



BUFFALO BEND NATURE PARK



Bringing Socio-Ecological Capital into Houston's East End Community

While serving as Director of the Trust for Public Land's Houston Office, Linda Shead worked with County agencies and local non-profit group, the Buffalo Bayou Partnership, to gain support and raise the remaining amount of money needed to purchase a 10-acre vacant greenspace she would eventually name "Buffalo Bend Nature Park."

Situated along the Buffalo Bayou corridor on the east side of Houston, the park is within the area identified by the Buffalo Bayou Partnership's 20-year Master Plan, *Buffalo Bayou and Beyond*, which imagines a new vision for the bayou, one that balances conservation of the bayou's natural resources with development and urban renewal.

Working with the TPL, the Partnership provided financial and political support to assist with the land purchase. After the acquisition was final, the land was turned over to Harris County's Precinct 2. The Partnership in the meantime, having been asked by HCP2 to lead the Park's design and development such that it would follow the vision of BBP's Master Plan was already working on ideas in an initial stakeholder's group set up by Linda to develop the park's direction. The stakeholder's saw the space that would provide new activities to the community by using local ecological systems as the focal point of the park rather than more common features such as playgrounds and ball fields.



The Buffalo Bayou Partnership matched the \$145,000 CMP grant award with approximately \$244,000 to complete the CMP grant projects. The Partnership has spent the past 19 months implementing ecological restoration to the riparian forest and creating an upland wetland for Buffalo Bend Nature Park, a new public space providing socio-ecological capital to the Houston's east end residents in the form of civic engagement, ecological awareness, and community stability and prosperity.

The Coastal Management Plan Grant

The Partnership submitted a proposal to fund ecological improvements to the park's existing riparian forest corridor and for construction of an upland wetland on the park's upland, which consists of approximately twenty-five feet of Beaumont clay fill rumored to have been deposited on the property during construction of Houston's stormdrain system over 20 years earlier.

To complete the ecological features of Buffalo Bend Nature Park, the Partnership began working on attaining the necessary permits, assessing the existing conditions, and hiring the consultants and contractors necessary to fulfill the terms of the Partnership's CMP proposal. Over the course of the grant work, it became apparent that many essential steps to completing it were overlooked, and consequently delayed completion of the project and made for a far more complex and costly undertaking than originally anticipated.

Products

- Archeological Survey
 - Antiquities permit
- Boundary Survey
- Approved Park Design
- Planting Zones
 - Existing Tree Inventory
 - Riparian Plant list
 - Wetland plant list
- Hydrologic and Hydraulic Analysis w/wetland design criteria for plant community establishment
- Construction Documents
 - SWPPP
 - Project Manual
 - Written explanation construction contractor is responsible for providing and completing
- Harris County Release of Indemnity
- Flood Plain Permit
 - Supporting Documentation



Assessing the Existing Conditions of the Park's Riparian Forest



The University of St. Thomas's Environmental Studies Dept. Chair, Dr. Maury Harris and BBP Conservation Director, Scott Barnes, worked together to develop and manage data collection and resource management projects. The data was included to determine overall values for the riparian corridor. BBP Intern Murray Myers worked for Barnes conducting a comprehensive tree



inventory that mapped the native and non-native tree spp. As non-native trees were identified and logged, Myers performed a nick and treat herbicide application to the base of the tree. Over three hundred and fifty individuals, comprising of four our spp. were treated. The invasive trees that received herbicide treatments were Chinaberry (*Melia azedarach*), Chinese tallow, (*Sapium sebiferum*) Salt Cedar (*Tamarisk* spp.) and the Mimosa tree (*Albizia julibrissin*). Small student groups from Dr. Harris's Environmental Studies class collected soil samples throughout the riparian corridor from the toe to the upland edge which were analyzed for nutrients, texture and composition. The soil data and tree inventory were later used as the planting zones were developed.

