SUBMISSION FOR AWARD FOR ACHIEVEMENT
COMMUNITY DEVELOPMENT PROJECTS

GOBERNADORA MULTI-PURPOSE BASIN

ORIGINAL GROUNDWATER LEVEL
GRAVEL
SEAL
PUMPING WATER LEVEL

JOINT PROJECT BY
RANCHO MISSION VIEJO
Santa Margarita Water District
OC Public Works
ENGINEER
PACE
Rancho Mission Viejo (RMV), in partnership with Santa Margarita Water District and Orange County Public Works (OCPW) identified a unique opportunity to capture and utilize an untapped water resource to service existing and future community developments in southern Orange County while cleaning up pollution within the local watershed by developing this specialized 26-acre multi-purpose basin facility.

The basin provides multiple functions including:

- groundwater recharge
- groundwater recovery
- non-potable water reclamation
- flood mitigation
- urban stormwater treatment
- stream stabilization and habitat restoration
- wetlands and open water habitat
- regional trail connection
- groundwater recovery
- groundwater recharge
- non-potable water reclamation
- flood mitigation

**Important benefits include:**

- Water recycling and harvesting for regional water conservation (for SMWD water supplies to the Portola Reservoir).
- Regional trail connection from Thomas F. Riley Park to Caspers Wilderness Regional Park.
- Reduction in hydrologic conditions of concern for erosion control stabilization and reduction of sediment degradation from the County unincorporated community of Coto de Caza (an existing community of more than 5,000 homes) which has direct impacts to Gobernadora Ecological Restoration Area (GERA), a conserved wetlands restoration area that is occupied by the least Bell's vireo and southwestern willow flycatcher, both State and federally endangered riparian bird species.
- Reduction in the pollutants of concern from urban drainage runoff that is degrading water quality in Gobernadora Creek.

The Project includes facilities for water quality, drainage peak flow retarding, a Regional Riding and Hiking Trail, and non-potable water extraction/recycling. Unique to typical basin facilities, this basin was designed for dynamic operation and automatically adjusts its operation depending on the operation mode of the system. Automated controls trigger specific hydraulic operations.

The basin is located upstream of Gobernadora Ecological Reserve Area (GERA) and just south of the Coto de Caza community in the County of Orange, California.
The basin is situated adjacent to Gobernadora Creek, which drains a 7.8 square mile watershed that is almost completely urbanized from the Coto de Caza development. The facility is divided into two storage basins: a 10.9-acre upper basin and a 15.3-acre lower basin with combined maximum flood control storage of approximately 120 acre-feet.

The upper basin is operated and maintained by SMWD for water treatment and recycling purposes and the lower basin is operated and maintained by OCPW for flood control purposes. The upper basin allows urban nuisance (dry weather) runoff water to flow through multiple interconnected water quality treatment cells made up of wetland vegetation. The treated urban nuisance flows are captured by SMWD and recycled into their non-potable water system using a pump station in the upper basin. However, a portion of the treated nuisance flows is bypassed downstream to maintain a continued irrigation source for the Gobernadora Ecological Restoration Area (GERA). In addition, two groundwater wells are located within the perimeter embankment of the basin to capture part of the recharged groundwater in this area and connects to the same force main. Two large inflatable rubber dams are operated in the basin; one for dry-weather flow capture and diversion acting as the upper dam; and the second is for major storm event operation to divert flows to the lower basin acting as the lower dam.

Dry-Weather (Non-Storm Operations)

The Upper Basin is designed to capture, treat, recharge and reuse dry-weather/nuisance flows from the creek during non-storm periods. However, during storm periods the Upper Basin functions to assist in the diversion of storm flows to the Lower Basin. The Lower Basin is intended to be dry during dry-weather or non-storm periods.

