

CONCEPTUAL WETLAND MITIGATION PLAN  
FOR SEA PORT OIL TERMINAL PROJECT IN  
BRAZORIA AND HARRIS COUNTIES, TEXAS

REVISED JANUARY 2020

PREPARED FOR  
**SPOT Terminal Services LLC**

PREPARED BY  
**SWCA Environmental Consultants**

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OIL TERMINAL PROJECT IN BRAZORIA AND HARRIS  
COUNTIES, TEXAS**

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SWCA Project No. 51837

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## **CONTENTS**

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
<b>2</b>	<b>Baseline Conditions .....</b>	<b>1</b>
<b>3</b>	<b>Functional Assessment .....</b>	<b>6</b>
<b>4</b>	<b>Compensation .....</b>	<b>7</b>

## **Appendices**

**Appendix A. Functional Assessment Worksheets**

## **Tables**

<b>Table 1. Wetlands Subject to Impact through Implementation of the Project.....</b>	<b>1</b>
<b>Table 2. Tidal Fringe Functional Capacity Units Associated with the Project.....</b>	<b>6</b>
<b>Table 3. Freshwater Functional Capacity Units Associated with the Project.....</b>	<b>6</b>

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# 1 INTRODUCTION

This DRAFT Wetland Mitigation Plan has been prepared to address the functional loss of wetlands and subsequent compensatory mitigation as required to ensure compliance with Section 404 of the Federal Clean Water Act and Section 10 of the Rivers and Harbors Act for the SPOT Terminal Services LLC, Sea Port Oil Terminal (SPOT) Project (project).

Permanent fill to emergent and scrub-shrub wetlands and conversion of forested wetlands to emergent wetlands are anticipated during the construction and operation of onshore SPOT Project components which include approximately 62 miles of crude oil pipeline and an approximate 140-acre crude oil storage facility. These impacts occur in Harris and Brazoria Counties, Texas and within the West Galveston Bay and Austin-Oyster watersheds, as demarcated by the United States Geological Survey’s eight-digit Hydrologic Unit Code (HUC) 12040204 and Austin-Oyster, respectively. All anticipated wetland impacts are located within the regulatory jurisdiction of USACE Galveston District.

# 2 BASELINE CONDITIONS

Wetland delineation field surveys were conducted by SWCA Environmental Consultants (SWCA) in October and November of 2018 along the project alignment. Drawing from SWCA’s wetland delineation of the project area, the vast majority of the proposed project is situated in uplands; however, the proposed project will result in temporary impacts due to construction activities, conversion impacts by converting forested and scrub-shrub wetlands into emergent wetlands to maintain the right-of-way, and permanent impacts to jurisdictional wetlands associated with the construction of the crude oil storage facility infrastructure at the proposed Oyster Creek terminal. Specifically, the project will result in 100.54 acres of temporary impacts, conversion of 7.89 acres of forested or scrub-shrub wetlands to emergent wetlands, and permanent fill of 6.25 acres of wetlands. The specific wetland impacts are detailed in Table 1. For a full description of wetlands associated with the project, please refer to the wetland delineation report.

**Table 1. Wetlands Subject to Impact through Implementation of the Project.**

Feature ID	Cowardin Class	HUC 8 Watershed	Construction Impacts	Conversion Impacts	Operational (Permanent) Impacts
WA003	PEM	West Galveston Bay	0.01	0.00	0.00
WA004	PEM	West Galveston Bay	0.02	0.00	0.00
WA005	PEM	West Galveston Bay	0.02	0.00	0.00
WA006	PEM	West Galveston Bay	0.02	0.00	0.00
WA007	PEM	West Galveston Bay	0.02	0.00	0.00
WA008	PEM	West Galveston Bay	0.13	0.00	0.00
WA009	PEM	West Galveston Bay	0.04	0.00	0.00
WA010	PEM	West Galveston Bay	0.03	0.00	0.00
WA011	PEM	West Galveston Bay	0.00	0.00	0.00
WA012	PEM	West Galveston Bay	0.05	0.00	0.00
WA013	PEM	West Galveston Bay	0.11	0.00	0.00
WA014	PEM	West Galveston Bay	0.03	0.00	0.00
WA015	PEM	West Galveston Bay	0.01	0.00	0.00
WA016	PEM	West Galveston Bay	0.79	0.00	0.00

Feature ID	Cowardin Class	HUC 8 Watershed	Construction Impacts	Conversion Impacts	Operational (Permanent) Impacts
WA016	PSS	West Galveston Bay	0.04	0.00	0.00
WA017	PEM	West Galveston Bay	0.03	0.00	0.00
WA018	PEM	West Galveston Bay	0.10	0.00	0.00
WA018	PSS	West Galveston Bay	0.04	0.00	0.00
WA019	PEM	West Galveston Bay	0.10	0.00	0.00
WA020	PEM	West Galveston Bay	0.04	0.00	0.00
WA021	PEM	West Galveston Bay	0.08	0.00	0.00
WA022	PFO	West Galveston Bay	0.02	0.02	0.00
WA024	PEM	West Galveston Bay	0.12	0.00	0.00
WA025	PEM	West Galveston Bay	0.10	0.00	0.00
WA026	PSS	West Galveston Bay	0.05	0.00	0.00
WA027	PEM	West Galveston Bay	0.01	0.00	0.00
WA028A	PEM	West Galveston Bay	0.05	0.00	0.00
WA028B	PEM	West Galveston Bay	0.10	0.00	0.00
WA029	PFO	West Galveston Bay	0.09	0.09	0.00
WA030	PFO	West Galveston Bay	0.05	0.05	0.00
WA033	PEM	West Galveston Bay	<0.01	0.00	0.00
WA035	PEM	West Galveston Bay	0.02	0.00	0.00
WA038	PEM	West Galveston Bay	0.64	0.00	0.00
WA039	PEM	West Galveston Bay	4.20	0.00	0.00
WA040	PEM	West Galveston Bay	0.93	0.00	0.00
WA042	PFO	Austin-Oyster	0.01	0.01	0.00
WA043	PEM	Austin-Oyster	0.00	0.00	0.00
WA045	PSS	Austin-Oyster	0.01	0.00	0.00
WA047	PEM	Austin-Oyster	0.03	0.00	0.00
WA048	PEM	Austin-Oyster	0.27	0.00	0.00
WB001	PEM	West Galveston Bay	0.21	0.00	0.00
WB002	PEM	West Galveston Bay	0.11	0.00	0.00
WB003	PEM	West Galveston Bay	0.81	0.00	0.00
WB004	PEM	West Galveston Bay	0.12	0.00	0.00
WB005	PEM	West Galveston Bay	0.30	0.00	0.00
WB006	PEM	West Galveston Bay	0.09	0.00	0.00
WB007	PEM	West Galveston Bay	0.29	0.00	0.00
WB008	PEM	West Galveston Bay	0.23	0.00	0.00
WB009	PEM	West Galveston Bay	0.16	0.00	0.00
WB010	PEM	West Galveston Bay	<0.01	0.00	0.00
WB011	PEM	West Galveston Bay	0.06	0.00	0.00
WB012	PFO	West Galveston Bay	0.14	0.14	0.00
WB013	PFO	West Galveston Bay	0.05	0.05	0.00
WB014	PFO	West Galveston Bay	0.15	0.15	0.00
WB016	PEM	West Galveston Bay	0.10	0.00	0.00
WB017	PEM	West Galveston Bay	0.36	0.00	0.00