Assessing the Park's Existing Upland Conditions

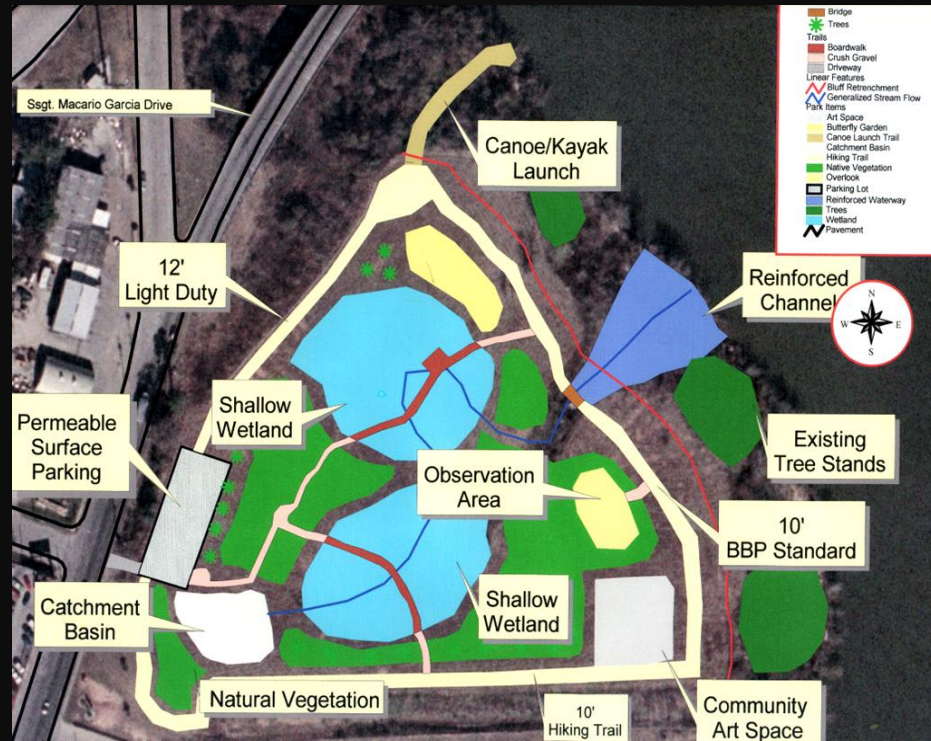


An analysis of the upland soil revealed that the surface layer of the uplands contained a thin layer of nutrient rich organics while immediately below the organic layer was a clay fill which lacked nutrients required for establishing and supporting complex native plant communities.

Herbaceous vegetation which covered the upland did not represent native plants or plant communities. non-native Bermuda grass seed was most likely spread after the clay fill had been brought in as an erosion control measure. The rare bunch of some hearty native plants were observed including *Andropogon glomeratus* and *Setaria geniculata*.



Buffalo Bend Nature Park's Conceptual Design of Features

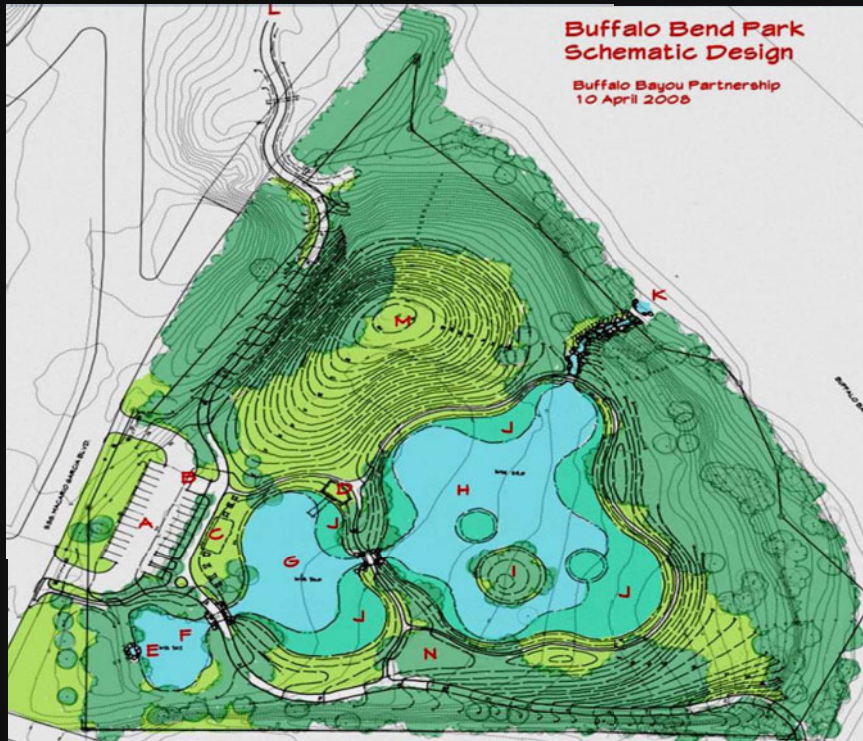


Through NOAA, the 10-acre tract of land was purchased, in part, through the federal assistance award program, making it subject to the condition that the property shall be managed for conservation purposes in perpetuity, consistent with the purposes for which it was entered into the Coastal Estuarine Land Conservation Program, and shall not convert to other uses. Researching the natural history of the site, mention of a surface water feature, probably a stormwater ravine with seasonally ponding water, was discovered, but the most certain recorded system was the broad riparian forest. Its lateral extent from the river bank here isn't clearly defined and although there is no doubt the

forests transitioned to coastal prairie, because of data about the naturally occurring gradient and how far flood events reached out from the channel is incomplete, it is unknown if the coastal prairie was represented somewhere on this property or not.

