

Exploration Green Public Access Development and Ecosystem Restoration

GLO Contract #: 17-191-000-9828

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A REPORT FUNDED BY A TEXAS COASTAL MANAGEMENT PROGRAM
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I. Project Summary

During Coastal Management Program (CMP) Cycle 21, Galveston Bay Foundation (GBF), partnered with Clear Lake City Water Authority (CLCWA) and the Exploration Green Conservancy (EGC) to initiate trail construction under Phase 1 of the Exploration Green Master Plan (Master Plan). Project partners installed a 10-foot wide, 1.1 mile, all weather, ADA compliant concrete trail surface for walkers, runners and cyclists. The trail is 6-inches thick with lime stabilized subgrade to accommodate for potential maintenance vehicle use. The trail was built to standards higher than the required standard 4.5" for pedestrian traffic use required for Harris County. In addition, some deficiencies were found during the ADA inspection and were addressed before final TDLR approval could take place. Final approval was received on July 10, 2018.

Phase 1 saw many weather-related setbacks as the project progressed. Extensive rainfall caused delays during all Phases of the project due to ground saturation preventing use from heavy machinery. One such weather delay was Hurricane Harvey. In August of 2017, Hurricane Harvey hit the Houston area causing additional setbacks to project development. Although not complete at the time, the Phase 1 detention pond worked as planned and prevented approximately 150 homes from flooding.

GBF and partners planted over 700 native trees and shrubs for habitat restoration and over 16,000 wetland plants. These activities took place over the span of the project dating back to the first tree planting event in February of 2016. Since then, hundreds of volunteers have participated in restoration efforts and many hours from GBF and EGC went into planning efforts. Native trees and shrubs were grown out in an onsite nursery and cared for by EGC volunteers. EGC consulted with GBF and other project partners when planning restoration activities, and tree placement was strategically thought out prior to planting events. Wetland plantings were led by Mary Carol Edwards, Stormwater Wetland Program Specialist with Texas A&M AgriLife Extension Service.

A portion of CMP funding was designated for the installation of an irrigation system to support the newly planted native vegetation. To date, irrigation lines span 11,500 feet leading to trees and shrubs throughout Phase 1. Irrigation lines range in pipe size from ½" to 1 ¼" as needed. Lines are maintained by EGC.

These combined efforts have enhanced public accessibility to coastal wildlife habitat. During the Exploration Green Grand Opening on April 28, 2018, Houston Police Department estimated 1,000 visitors took part in the event. In addition, the project improves local environmental conditions by allowing natural wetland habitats to filter storm water runoff. Additional project funds were acquired by project partners to assist with the completion of Phase 1 projects.

II. Background Information

In May 2011, the CLCWA purchased Exploration Green (EG), historically utilized as Clear Lake City Municipal Golf Course, to retrofit the area with additional storm water detention volume and to help reduce flooding risks. Through the EGC, additional community benefits were identified that include providing public access to perpetually conserved open space, nature-based recreational opportunities to residents and visitors, water quality improvements from natural wetland filtration, and other valuable ecosystem services. A conservation easement, held by Galveston Bay Foundation, restricts future land uses of the property in perpetuity.

An approved EG Master Plan provides the framework for public access and habitat enhancement projects and outlines specific plans to create a system of engineered water detention ponds with functional wetlands and wildlife habitats and construct hiking and biking trails, parking facilities, and associated infrastructure

to facilitate public use of the property. The proposed shared-use trail system is identified as a Tier 1 priority in the Clear Lake Pedestrian and Bicyclist Study. The trail system contributes to the implementation of a regional Houston-Galveston Area Council effort to increase opportunities for alternative transportation, known as Pedestrian Pathways: A Planning Guide for the Houston-Galveston Region.

III. Project Implementation

A. Task 1: Project Design and Bidding

- Provide a brief description of status of the task.
 - Due to the scale of the Exploration Green project, partners were ahead of the CMP timeline and schedule. Some parts of this task were completed prior to the start of the October grant period. All documents have been submitted and this task is complete.

B. Task 2: Construction and Sign Installation

- Provide a brief description of status of the task.
 - Phase 1 ADA compliant trail was completed in March of 2018 and measures 10 feet wide and 1.1 miles. All CMP funded Phase 1 habitat related activities were completed in May of 2018. At which time restoration efforts included seeding with a native seed mix, planting 700 native trees and shrubs as well as assisting with planting over 16,000 wetland plants through volunteer workdays. As part of the restoration efforts, 11,500 feet of reuse irrigation line was installed to help promote growth of the native vegetation.
 - TDLR inspection was completed in March and deficiencies were found. Deficiency corrections began in May and final paperwork was submitted in July of 2018.
 - Two permanent CMP signs were provided, one was installed at the Reseda drive entrance and the second sign was installed at the corner of Reseda Dr. and Diana Ln. trail entrance (see attached Map).

