ac-ft/yr of supply.

4C.19.3 Environmental Issues

A summary of environmental issues by WTP improvement component is included in Table 4C.19-1. There is little to no environmental impact from the proposed O.N. Stevens WTP projects. The majority of the work will be on existing facilities and structures.

² The additional yield is based on an improved O.N. Stevens WTP capacity of 200 MGD. Based on the City's most recent five-year water use data, the O.N. Stevens WTP provides treated water supplies at a peak to average day ratio of 1.4:1. Using this peaking ratio, the 200 MGD peak capacity WTP would have an average day capacity of 143 MGD. The sludge handling facilities are anticipated to recover 10% (or 14.3 MGD).

**Table 4C.19-1.
Environmental Issues
City of Corpus Christi Water Supply Improvements**

Water Management Strategy/Component	Environmental Impact
Raw Influent Improvements	Negligible impact. Possibility of processing more water daily by the WTP could allow for increased consumption if the demand manifests itself, but also increased B&E inflows possible as well.
Nueces River Raw Water Pump Station Improvements	Negligible impact. Upgrades to existing facility will <u>not</u> involve construction in river or alteration of flows, excavation, or dredging.
O.N. Stevens WTP Solids Handling Facilities	Negligible impact. Minimum flows to Audubon Society Rookery will be preserved.

4C.19.4 Engineering and Costing

Figure 4C.19-1 show the facilities required to develop the Raw Influent Improvements. The improved headworks piping at O.N. Stevens will also allow for 100% blending and pre-sedimentation of source waters which will effect water quality improvements and chemical cost savings. Table 4C.19-2 summarizes the costs for the City of Corpus Christi WTP Improvements.

**Table 4C.19-2.
Cost Estimate Summary for O.N. Stevens WTP Improvements**

ITEM DESCRIPTION	AMOUNT
O.N. STEVENS WATER TREATMENT PLANT IMPROVEMENTS - CONSTRUCTION	
RAW INFLUENT IMPROVEMENTS	\$12,107,000
NUECES RIVER RAW WATER WATER INTAKE PUMP STATION IMPROVEMENTS	\$3,125,000
O.N. STEVENS SOLIDS HANDLING FACILITIES	\$7,590,000
Total Capital Costs	\$22,822,000
Engineering, Administrative, Legal Costs, and Contingencies	\$7,988,000
Loan Origination Fee	\$514,000
Total Project Cost	\$31,324,000
Annual Costs	
Debt Service (6 percent for 30 years)	\$2,276,000
Operations and Maintenance (for 41 MGD conventional treatment added)	\$3,564,000
Energy Costs	\$1,259,000
Total Annual Cost	\$7,099,000
Available Project Yield (acft/yr)	16,000
Annual Cost of Water (\$ per acft)	\$444
Annual Cost of Water (\$ per 1,000 gallons)	\$1.36

4C.19.5 Implementation Issues

Implementation of these water management strategies will require the following permits:

- NPDES Stormwater Pollution Prevention Plans

There are limited chances for participation by partners. To the extent these improvements will provide improvements in water quality or supply for wholesale finished or wholesale partially treated or wholesale raw water customers, there may be partnership opportunities with the wholesale customers.

The sequencing of construction will have to take into account the fact that this is the City's only WTP, so it has to keep operating throughout the construction process. There is detention time of only a few hours in the clearwells to allow for switching over to the new hydraulic structures near the end of construction. The Raw Influent Improvements Component is the only portion of the proposed improvements that will require special sequencing consideration.

4C.19.6 Evaluation Summary

An evaluation summary of this water management option is provided in Table 4C.19-3.

**Table 4C.19-3.
Evaluation Summary of O.N. Stevens Water Treatment Plant Improvements**

<i>Impact Category</i>	<i>Comment(s)</i>
a. Water Supply 1. Quantity 2. Reliability 3. Cost of Treated Water	1. 16,000 acft/yr 2. High reliability. 3. \$518 per acft
b. Environmental factors 1. Instream flows 2. Bay and Estuary Inflows 3. Wildlife Habitat 4. Wetlands 5. Threatened and Endangered Species 6. Cultural Resources 7. Water Quality a. dissolved solids b. salinity c. bacteria d. chlorides e. bromide f. sulfate g. uranium h. arsenic i. other water quality constituents	1. Negligible impact. The O.N. Stevens WTP Solids Handling Facilities will reduce demand on river water. 2. Negligible impact. The O.N. Stevens WTP Solids Handling Facilities may have minor reduction in inflows to tidal portion of the Nueces River. 3. Negligible impact. The O.N. Stevens WTP Solids Handling Facilities will preserve minimum water levels in the Audubon Society Rookery. 4. Low or no impact. 5. Negligible impact. The O.N. Stevens WTP Solids Handling Facilities will preserve minimum water levels in the Audubon Society Rookery. 6. Negligible impact. All work on O.N. Stevens WTP property- should be no impact. 7. Low or no impact. The O.N. Stevens WTP Solids Handling Facilities will likely produce water of higher quality than the original source water (including lowered TDS), as the facility would remove solids.
c. Impacts to State water resources	• No apparent negative impacts on water resources
d. Threats to agriculture and natural resources in region	• None
e. Recreational impacts	• None
f. Equitable Comparison of Strategies	• Standard analyses and methods used
g. Interbasin transfers	• Not applicable
h. Third party social and economic impacts from voluntary redistribution of water	• None
i. Efficient use of existing water supplies	• Improvement over current conditions
j. Effect on navigation	• None
k. Consideration of water pipelines and other facilities used for water conveyance	• None



FIGURE 3 - ALTERNATIVE No. 2
 1"=50'

REVISION NO.	DATE	BY	DESCRIPTION

SHEET 3 of X RECORD DRAWING NO. WTR XXX CITY PROJECT I BR-3	<p align="center">O.N. STEVENS WATER TREATMENT PLANT RAW WATER INFLUENT IMPROVEMENTS</p> <p align="center">FIGURE 4C.19-1</p>	<p align="center">CITY OF CORPUS CHRISTI TEXAS WATER DEPARTMENT Department of Engineering Services</p>	<p align="center">Freese and Nichols 10814 Jubilee West Building R, Suite 100 Austin, Texas 78758 Phone - (512) 451-7955 Fax - (512) 451-7955</p>	<p align="center">NOT FOR CONSTRUCTION</p> <p align="center">THIS DOCUMENT IS INTENDED FOR USE AS A REFERENCE ONLY. IT IS NOT TO BE USED FOR CONSTRUCTION OF ANY PROJECT. THE USER ASSUMES ALL LIABILITY FOR ANY DAMAGE OR INJURY RESULTING FROM THE USE OF THIS DOCUMENT.</p> <p align="right">CONSULTANT'S SHEET PROJECT NO. C080271</p>
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