Stormwater Treatment Area (STAs)

Purpose and General Description: Constructed and managed treatment wetlands utilized in South Florida primarily for total phosphorus (TP) removal.

Physical Description: Optimal operating water depth of 2 ½ feet. If intended by design, maximum water depth of four (4) feet for high flow conditions similar to the existing STAs. Embankments are typically six (6) feet with three horizontal to one vertical (3H:1V) side slopes unless the maximum water depth is four (4) feet. Then, the embankments are typically nine (9) feet with 3H:1V side slopes. Features include inflow pump stations or inflow gravity structures, distribution canal, collection canal, internal structures and cells/levees, gravity outflows, and seepage canals.

General Description of Operations: These features utilize a pump station or gravity inflow structure if flow is reservoir assisted to bring water into the facility. An inflow distribution canal is utilized to distribute the water to treatment cells. The water flows through parallel or series flow-paths consisting of multiple treatment cells. The treated water is then collected in a collection canal and discharged via pump or gravity flows or a combination of both to receiving waters.

Hydrologic Performance: The primary purpose of STAs is water quality treatment not storage. They are operated to maximize nutrient removal or achieve specific discharge limits. It is critical to maintain wet conditions over the majority of the treatment areas for most of the time in order to achieve optimal water quality treatment- both to ensure viability of the highest performing treatment vegetation (submerged aquatic vegetation), and to avoid dryout of the soil, which can release TP upon rewetting. The hydrologic trade off is that maintaining wet conditions requires adding supplemental water during dry periods of the year, which reduces the water available for the Everglades. Since water depths are shallow with emergent vegetation, these features can experience higher evapotranspiration (ET) losses, and in certain locations seepage losses, than deeper storage features.

Water Quality Performance: Since the South Florida Water Management District (SFWMD) now has six (6) operational STAs in the Everglades Agricultural Area (EAA), some of which have been operating since 1996, there has been an increasing understanding of the phosphorus removal capabilities of STAs. Of the six (6) operational Everglades Construction Project STAs, STA-3/4 is the best performing and has exhibited a range of annual TP outflow concentrations of 13-23 parts per billion (ppb). The current rule of thumb for optimal treatment vegetation is an STA with multiple parallel flow-paths, consisting of an emergent cell followed by a submerged aquatic vegetation cell comprising approximately 60% of the treatment area.

Environmental / Ecological Advantages or Benefits: STAs are not intended to provide ideal or natural habitat within the footprint. The intent is to utilize the STA to improve water quality in downstream water bodies and thereby provide environmental/ecological benefits. Nonetheless, the currently operational STAs have provided an ancillary benefit of high quality habitat and as a result have attracted birds, alligators, fish, and other types of wildlife.

Environmental / Ecological Impacts or Concerns: Because STAs have provided an ancillary benefit as a wildlife attractant, additional regulatory constraints related to wildlife protection

have emerged (i.e. the Migratory Bird Treaty Act, Endangered Species Act, etc.). As a result, STAs have been subjected to operational constraints in order to protect wildlife, which are at times in conflict with operating STAs for optimal water quality treatment / improvement.

Economic / Recreational Advantages or Benefits: The existing STAs have provided numerous recreational opportunities including duck hunting, bird watching, catch and release fishing, etc.

Economic / Recreational Impacts or Concerns: Need to ensure that recreational opportunities do not interfere with this features' primary purpose of water quality treatment. STAs which achieve a higher level of water quality treatment have a higher unit cost per acre of treatment area than wetted flow-ways due to the internal embankments and levees.

O&M Considerations (if any): Vegetation management is very critical within STAs. Vegetation can be managed to encourage optimal treatment vegetation or to discourage less than optimal or exotic vegetation. Water levels within STAs also must be maintained at appropriate levels in order to ensure viability of vegetation and optimal hydraulic retention times/treatment performance.

Uncertainty Concerns: Uncertainties related to how to optimize operations of STAs, which perform best under low flow steady-state conditions, to achieve downstream flow targets, which require highly variable flow and pulsing.