# Flow-ways - Maintained Wet

**Purpose and General Description:** Above ground shallow storage and conveyance feature that operates like a flowing wetland system that is maintained in a wetted condition.

**Physical Description:** Typical configuration assumed four (4) foot maximum water depth above grade; embankments less than or equal to nine (9) feet in height with three horizontal to one vertical (3H:1V) side slopes. Embankments are earthen with no armor and vegetated slopes. Features include inflow pump station or gravity structure, distribution canal, collection canal, outflow pump station or gravity structure and seepage canals (or utilize existing canals) for seepage management. All features evaluated had no internal levees, no internal structures, and no internal vegetation maintenance. However, these features may be included if necessary or desirable.

**General Description of Operations:** These features are designed to operate like a flowing wetland system with the associated water quality and wildlife habitat conditions similar to the historic River of Grass. These features are actively maintained in a wet condition regardless of prevailing weather conditions to the extent practicable and not allowed to naturally dryout.

**Hydrologic Performance:** Flow-ways are intended to create hydrology more consistent with the historic River of Grass within the feature footprint as well as to downstream water bodies. Flow-ways can use gravity or pump inflows, but flow-ways using gravity flows that are not reservoir assisted will experience hydraulic limitations and may not be able to deliver flows consistent with the restoration target time series downstream. Since the flow-ways have unmanaged vegetation within them, the density of the vegetation could impact the ability of water to flow. This may require water depths greater than four (4) feet on the upstream end of the flow-way in order to drive the desired water flows to the discharge end of the flow-way necessary to release the quantity of water desired at the time it is required.

When flow-ways are maintained in a wet condition, it requires supplemental water to meet this requirement during dry periods, which may have an impact on ability to meet environmental hydrologic targets. Since water depths are shallow with emergent vegetation, these features can experience higher ET losses, and in certain locations seepage losses, than deeper storage features.

**Water Quality Performance:** High uncertainty in predicting total phosphorus (TP) water quality performance. There is a lack of South Florida data on the ability and effectiveness of this type of feature to reduce TP concentrations. Current water quality analysis assumes these features have minimal operational management and minimal vegetation management. Therefore, flow-ways provide less treatment compared to a Stormwater Treatment Area (STA). Analysis assumes that optimal treatment performance is obtained when flow-ways remain wet. However, even wetted flow-ways are not anticipated to be able to reduce phosphorus concentrations below 25 parts per billion (ppb) which is higher than the inflow TP concentration requirements to the Everglades. Therefore, discharges from flow-ways must receive further treatment in an STA prior to discharge to the Everglades.

**Environmental / Ecological Advantages or Benefits:** Flow-ways are intended to restore and expand the spatial extent of wildlife habitats and landscapes more consistent with the historic River of Grass in addition to providing benefits to downstream water bodies and habitats.

**Environmental / Ecological Impacts or Concerns:** Ensuring that flow-ways do not interfere or compete with ability to achieve restoration benefits to the existing natural system (e.g., Everglades Protection Area) and to the Everglades. Specifically, need to ensure that providing restoration of farm lands within the Everglades Agricultural Area does not take precedence over the restoration of and the continued viability of the existing natural areas in the Everglades. If these features are successfully managed or operated to encourage wildlife utilization, additional regulatory constraints related to wildlife protection may emerge (i.e. the Migratory Bird Treaty Act, Endangered Species Act, etc.). As a result, these features could be subjected to operational constraints in order to protect wildlife, which could greatly limit operations and associated benefits to the natural system.

**Economic / Recreational Advantages or Benefits:** Flow-ways will provide recreational opportunities similar to other wetland habitat. Flow-ways as shallow storage features have a lower cost per acre-foot of storage than deep storage features due to the smaller embankment heights and no internal embankments.

**Economic / Recreational Impacts or Concerns:** Relative to storage capabilities, flow-ways have a significantly larger land acquisition requirement than deep reservoirs. These land requirements are so high that it may be impractical to acquire all of the lands required to meet the performance targets if all storage was contained in shallow features.

**O&M Considerations (if any):** Vegetation management, particularly removal of exotic species will be a major consideration for this feature as well as maintaining the exterior embankments.

**Uncertainty Concerns:** Hydraulic uncertainties exist with regard to flow-ways. Hydraulics will be very dependent on vegetation type and density, topography, features upstream and downstream, and operations. High uncertainty related to TP water quality performance. High uncertainty of vegetation types that will grow and habitat types that will develop in areas previously impacted by agricultural production and significant soil subsidence and oxidation.