

Appendix H

Detailed Cost Estimate and Cost Analysis

Project Goals and Objectives

Mitchell Lake, TX is a single-purpose, ecosystem restoration, general investigation feasibility study. The study officially started with the signing of the Feasibility Cost Share Agreement between the US Army Corps of Engineers (USACE) and the San Antonio Water System (SAWS) on 05 September 2018. A combination Charette and Alternatives Milestone Meeting (AMM) was successfully conducted on 16 January 2019. The study is currently at the Tentatively Selected Plan (TSP) Milestone.

This is an interim response to the study authority. Broadly, the problem is the loss of both habitat structure and function of the aquatic and riparian habitats of Mitchell Lake. Although the lake no longer serves a wastewater function, the degradation from that function is still evident. The waters of Mitchell Lake are highly eutrophic causing unstable dissolved oxygen and pH levels, and therefore the current conditions no longer support the biodiversity of the historic wetland vegetation community or other aquatic life.

SPECIFIC PLANNING OBJECTIVES

1. Increase the areal extent and quality of fish and wildlife habitat in the study area for the life of the project.
2. Increase the floral and faunal species diversity and richness in the study area for the life of the project.
3. Manage and control invasive species in the study area for the life of the project.

Methodology

To arrive at the current costs for each of the alternative, the MII V 4.4 software and 2016 cost books (latest available versions) were used for plan formulation and then the final numbers for the Tentatively Selected Plan (TSP) were updated to the newer MII V 4.4.2 and 2016 cost books, and escalated to current pricing. This is the most current version of the MCACES software. The remaining measures in the estimate are broken out based on the Civil Works Work Breakdown Structure (CWWBS). The project had multiple flood risk management and mitigation options. After going through all of them the final options for the Tentatively Selected Plan were developed. There were three measures and broken out into options with different environmental alternatives. The costs for each were developed and the most cost effective for this project was deemed to be the TSP. The estimate currently includes construction, relocations, plantings, PED and Construction Management costs, and contingency.

Assumptions and Constraints

Changes in, and around, Mitchell Lake have caused the historic tule (tall emergent wetland vegetation) wetland system to degrade resulting in hyper-eutrophic waters, reductions in habitat quality and quantity, and reductions in wildlife diversity.

1. Loss of fish and wildlife habitat quality and diversity, particularly for migratory birds.
2. There is little aquatic connectivity between the upstream and downstream habitats. Salinity and nutrient loading will continue to increase.
3. There are invasive species on site that out-compete native flora. These invasive species will continue to spread.
4. There is high nutrient loading and extreme daily variation in pH and O₂ levels leading to hypereutrophic conditions.

Opportunities exist to:

1. Reconnect the upstream and downstream hydrologies.
2. Improve water quality through ecosystem restoration.
3. Provide additional recreation and ecotourism benefits to the community.

Alternatives

For each area remaining, the final array of management measures was combined into individual alternatives. Each of these alternatives could be a standalone plan, or combined with other alternatives to form a suite of alternative plans.

In addition, several scales of most alternatives were developed for each area in order to achieve differing levels of captured and uncaptured benefits (Table 1 and Table 2).

Area 1 – Bird Pond Wetland Alternatives

- Alternative 1a - Enhancing the footprint of the existing 3.17-acre wetland
- Alternative 1b - Increasing the footprint to form a 6.42-acre wetland

Area 2 – Central Wetland Alternatives

- Alternative 2a - Enhancing the footprint of the existing 10.46-acre wetland
- Alternative 2b - Increasing the footprint to form a 18.37-acre wetland

Area 3 – Skip's Pond Alternative

- Alternative 3 - Enhancing the footprint of the existing 2.18-acre wetland

Area 6 – Polders Alternative

- Alternative 6 - Management/Modification of Existing 49.52 Polders/Basins

Area 7 – Fringe Wetlands / Coves 1 – 3 Alternatives

- Alternative 7a – Enhancing 53.68 acre Cove 1 alone
- Alternative 7b – Enhancing 11.84 acre Cove 2 alone
- Alternative 7c – Enhancing 6.84 acre Cove 3 alone
- Alternative 7d – Enhancing 65.52 acres of Coves 1 & 2

- Alternative 7e – Enhancing 60.52 acres of Coves 1 & 3
- Alternative 7f – Enhancing 18.68 acres of Coves 2 & 3
- Alternative 7g – Enhancing 72.36 acres of Coves 1 - 3