Storm Flows (Flood Operations)

During storm periods, the flows in the creek will overtop the upper rubber dam. When the depth of flow over the dam exceeds six inches, as measured by the stream gauge at the dam, the programmable logic controller (PLC) located at the pump station will signal the upper dam to deflate and the mechanical gate for the diversion pipe at this location to close, preventing flows from entering the upper basin. If the storm flows continue to increase in the creek as measured by the stream gauge located at the lower dam, then when the depth of flow in the channel equates to the 10-year flow, this will signal the PLC to inflate the lower rubber dam. A portion of the storm flows will be diverted into the upper basin and the remainder of the flood flows spill over the rubber dam and continue downstream within Gobernadora Creek. When the flow depth reduces to two inches over the dam for over six hours then the PLC will signal the lower dam to deflate.
**BASIN FEATURES**

**INFLATABLE RUBBER DAMS** The key element of the system allowing for dynamic operation consists of two separate inflatable rubber dams to manage water levels in the creek. The upstream in-creek structure is designed to redirect the nuisance flows towards the Upper Basin intake structure and is 70 feet long by 4 feet high when fully inflated. This dam is normally inflated in dry weather periods. The downstream rubber dam consists of a 100-feet wide, 6-feet high air dam that will be only inflated during the passing of flood events larger than the 10-year flood. For the larger events, the upstream air dam is deflated and the downstream air dam is inflated in order to divert peak flows into the Upper Basin via the channel side weir.

**GROUNDWATER PRODUCTION WELLS** This facility consists of two groundwater production wells located along the perimeter of the basin. These wells are to a depth of approximately 100-feet and provide screening through two different aquifers. The production wells have a combined capacity of 45 GPM.

**SIDE WEIR SPILLWAY / HYDRAULIC STRUCTURES** The basin is an "off-channel" facility and a side weir is used during flood flows to allow portions of the peak flow to enter into the basin storage for peak flow attenuation. The side weir is about 200 feet long and is elevated about 6 feet above the bottom of the creek. The lower rubber dam must be inflated in order to guarantee that the creek water depths are high enough to overtop the side-weir spillway.

**CONSTRUCTED WETLANDS** The upper basin contains constructed wetlands in place to improve water quality. However, it also provides the initial detention storage to maximize the effective storage volume combined with the lower basin. The upper basin is approximately 11 acres large and 3.5 feet deep. The upper basin flood has five interconnected water quality treatment five cells. The small earthen embankments separate the cells which are 3-feet high, connected by 24-inch pipes. The flow meanders through the water quality basin with a flowpath length of about 2,000 feet and terminates at the surface water pump station which will also by-pass a portion of the return flow to the creek.

**PUMP STATION / CONTROL CENTER** The pump station, which is housed underneath the Upper Basin embankment, includes a pump and wet well/dry wells housing the valves, discharge piping, instrumentation, and wet well. Nuisance flows enter the wet well by gravity and are conveyed through an 12-inch force main to the Portola non-potable reservoir at a discharge of approximately 5 to 6 cfs. The wet well is also designed with a slide gate that connects to a 24-inch pipe and allows bypassing of treated return flows for irrigation of downstream riparian vegetation. There are many other specialized hydraulic structures which are used to interconnect the different components of the basin together and operate correctly.
The Gobernadora Basin provides a unique vehicle for water conservation, water recycling and groundwater recharge. Southern Orange County faces significant challenges to ensure reliable and clean water supplies to its communities. The basin provides the ability to capture, treat, and reuse nuisance runoff flow within the creek. Approximately 350 to 800 acre-feet of water is expected to be captured by the basin each year, reducing a portion of the District’s imported water costs to meet non-potable irrigation demand. With a reduction in non-potable irrigation demand, drinking water supplies can be spared and overall water demand is reduced. Water that is not directly diverted to the Santa Margarita Water District non-potable water supplies, is infiltrated into the groundwater table for future use.

**No Carbon Footprint**

The water entering the basin is through a naturalized treatment system treated via hydraulic and biological means. The 11-acre constructed wetlands include vegetation that emits oxygen and enhances air quality to the immediate area.

**No Power Consumption**

The biological treatment system prevents the need for any power use in the treatment process. Water flows via gravity into a biological treatment system consisting of wetland vegetation, none of which requires power to operate.