Feature ID	Cowardin Class	HUC 8 Watershed	Construction Impacts	Conversion Impacts	Operational (Permanent) Impacts
WB017	PFO	West Galveston Bay	0.42	0.42	0.00
WB021	PSS	West Galveston Bay	0.06	0.06	0.00
WB025	PEM	West Galveston Bay	0.31	0.00	0.00
WB027	PEM	West Galveston Bay	0.03	0.00	0.00
WB028	PFO	West Galveston Bay	0.26	0.26	0.00
WB029	PEM	West Galveston Bay	0.03	0.00	0.00
WB030	PEM	West Galveston Bay	0.02	0.00	0.00
WB031	PEM	West Galveston Bay	0.30	0.00	0.00
WB032	PEM	West Galveston Bay	0.53	0.00	0.00
WB032	PSS	West Galveston Bay	0.28	0.01	0.00
WB033	PEM	West Galveston Bay	0.01	0.00	0.00
WB035	PSS	Austin-Oyster	0.01	0.00	0.00
WB037	PSS	Austin-Oyster	0.04	0.00	0.00
WB038	PEM	Austin-Oyster	0.09	0.00	0.00
WB038	PFO	Austin-Oyster	0.04	0.04	0.00
WB040	PSS	Austin-Oyster	0.08	0.02	0.00
WB041	PEM	Austin-Oyster	0.03	0.00	0.00
WB042	PEM	Austin-Oyster	0.61	0.00	0.00
WB043	PEM	Austin-Oyster	0.53	0.00	0.05
WB043	PFO	Austin-Oyster	1.25	1.25	0.00
WB045	PEM	Austin-Oyster	0.05	0.00	0.00
WB052	PEM	Austin-Oyster	0.51	0.00	0.00
WB056A	PEM	Austin-Oyster	0.35	0.00	0.00
WB056	PFO	Austin-Oyster	2.35	2.35	0.00
WB063	PSS	Austin-Oyster	0.09	0.03	0.00
WB064	PEM	Austin-Oyster	0.01	0.00	0.00
WB065	PEM	Austin-Oyster	0.27	0.00	0.00
WB065	PSS	Austin-Oyster	0.06	0.00	0.00
WB065A	PSS	Austin-Oyster	0.10	0.00	0.00
WB065A	PEM	Austin-Oyster	0.78	0.00	0.00
WB065B	PSS	Austin-Oyster	0.02	0.00	0.00
WB065C	PSS	Austin-Oyster	0.06	0.00	0.00
WB067	PSS	Austin-Oyster	0.20	0.03	0.00
WB069	PEM	Austin-Oyster	0.07	0.00	0.00
WB069	PSS	Austin-Oyster	0.34	0.02	0.00
WB070A	PEM	Austin-Oyster	0.02	0.00	0.00
WB071	PEM	Austin-Oyster	6.02	0.00	6.02
WB072B	PFO	Austin-Oyster	0.18	0.00	0.18
WC001	PEM	Austin-Oyster	0.02	0.00	0.00
WC001	PFO	Austin-Oyster	0.66	0.66	0.00
WC002	PEM	West Galveston Bay	0.08	0.00	0.00
WC003	PEM	West Galveston Bay	0.20	0.00	0.00



Feature ID	Cowardin Class	HUC 8 Watershed	Construction Impacts	Conversion Impacts	Operational (Permanent) Impacts
WC004	PSS	West Galveston Bay	0.43	0.13	0.00
WC007	PEM	Austin-Oyster	0.10	0.00	0.00
WC008	PEM	Austin-Oyster	0.04	0.00	0.00
WC009	PEM	Austin-Oyster	0.34	0.00	0.00
WC010	PEM	Austin-Oyster	0.10	0.00	0.00
WC011	PEM	Austin-Oyster	0.09	0.00	0.00
WC012	PEM	Austin-Oyster	6.10	0.00	0.00
WC013B	PEM	Austin-Oyster	0.01	0.00	0.00
WC015	PFO	Austin-Oyster	0.01	0.01	0.00
WC015	PEM	Austin-Oyster	0.11	0.00	0.00
WC016	PEM	Austin-Oyster	0.31	0.00	0.00
WC017A	PEM	Austin-Oyster	0.50	0.00	0.00
WC017B	PEM	Austin-Oyster	1.80	0.00	0.00
WC018	PEM	Austin-Oyster	5.98	0.00	0.00
WC020	PEM	West Galveston Bay	0.05	0.00	0.00
WD002	PEM	Austin-Oyster	0.02	0.00	0.00
WD004	PEM	Austin-Oyster	0.04	0.00	0.00
WD005	PEM	Austin-Oyster	0.01	0.00	0.00
WD006	PEM	Austin-Oyster	0.01	0.00	0.00
WD007	PEM	Austin-Oyster	0.03	0.00	0.00
WD008	PFO	Austin-Oyster	0.07	0.07	0.00
WD010	PEM	Austin-Oyster	0.02	0.00	0.00
WE001	PEM	West Galveston Bay	0.30	0.00	0.00
WE002	PSS	West Galveston Bay	0.21	0.09	0.00
WE002	PEM	West Galveston Bay	0.08	0.00	0.00
WE003	PEM	West Galveston Bay	0.02	0.00	0.00
WE004	PEM	West Galveston Bay	<0.01	0.00	0.00
WE005	PFO	West Galveston Bay	0.05	0.05	0.00
WE006	PEM	West Galveston Bay	0.06	0.00	0.00
WE006C	PFO	West Galveston Bay	0.18	0.18	0.00
WF001	PEM	Austin-Oyster	0.03	0.00	0.00
WF003	PEM	Austin-Oyster	0.18	0.00	0.00
WF004	PEM	Austin-Oyster	0.07	0.00	0.00
WF005	PEM	Austin-Oyster	0.09	0.00	0.00
WF006	PEM	Austin-Oyster	0.01	0.00	0.00
WF007	PEM	Austin-Oyster	0.08	0.00	0.00
WF008	PEM	Austin-Oyster	0.05	0.00	0.00
WF009	PFO	Austin-Oyster	0.04	0.04	0.00
WF009	PEM	Austin-Oyster	0.02	0.00	0.00
WF010	PFO	Austin-Oyster	0.72	0.72	0.00
WF010	PSS	Austin-Oyster	0.23	0.00	0.00
WF011	PSS	Austin-Oyster	0.03	0.00	0.00