With what was known and assumed about the plant communities and their associated landform, the initial stakeholder's group set up to establish criteria to guide future projects recommended the upland area have a constructed wetland to represent the historic drainage. As the primary upland eco-feature, minor decisions such as specific forest cover or open areas supporting native wildflowers and prairie grasses would come in to the extent that was designed during the design phase of creating a park. From the edge of the upland moving down the slope the wooded riparian was the pre existing eco-feature that would receive initial restoration procedures to begin its recovery, and have a comprehensive, long term resource management plan until riparian benefits and indicator functions of sustainability are in place.

Buffalo Bend Nature Park Schematic Design



SWA Schematic Design (above)

Plan Key (left)_ (tap to enlarge)

Schematic Design Description:

- A. Parking area:
 - a. 23 spaces, 2 HC spaces
 - b. Single horizontal pipe gully
 - c. Pavement governed with subsidence to ponds
- B. Bus stop-off area:
 - a. For passenger loading and unloading only
 - b. Long-term bus parking is across street
- C. Community garden reservation zone:
 - a. Highly visible location for good community interaction and "eyes-on-the-ear"
 - b. Fenced access on each side of garden area
- D. Ponds:
 - a. For interpretive signs
 - b. For shelter from sun or rain showers
 - c. Includes bankbreak over water and marsh for water study and exploration
- E. "Spring":
 - a. "Source" of water for ponds:
 - i. Made of recycled concrete
 - ii. Option 1: recaptured from Pond H
 - iii. Option 2: pumped from storm drain outlet
- F. Upper Pond at elevation 30.00:
 - a. Emergent marsh
 - b. First filtration for circulating water
- G. Middle Pond at elevation 29.00:
 - a. Open water facing community garden and picnic area
 - b. Emergent marsh around eastern and southern edges
- H. Lower Pond at elevation 24.00:
 - a. Lumped pond area
 - b. Will have variable water level depending on time of year and rainfall
 - c. Will be most emergent marsh and prairie fringe
- I. Habitat island:
 - a. For protected nesting habitat
 - b. Marsh reserved for routine maintenance marsh
- J. Emergent Marsh:
 - a. Variable depths from 2" to 10" to provide maximum variety of conditions
 - b. South side of Middle Pond to be designed as a showplace for emergent plantings
 - c. Lower Pond marsh to include shallow prairie plantings at outer edge
- K. Overflow to Buffalo Bayou:
 - a. Used to handle extensive rainfall event
 - b. Made of recycled concrete
 - c. Will have natural level control structure to provide for controlled water surface elevations in lower ground
- L. Buffalo Bayou Bike Trail:
 - a. Accessible bike trail route, connecting upstream and downstream to future trail links
 - b. Check parking area as trailhead for bike trail
 - c. Small topofuse allow walking around Middle and Lower Ponds for access to water and marsh for observation and study
- M. Marsh and Prairie Overlook Hill:
 - a. Hill is location for excavation from ponds; final height will be determined by final excavation amounts
 - b. Hill is shaped to provide natural watching amphitheater on north side of Lower Pond
 - c. Hill will provide view to park and Buffalo Bayou
 - d. Is located to block traffic noise from adjacent roadway
 - e. May be planted with native grasses
- N. Revegetation:
 - a. Areas of park will be revegetated with native herbaceous and grasses
 - b. Understory will be allowed to develop naturally to provide shelter and forage for birds and small vertebrates
 - c. Existing trees will be retained wherever possible (except for exotic invasives)

Kevin Shanley was hired to produce the final design for the park. Upon reviewing the conceptual ideas and going over the theory behind what the park will convey to users and teach to students, Shanley submitted the final design for the park, applying the best conceptual ideas and other influences to pull together a balanced feature layout. The most dramatic being the upland wetland has always been viewed as the dominant ecological feature for the park. Taking a thoughtful approach to an inadequate budget and complete the work ahead, he located the wetlands to minimize excavation costs and again pulled from the conceptual map that created a hill of unknown size using the cut material. The actual cut material was more than thought by the initial stakeholder group and ended up creating a hilltop equal to the height of the bridge spanning the bayou and consuming almost a third of the park. Although met with disbelief when the hill's size was presented, in the end it was larger than expected, but in being so, it kept every truck load of cut material on-site and the budget within limits.