C. Task 3: Project Monitoring and Reporting

- Provide a brief description of status of the task.
 - All monthly progress reports have been submitted.

NEWS ARTICLES & MEDIA

The attached articles were not published using CMP funding. They do, however, promote the project and garner public interest.

Houston Chronicle

<https://www.houstonchronicle.com/opinion/letters/article/Sunday-letters-Volunteer-effect-retarding-12852847.php#photo-15429604>

Fast Company – Design

<https://www.fastcodesign.com/90160490/the-suburban-golf-course-reconsidered-for-the-age-of-climate-change>

USA Today

<https://www.usatoday.com/story/news/nation/2018/01/19/how-small-houston-community-survived-hurricane-harvey-when-other-parts-didnt/1049018001/>

Chron/Bay Area Citizen:

<http://m.chron.com/neighborhood/bayarea/article/Clear-Lakes-s-former-golf-course-turned-reservoir-12398577.php>

The Washington Post:

https://www.washingtonpost.com/news/wonk/wp/2017/11/27/reclaiming-golf-courses-could-help-houston-fight-the-next-hurricane-harvey/?utm_term=.ccb279100982

Texas Tribune: <https://www.texastribune.org/2017/11/17/search-flood-control-solution-one-houston-community-turned-golf-course/>

Business Insider:

<http://www.businessinsider.com/cities-flooding-hurricanes-trump-climate-change-houston-2017-11>

Houston Business Journal:

<https://www.bizjournals.com/houston/news/2017/09/28/formergolf-course-to-protect-thousands-of-bay-area.html> (Needs subscription)

<https://www.bizjournals.com/houston/news/2018/04/20/houston-area-flood-mitigation-green-space-project.html>

Civil Engineering:

<https://www.asce.org/cemagazine/> (Need subscription)

Stormwater Solutions:

<https://www.estormwater.com/drainage-hole-one>

Civil + Structural Engineer:

<https://cseengineermag.com/article/exploration-green/>

http://www.builderonline.com/land/development/houston-area-flood-mitigation-project-finishes-first-phase_c

TREE LIST, EXPLORATION GREEN PHASE 1

	<i>Botanical name</i>	<i>Common name</i>
1	<i>Callicarpa americana</i>	American Beauty Berry
2	<i>Fraxinus pennsylvanica</i>	Ash, Green
3	<i>Betula nigra</i>	Birch, River
4	<i>Nyssa sylvatica</i>	Black Gum/Tupelo
5	<i>Ulmus americana</i>	Elm, American
6	<i>Ulmus crassifolia</i>	Elm, Cedar
7	<i>Ulmus alata</i>	Elm, Winged
8	<i>Malus angustifolia</i>	Crabapple, Southern
9	<i>Taxodium distichum</i>	Cypress, Bald
10	<i>Taxodium mucronatum</i>	Cypress, Montezuma
11	<i>Ilex vomitoria</i>	Holly, Yaupon
12	<i>Populus deltoides</i>	Cottonwood, Eastern
13	<i>Pinus taeda</i>	Pine, Loblolly
14	<i>Crataegus opaca</i>	Mayhaw
15	<i>Prunus Mexicana</i>	Mexican Plum
16	<i>Morus rubra</i>	Mulberry, Red
17	<i>Quercus macrocarpa</i>	Oak, Bur
18	<i>Quercus x comptoniae</i>	Oak, Compton
19	<i>Quercus virginiana</i>	Oak, Live
20	<i>Quercus nuttallii</i>	Oak, Nuttall
21	<i>Quercus lyrata</i>	Oak, Overcup
22	<i>Quercus michauxii</i>	Oak, Swamp Chestnut
23	<i>Quercus alba</i>	Oak, White
24	<i>Acer rubrum</i>	Red Maple
25	<i>Cercis canadensis</i>	Redbud, Eastern
26	<i>Cassia senna</i>	Senna
27	<i>Euonymus americanus</i>	Strawberry Bush
28	<i>Celtis laevigata</i>	Sugarberry
29	<i>Magnolia virginiana</i>	Sweet Bay Magnolia
30	<i>Liquidambar styraciflua</i>	Sweetgum
31	<i>Platanus occidentalis</i>	Sycamore (American)
32	<i>Malvaviscus arboreus</i>	Turk's Cap
33	<i>Carpinus caroliniana</i>	American Hornbeam
34		Loquat Leaf Oak
35		Oak, Red
36	<i>Quercus muehlenbergii</i>	Oak, Chinkapin