Feature ID	Cowardin Class	HUC 8 Watershed	Construction Impacts	Conversion Impacts	Operational (Permanent) Impacts
WF020	PEM	West Galveston Bay	0.04	0.00	0.00
WF023	PEM	West Galveston Bay	0.47	0.00	0.00
WF029	PEM	Austin-Oyster	0.45	0.00	0.00
WF029	PSS	Austin-Oyster	0.41	0.00	0.00
WF030	PEM	Austin-Oyster	0.32	0.00	0.00
WF031	PEM	Austin-Oyster	0.14	0.00	0.00
WF032	PEM	Austin-Oyster	0.01	0.00	0.00
WB046	EEM	Austin-Oyster	7.41	0.00	0.00
WB047	EEM	Austin-Oyster	0.31	0.00	0.00
WB047	ESS	Austin-Oyster	1.66	0.20	0.00
WB047B	EEM	Austin-Oyster	0.20	0.00	0.00
WB047C	EEM	Austin-Oyster	0.11	0.00	0.00
WB048	ESS	Austin-Oyster	0.30	0.00	0.00
WB049	EEM	Austin-Oyster	5.25	0.00	0.00
WB049	ESS	Austin-Oyster	0.11	0.10	0.00
WB049A	ESS	Austin-Oyster	0.60	0.00	0.00
WB050	EEM	Austin-Oyster	3.11	0.00	0.00
WB051	ESS	Austin-Oyster	1.72	0.40	0.00
WB051	EEM	Austin-Oyster	9.50	0.00	0.00
WB051B	EEM	Austin-Oyster	0.80	0.00	0.00
WB057	ESS	Austin-Oyster	1.63	0.24	0.00
WB057	EEM	Austin-Oyster	9.66	0.00	0.00
WB058	EEM	Austin-Oyster	0.06	0.00	0.00
WB059	EEM	Austin-Oyster	0.01	0.00	0.00
WB060	EEM	Austin-Oyster	0.09	0.00	0.00
WB061	EEM	Austin-Oyster	0.52	0.00	0.00
WB062	EEM	Austin-Oyster	<0.01	0.00	0.00
WE034	EEM	Austin-Oyster	0.05	0.00	0.00
WF014	EEM	Austin-Oyster	0.09	0.00	0.00
WF015	EEM	Austin-Oyster	1.84	0.00	0.00
WF016	EEM	Austin-Oyster	2.41	0.00	0.00
WF017	EEM	Austin-Oyster	0.11	0.00	0.00
WF033	EEM	Austin-Oyster	0.20	0.00	0.00
WF034	EEM	Austin-Oyster	0.06	0.00	0.00
WX005	EEM	Austin-Oyster	3.31	0.00	0.00
WX008B	ESS	Austin-Oyster	0.00	0.00	0.00
WX008B	EEM	Austin-Oyster	0.00	0.00	0.00
WX009	EES	Austin-Oyster	0.00	0.00	0.00
WX010	EEM	Austin-Oyster	0.00	0.00	0.00
WX012	EEM	Austin-Oyster	0.00	0.00	0.00
WX013	PEM	Austin-Oyster	<0.01	0.00	0.00
<b>TOTAL OVERALL</b>			<b>100.54</b>	<b>7.89</b>	<b>6.25</b>

Feature ID	Cowardin Class	HUC 8 Watershed	Construction Impacts	Conversion Impacts	Operational (Permanent) Impacts
		<b>TOTAL PEM</b>	<b>39.89</b>	<b>0.00</b>	<b>6.07</b>
		<b>TOTAL PSS</b>	<b>2.79</b>	<b>0.39</b>	<b>0.00</b>
		<b>TOTAL PFO</b>	<b>6.74</b>	<b>6.56</b>	<b>0.18</b>
		<b>TOTAL EEM</b>	<b>45.10</b>	<b>0.00</b>	<b>0.00</b>
		<b>TOTAL ESS</b>	<b>6.02</b>	<b>0.94</b>	<b>0.00</b>

### 3 FUNCTIONAL ASSESSMENT

Drawing from the collected field data, SWCA completed wetland functional assessments according to the appropriate hydrogeomorphic (HGM) models provided by the USACE Galveston District. To determine the necessary compensatory mitigation, the baseline functional assessments for each wetland were then compared to the functional values that will persist following completion of the project (see attached functional assessment worksheets). In some cases (i.e., temporary impacts to emergent wetlands for which pre-construction contours will be restored, tidal wetlands for which the HGM indicates no functional degradation), implementation of the project will result in no loss of functional capacities. In such cases, no mitigation will be provided. Tables 2 and 3 provide the respective mitigation requirements for tidal fringe (estuarine) wetlands and palustrine (freshwater) wetlands.

**Table 2. Tidal Fringe Functional Capacity Units Associated with the Project.**

Feature ID	Watershed	Cowardin Class	Conversion Impacts (Acres)	Biota	Botanical	Physical	Chemical
WB047	Austin-Oyster	ESS	0.20	0.00	0.00	0.00	0.00
WB049	Austin-Oyster	ESS	0.10	0.00	0.00	0.00	0.00
WB051	Austin-Oyster	ESS	0.40	0.00	0.00	0.00	0.00
WB057	Austin-Oyster	ESS	0.24	0.00	0.00	0.00	0.00
<b>Total</b>	<b>Austin-Oyster</b>	<b>Total</b>	<b>0.94</b>	0.00	0.00	0.00	0.00

**Table 3. Freshwater Functional Capacity Units Associated with the Project.**

Feature ID	Watershed	Cowardin Class	Impact Acreage		Physical	Biological	Chemical
			Conversion	Permanent			
WA022	West Galveston Bay	PFO	0.02	0.00	0.005	0.006	0.005
WA029	West Galveston Bay	PFO	0.09	0.00	0.026	0.023	0.024
WA030	West Galveston Bay	PFO	0.05	0.00	0.015	0.013	0.013
WA042	Austin-Oyster	PFO	0.01	0.00	0.003	0.003	0.003
WB012	West Galveston Bay	PFO	0.14	0.00	0.034	0.035	0.037
WB013	West Galveston Bay	PFO	0.05	0.00	0.012	0.015	0.013
WB014	West Galveston Bay	PFO	0.15	0.00	0.031	0.048	0.040
WB017	West Galveston Bay	PFO	0.42	0.00	0.077	0.114	0.106
WB021	West Galveston Bay	PSS	0.06	0.00	0.005	0.013	0.010
WB028	West Galveston Bay	PFO	0.26	0.00	0.048	0.051	0.066