**Downstream Habitat Preservation**

The basin facility protects downstream habitat by reducing high volumes of flows unnatural to the stream system to prevent excess erosion to the stream bank areas. Additionally, no longer will polluted urban runoff harm habitat areas throughout the downstream area since these flows are treated prior to discharge back into the stream system through the naturalized wetland treatment system within the basin.
The residents of the Coto de Caza area and The Ranch benefit from the creation of a new water supply source, aesthetic improvements due to the enhanced open space and improved downstream conditions and several environmental enhancements that provide unique recreational opportunities. Additionally, an interpretive center educates the public about the system’s purpose and how it operates providing a social educational benefit on the topics of water pollution and water conservation.

Economic value is generated by the project through the value of the water that is captured, treated and made available for non-potable water use. This non-potable supply can be sold as a water asset and it also saves money as a less expensive water source than potable (drinking) water that would have been imported into the region at a cost of approximately $900/acre-foot. The system is expected to generate an additional 350 to 800 acre feet of water annually, producing a savings of $315,000 to $720,000 annually, plus generate revenue once this water is sold to an end-user.

Due to the extensive benefits, both to the public and private sector, over 30% of the project was funded by public grants.
Planet / Environmental Quality

**Ecosystem and fisheries restoration and protection:** Gobernadora Creek was restored over a 20 year process such that it now supports two State and federally endangered species in addition to many other riparian species. Although protected by a recorded conservation easement, Gobernadora Creek was suffering as a result of untreated hydrologic conditions of concern and pollutants of concern that originate upstream in the community of Coto de Caza. Implementation of the basin reduces these conditions such that the values and functions of Gobernadora Ecological Restoration Area (GERA) will remain capable of supporting a rich and diversified ecosystem.

**Storm water capture, storage, treatment, and management:**
- Reduction in the hydrologic conditions of concern that were resulting in the direct impacts to GERA, a conserved wetlands restoration area that is occupied by least Bell's vireo and southwestern willow flycatcher, both State and federally endangered riparian bird species
- Peak drainage flow retarding basin for reducing 25-year through 100-year storm events in the region
- Water quality runoff enhancement through the water quality basins included in the project scope.
- Reduction of sedimentation degradation for downstream watershed which specifically benefits GERA, a designated wetlands conservation area.

**Non-point source pollution reduction, management and monitoring:** The water quality basin feature provides for removal of non-point source pollutants. In particular, pollutants of concern will be reduced from urban drainage runoff that is degrading water quality in Gobernadora Creek. SMWD will provide on-going management and monitoring of this feature through the water harvesting operations.

**Groundwater recharge and management projects:** The basin system provides enhanced groundwater recharge, resulting from the water quality basin and the peak flow reduction basin.

**Watershed protection and management:** The project provides a direct benefit to the GERA, a designated wetlands conservation area by reducing of sedimentation degradation/erosion and associated species such as the least Bell’s vireo and southwestern willow flycatcher. Quality runoff is improved through the water quality basins; previously there were no water quality basins for runoff from the Coto de Caza community.

**Water banking, exchange, reclamation, and improvement of water quality:** Water quality runoff is improved through the water quality basins; previously there were no water quality basins for runoff from the Coto de Caza community.
Since the basin project serves many purposes, construction/development costs and long-term operational costs benefit in several manners:

- The basin mitigates future hydrological impacts from development of The Ranch’s PA 3 area.
- The basin system is part of the regional flood mitigation program for The Ranch.
- The water generated frees up water resources for future development.
- As a joint-party project with RMV, SMWD and OC Public Works, the costs of development and operation are spread out, reducing the financial impacts to any one party. The system has specific elements designated to each party, who in-turn manage operations of their specific pieces.
- Operational costs are minimized since the system is naturalized and relies on minimal mechanical equipment and power. The majority of the system functions via gravity and wetland vegetative based pollutant removal.

The Gobernadora Multi-Purpose Basin is scalable to any size and produces significant benefit for community development, water resource protection and enhancement, wildlife resource management, and recreational open space, and as such should serve as a model to all of Orange County and the Inland Empire.

Communities can no longer rely solely on traditional water supply sources and the availability of imported water for OC and the IE continue to dwindle. This project demonstrates how a new water source can be successfully and economically tapped while simultaneously protecting habitat, natural water corridors and recreational open space for communities.

Water pollution prevention and treatment are required for all new and existing development areas and this project creatively addresses this need, while sharing the cost of these measures with other functions to generate a net benefit, rather than cost.