Although Shanley's design includes the primary features of the conceptual design, his layout and forms proved distinctly unique. His design was able to achieve this even though looking closely, it is apparent that there were design limits controlled by the budget which Shanley kept in mind to use the existing topography to control costs of the cut and fill construction costs.

The SWA schematic design goes on to include a more complete design that has phase two work, such as the park trails, included. The level of detail is so well developed that the design identifies locations, extent and slope, down to ADA compliance. Their level of accuracy is such that, if necessary, could be used in the future as a quick way to estimate phase two costs with some degree of certainty.

To maintain the same level of detail that SWA provided for the schematic design, an equally proficient hydrologist to complete a "functional design" that dictates how well the wetlands are providing the ecological benefits expected from natural wetland

Dodson & Associates Hydrologic and Hydraulic Modifications to Upland Wetland System

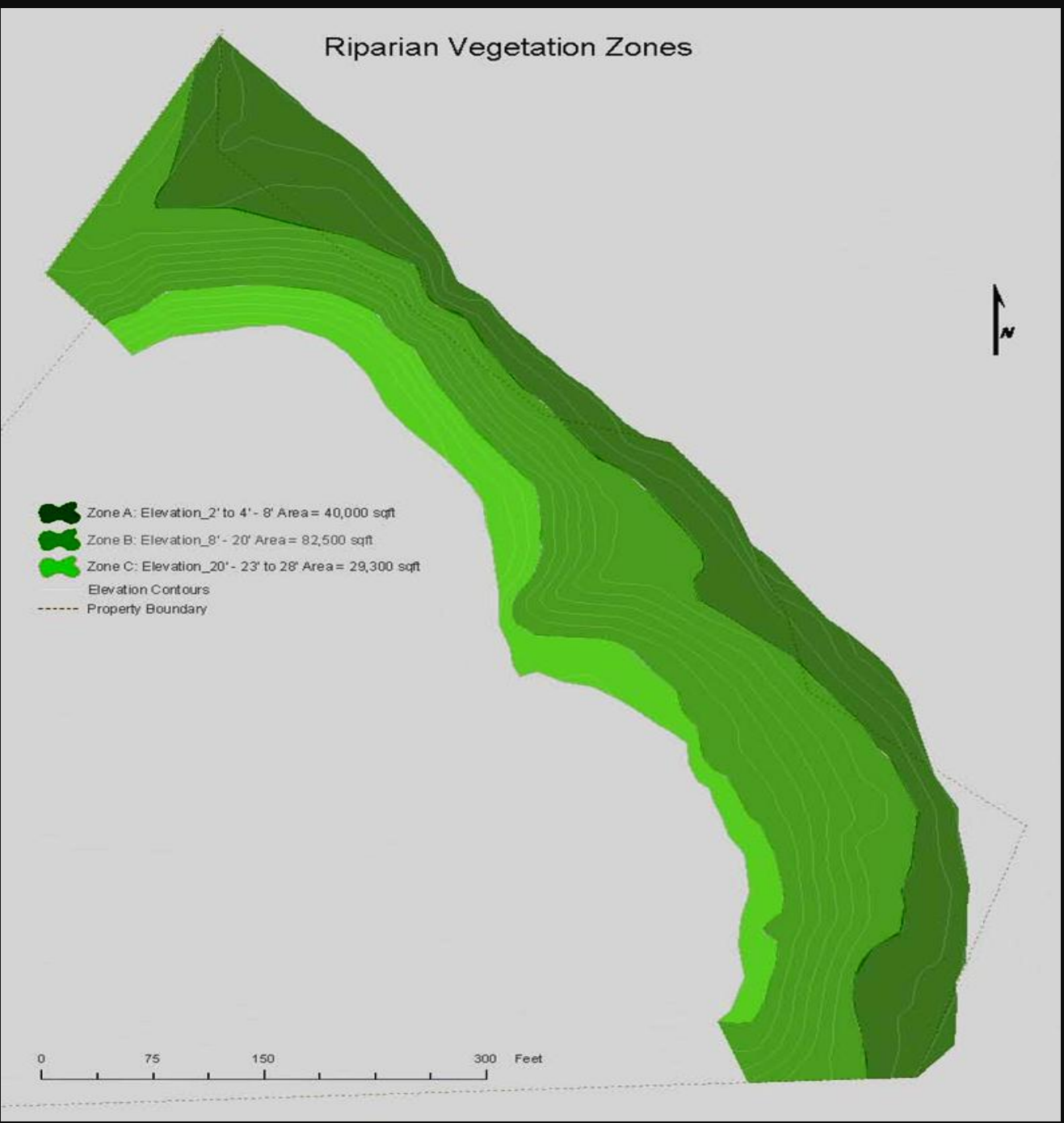


The hydrological and hydraulic analysis results recommended modifications to the wetland floor (blue area on adjacent map) for the following reasons :