Feature ID	Watershed	Cowardin Class	Impact Acreage		Physical	Biological	Chemical
			Conversion	Permanent			
WB032	West Galveston Bay	PSS	0.01	0.00	0.001	0.003	0.002
WB038	Austin-Oyster	PFO	0.04	0.00	0.010	0.010	0.010
WB040	Austin-Oyster	PSS	0.02	0.00	0.002	0.004	0.002
WB043	Austin-Oyster	PEM	0.00	0.05	0.016	0.017	0.023
		PFO	1.25	0.00	0.405	0.344	0.334
WB056	Austin-Oyster	PFO	2.35	0.00	0.677	0.714	0.595
WB063	Austin-Oyster	PSS	0.03	0.00	0.005	0.009	0.007
WB067	Austin-Oyster	PSS	0.03	0.00	0.004	0.009	0.007
WB069	Austin-Oyster	PSS	0.02	0.00	0.003	0.006	0.005
WB071	Austin-Oyster	PEM	0.00	6.02	1.836	2.709	2.245
WB072B	Austin-Oyster	PFO	0.00	0.18	0.087	0.072	0.111
WC001	Austin-Oyster	PFO	0.66	0.00	0.197	0.154	0.132
WC004	West Galveston Bay	PSS	0.13	0.00	0.017	0.039	0.031
WC015	Austin-Oyster	PFO	0.01	0.00	0.002	0.003	0.003
WD008	Austin-Oyster	PFO	0.07	0.00	0.015	0.023	0.014
WE002	West Galveston Bay	PSS	0.09	0.00	0.004	0.012	0.005
WE005	West Galveston Bay	PFO	0.05	0.00	0.011	0.013	0.013
WE006	West Galveston Bay	PFO	0.18	0.00	0.039	0.053	0.046
WF009	Austin-Oyster	PFO	0.04	0.00	0.012	0.010	0.010
WF010	Austin-Oyster	PFO	0.72	0.00	0.154	0.231	0.135
West Galveston Bay		PEM	<b>0.00</b>	<b>0.00</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
		PSS	<b>0.29</b>	<b>0.00</b>	<b>0.027</b>	<b>0.067</b>	<b>0.048</b>
		PFO	<b>1.41</b>	<b>0.00</b>	<b>0.302</b>	<b>0.371</b>	<b>0.363</b>
Austin-Oyster		PEM	<b>0.00</b>	<b>6.07</b>	<b>1.852</b>	<b>2.726</b>	<b>2.268</b>
		PSS	<b>0.10</b>	<b>0.00</b>	<b>0.014</b>	<b>0.028</b>	<b>0.021</b>
		PFO	<b>5.15</b>	<b>0.18</b>	<b>1.562</b>	<b>1.564</b>	<b>1.347</b>

## 4 COMPENSATION

To compensate for these functional losses, SPOT Terminal Services LLC (the Permittee) proposes to purchase mitigation credits from approved mitigation banks whenever practicable. WA042, WB038, WB040, WB043, WB056, WB063, WB067, WB069, WB071, WB072B, WC001, WC015, WD008, WF009, and WF010 are located within the Austin-Oyster watershed (12040205), which is the primary service area for Columbia Bottomlands Conservation Mitigation Bank (CBCMB), for example. Based on the MBI for CBCMB, these impacts are properly mitigated for using a 1:1 ratio. The location of the impacts generally align with areas that were historically forested wetlands; therefore, the Permittee plans to offset impacts to PEM and PSS wetlands by purchasing forested wetland credits. Since these credits are sold as suites, the Project will require a total of 4.4 credits suites to be purchased.

Several wetlands that will incur functional degradation as a result of the project (WA029, WA030, WB017, WB028, WB032, and WC004) are located within portions of the West Galveston Bay watershed (12040204) that are in CBCMB’s secondary service area. These wetlands will realize a loss of no more than 0.25 functional capacity units (FCU) per functional value. According to the MBI, these wetland impacts must be mitigated for using suites purchased at a 1.5:1 ratio. Therefore, an additional 0.4 credit suite will be purchased to compensate for the project’s functional degradation of these wetlands.

The project's wetland impacts in the portions of the West Galveston Bay watershed that are beyond the secondary service area of CBCMB (i.e., WA022, WB012, WB013, WB014, WB021, WE002, and WE006) will be mitigated for through a credit purchase from the Lower Brazos River Mitigation Bank (LBRMB). Forested wetlands within LBRMB's secondary service area will have no greater than 0.17 FCU per functional value. Similarly, scrub-shrub wetlands will have impacts of no greater than 0.03 FCU per functional value. Considering that these credits are sold as suites and that the impacts are in LBRMB's secondary service area, these wetland impacts will be mitigated through the purchase of 0.1 suite of non-forested wetland and 0.3 suite of forested wetland credits.

All mitigation credits will be purchased from the mitigation banks concomitantly with initiation of construction activities on the project. However, should the banks no longer be able to provide all required mitigation credits, or any portion thereof, for the project suggested above, the Permittee will develop a fully functioning permittee-responsible mitigation (PRM) project to compensate for any expected impacts for which mitigation needs remain outstanding. In such a case, the Permittee will develop a PRM plan that would generate any required credits as in-kind mitigation for any of the wetland impacts not mitigated through purchase from a mitigation bank.

If necessary, the Permittee will develop a PRM plan that includes all of the required elements contained in the 2008 Mitigation Rule, which would be subject to approval by the USACE. In particular, the PRM plan would include baseline information, mitigation work plan, performance standards, maintenance plans, monitoring requirements, site protection instruments, and financial assurances sufficient to meet USACE's standards. In the event a PRM is required, the Permittee has identified tracts in the Austin-Oyster and West Galveston Bay watersheds that are capable being developed to restore previously degraded and/or enhance existing wetlands sufficiently to re-establish the functional losses described above. As previously described, wetlands proposed for impact by the project are generally associated with areas that were historically part of the Columbia Bottomlands ecological province. Considering the historic and on-going degradation to these, replacement of relatively poor quality wetlands with high quality forested bottomlands would be ecologically preferable. Furthermore, to account for the temporal loss associated with implementing a PRM, the Permittee will provide a two credits of mitigation for each lost functional unit. Based on the credit purchases described for the bank credits, this 2:1 ratio will require the Permittee to develop no less than 10.4 credit suites to offset the lost functions associated with the project. Based on past experiences with PRM projects, this will require no less than 15 acres to generate the necessary credits. Assuming this, the PRM plan would provide more than twice (i.e., 1:2.15) the acreage of wetlands as those impacted as well as more than twice the functional credits lost while restoring a portion of the greatly degraded Columbia Bottomlands forested wetland ecosystem.

If a bank's mitigation credits become available after the Permittee has initiated the PRM plan, the Permittee shall coordinate with the bank's sponsor and the USACE to acquire credits in place of the PRM. Once the USACE has received documentation of the Permittee's acquisition of the required bank credits, the Permittee's obligations relative to the PRM plan shall cease.