Area 9 – Dam Forested Wetland Alternatives

- Alternative 9a - Enhancement of the existing 2.55-acre wetland footprint, no dam modification
- Alternative 9b - Expanding the existing wetland to form a 4.48-acre wetland, no dam modification

Area 10 – Downstream Wetlands Alternative

Alternative 10 – Creation of 51.32 acres of wetlands

Recommended Plan

After analyzing the costs and the risks associated with the various alternatives and running the CEICA, the recommended plan is Alternative Plan 8. The incremental cost per incremental output for Alternative Plan 8 is \$8,787, with a first cost of \$5,115,007; a first cost increase of approximately \$472,000 over Plan 7. Plan 8 would restore 95.7% of the total area identified for restoration under this study.

Mitchell Lake
Area for consideration

Notes/ Assumptions:

1. CWE Expresses Contingency Factored at 25% - to consider potential unknown site conditions.
2. CWE Expresses 1.52 % Escalation to Midpoint of Construction - Factored at .5 years, anticipating a \pm 1 year Total Contract P.O.P. (Period Of Performance).

Estimated by CESWF (Druzba, Hopkins, Vo)
Designed by CESWF
Prepared by CESWF (Druzba, Hopkins, Vo)

Preparation Date 4/4/2014
Effective Date of Pricing 4/4/2014
Estimated Construction Time 1,095 Days

PROJECT INDIRECT SUMMARY - Scope Page 1

Description	Quantity	UOM	ContractCost	Contingency	ProjectCost
PROJECT INDIRECT SUMMARY - Scope			5,183,081	1,295,770	6,577,329
1 Area 1B - Adjacent to Bird Pond Expanded Limits	1.00	LS	475,011	118,753	602,789
1.1 Wetland Cell Excavation	1,570.00	CY	20,163	5,041	25,587
1.2 6" PVC Pipeline from Lake Mitchell Pumps	9,843.00	LF	260,485	65,121	330,555
1.3 Trench Excavation	876.00	CY	71,007	17,752	90,108
1.4 Gravel bedding backfill	150.00	CY	8,215	2,054	10,425
1.5 Trench Backfill	719.00	CY	3,630	908	4,607
1.6 Water Control Stop Log Structure	1.00	EA	110,248	27,562	139,905
1.7 Trench Area Turfing	801.00	SY	1,263	316	1,602
2 Area 2B - Central Wetlands Limits if bird pond used	1.00	LS	303,204	75,801	384,766
2.1 Wetland Cell Excavation	4,826.00	CY	62,107	15,527	78,814
2.2 Connector Ditch from Birds Pond	591.00	LF	4,263	1,066	5,410
2.3 Ditch Excavation	1,046.00	CY	14,224	3,556	18,051
2.4 Water Control Stop Log Structure	2.00	EA	220,496	55,124	279,809
2.5 Trench Area Turfing	1,340.00	SY	2,112	528	2,681
3 Area 3- Skip's Pond	1.00	LS	94,335	23,584	119,711
3.1 Wetland Cell Excavation	432.00	CY	5,559	1,390	7,054
3.2 Connector Ditch from Birds Pond	98.00	LF	707	177	897
3.3 Ditch Excavation	177.00	CY	2,407	602	3,054
			85,225.71		108,151.42

PROJECT INDIRECT SUMMARY - Scope Page 2

<u>Description</u>	<u>Quantity</u>	<u>UOM</u>	<u>ContractCost</u>	<u>Contingency</u>	<u>ProjectCost</u>
3.4 Water Control Stop Log Structure	1.00	EA	85,226	21,306	108,151
3.5 Trench Area Turfing	227.00	SY	437	109	554
4 Area 6 - Polders	1.00	EA	128,470	32,118	163,028
4.1 Berms Fill Material	3,309.00	CY	126,838	31,710	160,958
4.2 Trench Area Turfing	503.00	SY	1,632	408	2,071
5 Area 7 - Fringe Wetlands	1.00	EA	2,026,080	506,520	2,571,096
6 Area 10 - Downstream Wetland	1.00	LS	544,361	136,090	690,794
6.1 Existing Wetland Excavation	7,907.00	CY	103,369	25,842	131,176
6.2 Water Control Stop Log Structure	4.00	EA	440,992	110,248	559,619
7 PED	1.00	EA	895,344	223,836	1,136,192
8 CM	1.00	LS	716,276	179,069	908,954