- Improved water circulation throughout the wetland
- Modification to the wetlands storage capacity to maintain a more consistent water surface elevation, balancing it between equal wet and dry season extremes
- Accurate sizing of the planting shelves that relates to the plant communities being established such that they will have the potential for maximum growth yet won't have so much shelf that vacant niches are exposed for exploitation by invasive plants
- Reduction of flow rate on either side of overflow weirs between cells 1 and 2, cells 2 and 3 and at the final outlet to reduce blowouts and damage during high flow conditions

Riparian Vegetation Zones

The riparian corridor clearing removed dogwood thickets, suffocating vines, fallen trees from hurricane, years of accumulated litter along with killing hundreds of invasive non-native trees comprising 7 species using the nick-and-treat herbicide application. Once the clearing was completed, analysis of the soil composition, moisture, shade, final tree density after clearing and slope through the riparian gradient were used to develop the planting zone map and planting plan for the understory and canopy vegetation that was planted as part of the CMP grant. The final volunteer tree planting took place in February and concluded the first phase of BBP's restoration work to the park's riparian corridor.



BBP Staff & Volunteers Begin Managing Riparian Thickets



Riparian Management, Cont.



Natural Resource Management to the Park's Riparian Corridor



Volunteers Plant over 2000 Trees and 1000 herbaceous understory plants



Upland Grading and Wetland Formation Begins



Construction of the wetlands started after months of planning, process analysis, permitting and preparations delayed the construction schedule . Onsite upland work began when the SWPPP silt fence was installed (left), followed by bulldozers that scraped and stockpiled the organic, nutrient rich topsoil which would be re spread over the upland surface when grading work was completed. (below).



Constructing the outfall



Weir/bridge feature between cells and cistern,



Below: spillway for carrying treated wetland overflow to the Buffalo Bayou



Below: the first input of rainwater able to be stored in what will eventually become the lower wetland cell



Top Left: With the finish grading of the aquatic shelves finished and water level control structure in place, wetland crews begin pumping in water to fill the cells completely and establish the planting zones

Top Right: First trailer of plants get dropped off



Bottom Left: Marissa Sipocz leads her team of experienced wetland volunteers by reviewing the specific shelf depths to target for the first load of plants to go into the wetland

Bottom Right: BBP's novice wetlander's receive instructions from marissa on the task of separating the intertwined root systems of individual plants so they are ready to be planted by the planting team



Small wetland teams like these can be seen in the wetlands several days a week between regularly scheduled volunteer days



BBP Wetland Team Leader, Jessalyn Ballard, works with volunteers or leads BBP's Harris County Community Service Workers a couple of mornings during the week between her regularly scheduled volunteer events



Marissa Sipocz and a couple of volunteers surprised us when they were spotted in a far corner of the wetlands early one weekday morning, out on this day to get a few left over plants in from the previous weekend volunteer planting.



Every morning and for most of the day the wetlands are used by as many as 16 black-bellied whistling ducks, a handful of black-necked stilts and less frequent visits from a pair of white faced ibis. Dozens of ever present and killdeer and doves, mixed with other local residents, make up the current bird population seen using the wetlands as they become established with the wetland material being installed . Throughout the wetlands, the vegetation has been blooming, seeding and producing offshoots aquatic plants like bullrush, thalia, duck weed, pickerel weed, native canna, and at least three native cyperus spp. There are a few areas becoming overtaken by deep rooted sedge which we manage a half hour or so each time we are able to spend a day focused on the wetlands.



Natural Resource Management to the Parks Eco-Features will ensure the Park's Socio-Ecological Capital

With over a dozen volunteer days spent installing plants in the wetlands and three times as many days spent preparing for the planting days, the effects are finally becoming apparent as individual plants of every species have shown signs of vigor and heartiness once the shock has worn off from being transplanted. Many species have reestablished their erect form, begun blooming and seeding,

As the work defined by the CMP grant come to an end, ongoing management will continue in the wetlands and throughout the recovering riparian forest. As management continues, the Partnership intends to lead several more tree planting campaigns that will continue improving and broadening the riparian zone to increase its benefits to the bayou, wildlife and community.