**APPENDIX A**  
**Functional Assessment Worksheets**

WAA Name: WB047  
 WAA Acres: 0.199  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Conversion from ESS to EEM

**Pre-Project (Baseline)**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/25/2018
Variable	Subindex
Vedge	0.40
Vhydro	0.10
Vnhc	0.20
Vtypical	1.00
Vslope	1.00
Vwidth	0.80
Vrough	1.00
Vsoil	0.80

**Post Project**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vedge	0.40
Vhydro	0.10
Vnhc	0.20
Vtypical	1.00
Vslope	1.00
Vwidth	0.80
Vrough	1.00
Vsoil	0.80

FCIs; (see formulas):	Pre-Project	Post-Project
<b>Biota</b>	0.600	0.600
<b>Botanical</b>	1.000	1.000
<b>Physical</b>	0.740	0.740
<b>Chemical:</b>	0.316	0.316
FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
<b>Biota:</b>	0.12	<b>0.12</b>
<b>Botanical:</b>	0.20	<b>0.20</b>
<b>Physical:</b>	0.15	<b>0.15</b>
<b>Chemical:</b>	0.06	<b>0.06</b>

Change in FCUs = (Post-Project - Pre-Project):	
<b>Biota</b>	<b>0.00</b>
<b>Botanical</b>	<b>0.00</b>
<b>Physical</b>	<b>0.00</b>
<b>Chemical</b>	<b>0.00</b>

WAA Name: WB049  
 WAA Acres: 0.097  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Conversion from ESS to EEM

**Pre-Project (Baseline)**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/25/2018
Variable	Subindex
Vedge	0.40
Vhydro	0.10
Vnhc	0.30
Vtypical	1.00
Vslope	0.10
Vwidth	0.60
Vrough	1.00
Vsoil	1.00

**Post Project**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vedge	0.40
Vhydro	0.10
Vnhc	0.30
Vtypical	1.00
Vslope	0.10
Vwidth	0.60
Vrough	1.00
Vsoil	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
<b>Biota</b>	0.607	0.607
<b>Botanical</b>	1.000	1.000
<b>Physical</b>	0.560	0.560
<b>Chemical:</b>	0.316	0.316
FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
<b>Biota:</b>	0.06	<b>0.06</b>
<b>Botanical:</b>	0.10	<b>0.10</b>
<b>Physical:</b>	0.05	<b>0.05</b>
<b>Chemical:</b>	0.03	<b>0.03</b>

Change in FCUs = (Post-Project - Pre-Project):	
<b>Biota</b>	<b>0.00</b>
<b>Botanical</b>	<b>0.00</b>
<b>Physical</b>	<b>0.00</b>
<b>Chemical</b>	<b>0.00</b>



WAA Name: WB051  
 WAA Acres: 0.397  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Conversion from ESS to EEM

**Pre-Project (Baseline)**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/26/2018
Variable	Subindex
Vedge	0.70
Vhydro	0.30
Vnhc	0.50
Vtypical	1.00
Vslope	0.50
Vwidth	0.60
Vrough	1.00
Vsoil	0.80

**Post Project**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vedge	0.70
Vhydro	0.30
Vnhc	0.50
Vtypical	1.00
Vslope	0.50
Vwidth	0.60
Vrough	1.00
Vsoil	0.80

FCIs; (see formulas):	Pre-Project	Post-Project
<b>Biota</b>	0.721	0.721
<b>Botanical</b>	1.000	1.000
<b>Physical</b>	0.640	0.640
<b>Chemical:</b>	0.548	0.548
FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
<b>Biota:</b>	0.29	<b>0.29</b>
<b>Botanical:</b>	0.40	<b>0.40</b>
<b>Physical:</b>	0.25	<b>0.25</b>
<b>Chemical:</b>	0.22	<b>0.22</b>

Change in FCUs = (Post-Project - Pre-Project):	
<b>Biota</b>	<b>0.00</b>
<b>Botanical</b>	<b>0.00</b>
<b>Physical</b>	<b>0.00</b>
<b>Chemical</b>	<b>0.00</b>

WAA Name: WB057  
 WAA Acres: 0.236  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Conversion from ESS to EEM

**Pre-Project (Baseline)**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/29/2018
Variable	Subindex
Vedge	0.70
Vhydro	0.60
Vnhc	0.50
Vtypical	1.00
Vslope	0.10
Vwidth	0.50
Vrough	1.00
Vsoil	0.80

**Post Project**

Tidal Fringe - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vedge	0.70
Vhydro	0.60
Vnhc	0.50
Vtypical	1.00
Vslope	0.10
Vwidth	0.50
Vrough	1.00
Vsoil	0.80

FCIs; (see formulas):	Pre-Project	Post-Project
<b>Biota</b>	0.807	0.807
<b>Botanical</b>	1.000	1.000
<b>Physical</b>	0.600	0.600
<b>Chemical:</b>	0.775	0.775
FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
<b>Biota:</b>	0.19	<b>0.19</b>
<b>Botanical:</b>	0.24	<b>0.24</b>
<b>Physical:</b>	0.14	<b>0.14</b>
<b>Chemical:</b>	0.18	<b>0.18</b>

Change in FCUs = (Post-Project - Pre-Project):	
<b>Biota</b>	<b>0.00</b>
<b>Botanical</b>	<b>0.00</b>
<b>Physical</b>	<b>0.00</b>
<b>Chemical</b>	<b>0.00</b>

<b>WAA Name:</b>	<b>WA022</b>
<b>WAA Acres:</b>	<b>0.021</b>
<b>Location HUC:</b>	<b>West Galveston Bay 12040204</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	9/13/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.50
Vrich	0.60
Vbasal	0.40
Vdensity	0.60
Vmid	0.50
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.434	0.188
Maintain Plant & Animal Communities (Biological):	0.642	0.325
Removal & Sequestrian of Elements & Compounds (Chemical):	0.597	0.330

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.01	0.00
Biological:	0.01	0.01
Chemical:	0.01	0.01

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.01
Biological	-0.01
Chemical	-0.01

**WAA Name:** WA029  
**WAA Acres:** 0.088  
**Location HUC:** West Galveston Bay 12040204  
**Impact Type:** Conversion from PFO to PEM

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/2/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	0.50
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.516	0.224
Maintain Plant & Animal Communities (Biological):	0.575	0.325
Removal & Sequestrian of Elements & Compounds (Chemical):	0.647	0.380

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.05	0.02
Biological:	0.05	0.03
Chemical:	0.06	0.03

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.03
Biological	-0.02
Chemical	-0.02

<b>WAA Name:</b>	<b>WA030</b>
<b>WAA Acres:</b>	<b>0.047</b>
<b>Location HUC:</b>	<b>West Galveston Bay 12040204</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/2/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	0.50
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.516	0.224
Maintain Plant & Animal Communities (Biological):	0.517	0.267
Removal & Sequestrian of Elements & Compounds (Chemical):	0.647	0.380

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.02	0.01
Biological:	0.02	0.01
Chemical:	0.03	0.02