WETLAND PLANTS, EXPLORATION GREEN PHASE 1

	<i>Botanical name</i>	<i>Common name</i>
1	Plant Species	Common Name
2	<i>Bacopa caroliniana</i>	Lemon bacopa
3	<i>Carex hyalinolepsis</i>	Thinscale sedge
4	<i>Carex louisianica</i>	Louisiana sedge
5	<i>Cephalanthus occidentalis</i>	Buttonbush
6	<i>Crinum americanum</i>	Swamp lily
7	<i>Cyperus articulatus</i>	Jointed Flatsedge
8	<i>Echinodorus cordifolium</i>	Creeping Burhead
9	<i>Eleocharis spp</i>	mixed spikerush species
10	<i>Eleocharis quadrangulata</i>	Square-stem spikerush
11	<i>Eleocharis montana</i>	Mountain spikerush
12	<i>Hymenocallis liriosme</i>	Spider lily
13	<i>Hydrolea ovata</i>	Blue waterleaf
14	<i>Iris virginica/hexagona/brevicaulis</i>	S. blue flag /Dixie iris
15	<i>Juncus effusus</i>	Soft rush
16	<i>Juncus spp.</i>	(J. polycephalus, diffussisimus)
17	<i>Nuphar lutea</i>	Spatterdock
18	<i>Nymphaea mexicana</i>	Yellow water lily
19	<i>Nymphaea odorata</i>	White water lily
20	<i>Panicum hemitomom</i>	Maidencane
21	<i>Pontederia cordata</i>	Pickerel weed
22	<i>Rhynchospora colorata</i>	Whitetop sedge
23	<i>Sagittaria lancifolia</i>	Bultongue
24	<i>Sagittaria platyphyla</i>	Delta duck potato
25	<i>Saururus cernuus</i>	Lizard tail
26	<i>Spartina spartinae</i>	Gulf cordgrass
27	<i>Thalia dealbata</i>	Powdery thalia

Permanent Sign Locations, Exploration Green Phase 1



PROJECT PHOTOGRAPHS



Figure 1. Phase 1A Pre-construction showing old golf cart path



Figure 2. Golf course, pre-construction looking towards Phase 1B



Figure 3. Old golf course showing Phase 1C Pre-construction



Figure 4. Phase 1A excavation



Figure 5. Phase IA excavation



Figure 6. Phase I construction



Figure 7. Construction of Phase 1A after seeding.



Figure 8. Phase 1B construction site.



Figure 9. Phase 1B before habitat island was constructed.



Figure 10. Phase 1A and 1B before 1C excavation.



Figure 11. Phase 1A and 1B after seeding and during 1C construction.



Figure 12. Phase 1C construction



Figure 13. Phase 1A through C with land bridge to habitat island.



Figure 14. Phase 1A through C facing east after land bridge was removed from habitat island.



Figure 15. Hydroseeding Phase 1A.



Figure 16. Hydroseeding Phase 1A.



Figure 17. Phase IA prep for 1st volunteer wetland planting.



Figure 18. Phase IA after initial wetland plantings



Figure 19. Phase 1A after initial habitat restoration



Figure 20. Trail and habitat restoration from 1C facing Phase 1B.



Figure 21. Phase 1B looking towards habitat island



Figure 22. Phase 1 habitat island construction, land bridge still intact.



Figure 23. Removal of habitat island land bridge.



Figure 24. Habitat Island prepped for volunteer tree planting.



Figure 25. Habitat Island after tree planting and removal of land bridge.



Figure 26. Initial Phase 1 trail construction.



Figure 27. Trail construction around Phase 1A.



Figure 28. Trail construction around Phase 1A with bat box installed by a boy scout as a separate project.



Figure 29. Trail construction with concrete poured.



Figure 30. Trail construction, pouring concrete at Phase 1A.



Figure 31. Trail construction phase 1C.



Figure 32. Trail construction Phase 1B.



Figure 33. Trenches for irrigation lines to water trees and shrubs.



Figure 34. Irrigation lines



Figure 35. Permanent CMP Sign



Figure 36. Permanent CMP Sign



Figure 37. Volunteer wetland planting.



Figure 38. Volunteer wetland planting.



Figure 39. Volunteer wetland planting.



Figure 40. GBF volunteer prepping holes for native tree planting.



Figure 41. GBF staff and Volunteer planting native trees.



Figure 42. GBF staff and Exploration Green and volunteers.



Figure 43. Volunteer lead tree planting.



Figure 44. GBF staff and volunteers.



Figure 45. GBF volunteers conducting habitat Maintenance activities in the Phase 1A wetland.



Figure 46. During Hurricane Harvey Phase 1 prevented approximately 150 homes from flooding.



Figure 47. Phase 1 during Hurricane Harvey



Figure 48. Phase 1A spillway during Hurricane Harvey.



Figure 49. Phase 1 vegetation, white-top sedge.



Figure 50. Native vegetation in Phase 1A.