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.01
Biological	-0.01
Chemical	-0.01

<b>WAA Name:</b>	<b>WA042</b>
<b>WAA Acres:</b>	<b>0.012</b>
<b>Location HUC:</b>	<b>Austin-Oyster 12040205</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/4/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	1.00
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.516	0.224
Maintain Plant & Animal Communities (Biological):	0.575	0.283
Removal & Sequestrian of Elements & Compounds (Chemical):	0.647	0.380

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.01	0.00
Biological:	0.01	0.00
Chemical:	0.01	0.00

Change in FCUs = (Post-Project -Pre-Project):	
Physical	0.00
Biological	0.00
Chemical	0.00

<b>WAA Name:</b>	<b>WB012</b>
<b>WAA Acres:</b>	<b>0.14</b>
<b>Location HUC:</b>	<b>West Galveston Bay 12040204</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	9/19/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	0.50
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.434	0.188
Maintain Plant & Animal Communities (Biological):	0.575	0.325
Removal & Sequestrian of Elements & Compounds (Chemical):	0.597	0.330

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.06	0.03
Biological:	0.08	0.05
Chemical:	0.08	0.05

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.03
Biological	-0.04
Chemical	-0.04

**WAA Name:** WB013  
**WAA Acres:** 0.051  
**Location HUC:** West Galveston Bay 12040204  
**Impact Type:** Conversion from PFO to PEM

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	9/20/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	1.00
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.434	0.188
Maintain Plant & Animal Communities (Biological):	0.517	0.225
Removal & Sequestrian of Elements & Compounds (Chemical):	0.597	0.330

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.02	0.01
Biological:	0.03	0.01
Chemical:	0.03	0.02

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.01
Biological	-0.01
Chemical	-0.01



**WAA Name:** WB014  
**WAA Acres:** 0.154  
**Location HUC:** West Galveston Bay 12040204  
**Impact Type:** Conversion from PFO to PEM

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	9/20/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.25
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.60
Vbasal	0.40
Vdensity	1.00
Vmid	0.50
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.25
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.365	0.158
Maintain Plant & Animal Communities (Biological):	0.600	0.283
Removal & Sequestrian of Elements & Compounds (Chemical):	0.547	0.280

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.06	0.02
Biological:	0.09	0.04
Chemical:	0.08	0.04

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.03
Biological	-0.05
Chemical	-0.04

<b>WAA Name:</b>	<b>WB017</b>
<b>WAA Acres:</b>	<b>0.42</b>
<b>Location HUC:</b>	<b>West Galveston Bay 12040204</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	9/21/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.25
Vtopo	0.10
Vcwd	0.30
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	1.00
Vmid	0.75
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.25
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.342	0.158
Maintain Plant & Animal Communities (Biological):	0.496	0.225
Removal & Sequestrian of Elements & Compounds (Chemical):	0.533	0.280

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.14	0.07
Biological:	0.21	0.09
Chemical:	0.22	0.12

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.08
Biological	-0.11
Chemical	-0.11

WAA Name: WB021  
 WAA Acres: 0.058  
 Location HUC: West Galveston Bay 12040204  
 Impact Type: Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	9/24/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vwood	0.75
Vmid	0.75
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.415	0.339
Maintain Plant & Animal Communities (Biological):	0.833	0.617
Removal & Sequestrian of Elements & Compounds (Chemical):	0.563	0.390

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.02	<b>0.02</b>
Biological:	0.05	<b>0.04</b>
Chemical:	0.03	<b>0.02</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>0.00</b>
Biological	<b>-0.01</b>
Chemical	<b>-0.01</b>

<b>WAA Name:</b>	<b>WB028</b>
<b>WAA Acres:</b>	<b>0.257</b>
<b>Location HUC:</b>	<b>West Galveston Bay 12040204</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	9/26/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.25
Vtopo	0.10
Vcwd	0.30
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	0.25
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.25
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.342	0.158
Maintain Plant & Animal Communities (Biological):	0.421	0.225
Removal & Sequestrian of Elements & Compounds (Chemical):	0.533	0.280

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.09	0.04
Biological:	0.11	0.06
Chemical:	0.14	0.07

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.05
Biological	-0.05
Chemical	-0.07

WAA Name: WB032  
 WAA Acres: 0.014  
 Location HUC: West Galveston Bay 12040204  
 Impact Type: Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	9/28/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	0.75
Vmid	1.00
Vherb	0.75
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	0.75
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.494	0.362
Maintain Plant & Animal Communities (Biological):	0.917	0.617
Removal & Sequestrian of Elements & Compounds (Chemical):	0.613	0.423

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.01	<b>0.01</b>
Biological:	0.01	<b>0.01</b>
Chemical:	0.01	<b>0.01</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>0.00</b>
Biological	<b>0.00</b>
Chemical	<b>0.00</b>

<b>WAA Name:</b>	<b>WB038</b>
<b>WAA Acres:</b>	<b>0.035</b>
<b>Location HUC:</b>	<b>Austin-Oyster 12040205</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/17/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.30
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	0.75
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

<b>FCIs; (see formulas):</b>	<b>Pre-Project</b>	<b>Post-Project</b>
<b>Temporary Storage &amp; Dentention of Storage Water (Physical):</b>	0.483	<b>0.224</b>
<b>Maintain Plant &amp; Animal Communities (Biological):</b>	0.463	<b>0.225</b>
<b>Removal &amp; Sequestrian of Elements &amp; Compounds (Chemical):</b>	0.633	<b>0.380</b>

<b>FCUs; (FCI x acres per WAA):</b>	<b>Pre-Project</b>	<b>Post-Project</b>
<b>Physical:</b>	0.02	<b>0.01</b>
<b>Biological:</b>	0.02	<b>0.01</b>
<b>Chemical:</b>	0.02	<b>0.01</b>

<b>Change in FCUs = (Post-Project -Pre-Project):</b>	
<b>Physical</b>	<b>-0.01</b>
<b>Biological</b>	<b>-0.01</b>
<b>Chemical</b>	<b>-0.01</b>

**WAA Name:** WB040  
**WAA Acres:** 0.02  
**Location HUC:** Austin-Oyster 12040205  
**Impact Type:** Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/17/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	0.50
Vmid	0.75
Vherb	0.50
Vdetritus	0.30
Vredox	0.10
Vsorp	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	0.50
Vdetritus	0.30
Vredox	0.10
Vsorp	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.426	0.316
Maintain Plant & Animal Communities (Biological):	0.750	0.533
Removal & Sequestrian of Elements & Compounds (Chemical):	0.483	0.360

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.01	<b>0.01</b>
Biological:	0.02	<b>0.01</b>
Chemical:	0.01	<b>0.01</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>0.00</b>
Biological	<b>0.00</b>
Chemical	<b>0.00</b>

WAA Name: WB043  
 WAA Acres: 0.047  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Permanent Impact PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/23/2018
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.25
Vherb	0.25
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.50

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.00
Vfreq	0.00
Vtopo	0.00
Vwood	0.00
Vmid	0.00
Vherb	0.00
Vdetritus	0.00
Vredox	0.00
Vsorp	0.00
Vconnect	0.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.327	0.000
Maintain Plant & Animal Communities (Biological):	0.333	0.000
Removal & Sequestrian of Elements & Compounds (Chemical):	0.450	0.000

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.02	<b>0.00</b>
Biological:	0.02	<b>0.00</b>
Chemical:	0.02	<b>0.00</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>-0.02</b>
Biological	<b>-0.02</b>
Chemical	<b>-0.02</b>



WAA Name: WB043  
WAA Acres: 1.247  
Location HUC: Austin-Oyster 12040205  
Impact Type: Conversion from PFO to PEM

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/23/2018
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.40
Vmid	1.00
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.571	0.247
Maintain Plant & Animal Communities (Biological):	0.500	0.225
Removal & Sequestrian of Elements & Compounds (Chemical):	0.697	0.430

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.713	0.31
Biological:	0.624	0.28
Chemical:	0.869	0.54

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.40
Biological	-0.34
Chemical	-0.33

<b>WAA Name:</b>	<b>WB056</b>
<b>WAA Acres:</b>	<b>2.347</b>
<b>Location HUC:</b>	<b>Austin-Oyster 12040205</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/29/2018
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vcwd	0.30
Vwood	1.00
Vtree	0.30
Vrich	0.60
Vbasal	0.40
Vdensity	1.00
Vmid	0.75
Vherb	0.50
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.50
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.535	<b>0.247</b>
Maintain Plant & Animal Communities (Biological):	0.546	<b>0.242</b>
Removal & Sequestrian of Elements & Compounds (Chemical):	0.683	<b>0.430</b>

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	1.25	<b>0.58</b>
Biological:	1.28	<b>0.57</b>
Chemical:	1.60	<b>1.01</b>

Change in FCUs = (Post-Project -Pre-Project):	
Physical	<b>-0.67</b>
Biological	<b>-0.71</b>
Chemical	<b>-0.59</b>

WAA Name: WB063  
 WAA Acres: 0.029  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/31/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	1.00
Vmid	1.00
Vherb	0.25
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	0.25
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.426	0.262
Maintain Plant & Animal Communities (Biological):	0.667	0.367
Removal & Sequestrian of Elements & Compounds (Chemical):	0.630	0.390

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.01	<b>0.01</b>
Biological:	0.02	<b>0.01</b>
Chemical:	0.02	<b>0.01</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>0.00</b>
Biological	<b>-0.01</b>
Chemical	<b>-0.01</b>

WAA Name: WB067  
WAA Acres: 0.032  
Location HUC: Austin-Oyster 12040205  
Impact Type: Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	11/1/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	1.00
Vmid	1.00
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.50

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.50

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.524	0.403
Maintain Plant & Animal Communities (Biological):	0.833	0.533
Removal & Sequestrian of Elements & Compounds (Chemical):	0.680	0.440

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.02	<b>0.01</b>
Biological:	0.03	<b>0.02</b>
Chemical:	0.02	<b>0.01</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>0.00</b>
Biological	<b>-0.01</b>
Chemical	<b>-0.01</b>

WAA Name: WB069  
 WAA Acres: 0.025  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	11/1/2018
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vwood	1.00
Vmid	1.00
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.580	0.446
Maintain Plant & Animal Communities (Biological):	0.917	0.617
Removal & Sequestrian of Elements & Compounds (Chemical):	0.730	0.490

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.01	<b>0.01</b>
Biological:	0.02	<b>0.02</b>
Chemical:	0.02	<b>0.01</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>0.00</b>
Biological	<b>-0.01</b>
Chemical	<b>-0.01</b>

WAA Name: WB071  
 WAA Acres: 6.02  
 Location HUC: Austin-Oyster 12040205  
 Impact Type: Permanent Impact PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	11/8/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	0.75
Vdetritus	1.00
Vredox	0.10
Vsorp	1.00
Vconnect	0.50

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.00
Vfreq	0.00
Vtopo	0.00
Vwood	0.00
Vmid	0.00
Vherb	0.00
Vdetritus	0.00
Vredox	0.00
Vsorp	0.00
Vconnect	0.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.305	0.000
Maintain Plant & Animal Communities (Biological):	0.450	0.000
Removal & Sequestrian of Elements & Compounds (Chemical):	0.373	0.000

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	1.83	<b>0.00</b>
Biological:	2.71	<b>0.00</b>
Chemical:	2.25	<b>0.00</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>-1.83</b>
Biological	<b>-2.71</b>
Chemical	<b>-2.25</b>

<b>WAA Name:</b>	<b>WB072</b>
<b>WAA Acres:</b>	<b>0.178</b>
<b>Location HUC:</b>	<b>Austin-Oyster 12040205</b>
<b>Impact Type:</b>	<b>Permanent Impact PFO</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	11/8/2018
Variable	Subindex
Vdur	0.75
Vfreq	0.50
Vtopo	0.10
Vcwd	0.30
Vwood	0.75
Vtree	0.30
Vrich	0.40
Vbasal	0.60
Vdensity	0.60
Vmid	0.50
Vherb	0.10
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.50

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.00
Vfreq	0.00
Vtopo	0.00
Vcwd	0.00
Vwood	0.00
Vtree	0.00
Vrich	0.00
Vbasal	0.00
Vdensity	0.00
Vmid	0.00
Vherb	0.00
Vdetritus	0.00
Vredox	0.00
Vsorpt	0.00
Vconnect	0.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.485	0.000
Maintain Plant & Animal Communities (Biological):	0.400	0.000
Removal & Sequestrian of Elements & Compounds (Chemical):	0.617	0.000

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.09	0.00
Biological:	0.07	0.00
Chemical:	0.11	0.00

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.09
Biological	-0.07
Chemical	-0.11

<b>WAA Name:</b>	<b>WC001</b>
<b>WAA Acres:</b>	<b>0.659</b>
<b>Location HUC:</b>	<b>West Galveston Bay 12040204</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/8/2018
Variable	Subindex
Vdur	1.00
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	0.75
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.40
Vmid	0.50
Vherb	0.50
Vdetritus	0.30
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	1.00
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.50
Vdetritus	0.30
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.564	<b>0.266</b>
Maintain Plant & Animal Communities (Biological):	0.517	<b>0.283</b>
Removal & Sequestrian of Elements & Compounds (Chemical):	0.633	<b>0.433</b>

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.37	<b>0.18</b>
Biological:	0.34	<b>0.19</b>
Chemical:	0.42	<b>0.29</b>

Change in FCUs = (Post-Project -Pre-Project):	
Physical	<b>-0.20</b>
Biological	<b>-0.15</b>
Chemical	<b>-0.13</b>



WAA Name: WC004  
WAA Acres: 0.134  
Location HUC: West Galveston Bay 12040204  
Impact Type: Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/9/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	1.00
Vmid	1.00
Vherb	0.75
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	0.75
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.494	0.362
Maintain Plant & Animal Communities (Biological):	0.833	0.533
Removal & Sequestrian of Elements & Compounds (Chemical):	0.663	0.423

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.07	<b>0.05</b>
Biological:	0.11	<b>0.07</b>
Chemical:	0.09	<b>0.06</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>-0.02</b>
Biological	<b>-0.04</b>
Chemical	<b>-0.03</b>

**WAA Name:** WC015  
**WAA Acres:** 0.007  
**Location HUC:** West Galveston Bay 12040204  
**Impact Type:** Conversion from PFO to PEM

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/11/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	0.75
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.434	0.188
Maintain Plant & Animal Communities (Biological):	0.538	0.267
Removal & Sequestrian of Elements & Compounds (Chemical):	0.597	0.330

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.00	0.00
Biological:	0.00	0.00
Chemical:	0.00	0.00

Change in FCUs = (Post-Project -Pre-Project):	
Physical	0.00
Biological	0.00
Chemical	0.00

<b>WAA Name:</b>	<b>WD008</b>
<b>WAA Acres:</b>	<b>0.068</b>
<b>Location HUC:</b>	<b>Austin-Oyster 12040205</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/19/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.50
Vwood	0.75
Vtree	1.00
Vrich	0.40
Vbasal	0.40
Vdensity	0.40
Vmid	0.25
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	1.00

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Dentention of Storage Water (Physical):	0.399	0.188
Maintain Plant & Animal Communities (Biological):	0.596	0.267
Removal & Sequestrian of Elements & Compounds (Chemical):	0.530	0.330

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.03	0.01
Biological:	0.04	0.02
Chemical:	0.04	0.02

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.01
Biological	-0.02
Chemical	-0.01

WAA Name: WE002  
 WAA Acres: 0.085  
 Location HUC: West Galveston Bay 12040204  
 Impact Type: Conversion from PSS to PEM

**Pre-Project (Baseline)**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	10/20/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vwood	0.25
Vmid	0.50
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Herbaceous/Shrub Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vwood	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.388	0.339
Maintain Plant & Animal Communities (Biological):	0.750	0.617
Removal & Sequestrian of Elements & Compounds (Chemical):	0.447	0.390

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.03	<b>0.03</b>
Biological:	0.06	<b>0.05</b>
Chemical:	0.04	<b>0.03</b>

Change in FCUs = (Post-Project - Pre-Project):	
Physical	<b>0.00</b>
Biological	<b>-0.01</b>
Chemical	<b>0.00</b>

**WAA Name:** WE005  
**WAA Acres:** 0.05  
**Location HUC:** West Galveston Bay 12040204  
**Impact Type:** Conversion from PFO to PEM

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/20/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.30
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	1.00
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.406	0.188
Maintain Plant & Animal Communities (Biological):	0.483	0.225
Removal & Sequestrian of Elements & Compounds (Chemical):	0.583	0.330

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.02	0.01
Biological:	0.02	0.01
Chemical:	0.03	0.02

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.01
Biological	-0.01
Chemical	-0.01

**WAA Name:** WE006  
**WAA Acres:** 0.18  
**Location HUC:** West Galveston Bay 12040204  
**Impact Type:** Conversion from PFO to PEM

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/20/2018
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.30
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	1.00
Vmid	1.00
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.25
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.30
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.406	0.188
Maintain Plant & Animal Communities (Biological):	0.517	0.225
Removal & Sequestrian of Elements & Compounds (Chemical):	0.583	0.330

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.07	0.03
Biological:	0.09	0.04
Chemical:	0.11	0.06

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.04
Biological	-0.05
Chemical	-0.05

<b>WAA Name:</b>	<b>WF009</b>
<b>WAA Acres:</b>	<b>0.041</b>
<b>Location HUC:</b>	<b>Austin-Oyster 12040205</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/24/2018
Variable	Subindex
Vdur	1.00
Vfreq	0.50
Vtopo	0.10
Vcwd	0.30
Vwood	1.00
Vtree	0.30
Vrich	0.40
Vbasal	0.40
Vdensity	0.60
Vmid	1.00
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	1.00
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	1.00
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

FCIs; (see formulas):	Pre-Project	Post-Project
Temporary Storage & Detention of Storage Water (Physical):	0.574	0.266
Maintain Plant & Animal Communities (Biological):	0.542	0.283
Removal & Sequestrian of Elements & Compounds (Chemical):	0.733	0.480

FCUs; (FCI x acres per WAA):	Pre-Project	Post-Project
Physical:	0.02	0.01
Biological:	0.02	0.01
Chemical:	0.03	0.02

Change in FCUs = (Post-Project -Pre-Project):	
Physical	-0.01
Biological	-0.01
Chemical	-0.01

<b>WAA Name:</b>	<b>WF010</b>
<b>WAA Acres:</b>	<b>0.724</b>
<b>Location HUC:</b>	<b>Austin-Oyster 12040205</b>
<b>Impact Type:</b>	<b>Conversion from PFO to PEM</b>

**Pre-Project (Baseline)**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	10/24/2018
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.30
Vwood	0.75
Vtree	0.50
Vrich	0.40
Vbasal	0.60
Vdensity	1.00
Vmid	0.75
Vherb	0.50
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

**Post Project**

SWG Riverine - Forested Interim HGM Model	
As Sampled On:	Estimated
Variable	Subindex
Vdur	0.50
Vfreq	0.50
Vtopo	0.10
Vcwd	0.10
Vwood	0.10
Vtree	0.10
Vrich	0.10
Vbasal	0.10
Vdensity	0.10
Vmid	0.10
Vherb	0.50
Vdetritus	1.00
Vredox	0.10
Vsorpt	1.00
Vconnect	0.75

<b>FCIs; (see formulas):</b>	<b>Pre-Project</b>	<b>Post-Project</b>
<b>Temporary Storage &amp; Dentention of Storage Water (Physical):</b>	0.438	<b>0.224</b>
<b>Maintain Plant &amp; Animal Communities (Biological):</b>	0.563	<b>0.242</b>
<b>Removal &amp; Sequestrian of Elements &amp; Compounds (Chemical):</b>	0.567	<b>0.380</b>

<b>FCUs; (FCI x acres per WAA):</b>	<b>Pre-Project</b>	<b>Post-Project</b>
<b>Physical:</b>	0.32	<b>0.16</b>
<b>Biological:</b>	0.41	<b>0.17</b>
<b>Chemical:</b>	0.41	<b>0.28</b>

<b>Change in FCUs = (Post-Project -Pre-Project):</b>	
<b>Physical</b>	<b>-0.16</b>
<b>Biological</b>	<b>-0.23</b>
<b>Chemical</b>	<b>-0.14</b>