

**NATURAL RESOURCE DAMAGE ASSESSMENT  
MONITORING AND REPORTING WORK PLAN  
FOR THE FORMER EMPIRE OIL REFINERY SITE  
GAINESVILLE, TEXAS**

**October 14, 2009**

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## **1 Introduction**

The purpose of developing a success criteria and monitoring plan is to describe how the restoration project will receive ultimate acceptance by the Trustees for compensation of lost natural resource services. The goal of the plan is to clearly outline the actions that must be taken prior to final project certification. This plan identifies the success criteria that must be met, describes how the success criteria are to be achieved, and explains when corrective measures may be required to achieve the minimum success criteria. The Trustees will provide OXY USA Inc. (OXY USA) with a final project certification once all measures have been successfully implemented or completed.

Restoration monitoring occurs after the completion and certification of the restoration project construction. Monitoring is generally divided into three distinct categories; Milestones, Grow-out (Phase I) and Maintenance (Phase II) monitoring. Milestones are key steps that must be achieved during the Phase I establishment process and are intended to ensure the project is on schedule to meet Phase I success criteria. Phase I monitoring is designed to insure that the project is developing into a successfully ecological resource. Phase II monitoring begins after Phase I monitoring has been completed and is designed to insure the long term stability and viability of the project.

This document takes into consideration that OXY USA, of its own accord, responsibility and risk, has undertaken construction, initial planting and establishment criteria for the restoration project in advance of public review and comment on the DARF and Consent Decree. Since the project proposed as the preferred restoration alternative received no public comment and has been accepted as final and is in an advanced stage of completion, this document will focus on post-planting success and viability as specified in the Phase I and Phase II success criteria (Sections 2 and 3). OXY USA will be responsible for meeting the success criteria, any corrective actions required as well as providing reports specified within this document and the Consent Decree.

### **1.1 Background**

The former Empire Oil Refinery was owned and operated by Empire Oil Company in Gainesville, Texas. The refinery was built in 1916 and operated until 1935. The property contains two round pits and six former tank pads. The two round pits are referred to as the Northern Pit and the Southern Pit located at the northern and southern ends of the property, respectively. In addition, what appear to be six aboveground tank pads are located southwest of the Northern Pit. It is not known what was stored or contained (other than a petroleum hydrocarbon material) in the Northern or Southern Pits, or how they were operated. This information is based on a January 21, 1942 aerial photograph and a recent survey of the property.

In September 2000 it was discovered that exposed petroleum hydrocarbon material in the Northern Pit Inner Pond was posing a potential or actual threat to wildlife. Several species of birds and other wildlife were killed because of exposure to the petroleum hydrocarbons. In mid-November, Texas Rail Road Commission, Texas Commission on Environmental Quality (TCEQ), United States Environmental Protection Agency (USEPA), US Fish and Wildlife Service (USFWS), and Texas Parks and Wildlife Department (TPWD) representatives visited the site. It was determined that the USEPA would lead a removal effort to eliminate the petroleum hydrocarbon material from the Northern Pit to protect migratory birds and other wildlife.

In March 2001, OXY USA agreed to mitigate the immediate threat to wildlife caused by the petroleum hydrocarbons in the Northern Pit. OXY USA applied for and was granted acceptance of the site into the TCEQ's Voluntary Cleanup Program (VCP). An Interim Corrective Measure (ICM) Investigation Work Plan, dated March 1, 2001, was submitted to the VCP. The ICM Investigation was completed by April 2001, and an ICM was selected to remove the petroleum hydrocarbon material from the Northern Pit Inner Pond. The ICM was implemented in June 2001, and was completed in December 2001.

An Affected Property Assessment (APA) Work Plan was submitted in February 2002, and was approved on June 3, 2002. On June 17, 2002, the APA was started, and all field activities were completed in August 2002. The APA Report (APAR) was submitted on November 27, 2002.

Based on the Tier 1 Exclusion Criteria Checklist completed in the APAR, it was determined that a Tier 2 Ecological Risk Assessment (ERA) was required for this site. A site visit and meeting were held February 19, 2003, with the Natural Resource Trustees, TCEQ VCP Project Manager, TCEQ Ecological Risk Assessor, OXY USA, and Environeering. The Trustees included the USFWS, TPWD, TCEQ, and the Texas General Land Office (GLO). During this meeting, the surrogate species for each feeding guild were discussed and agreed upon. The ERA Report was submitted to the TCEQ and NRDA Trustees on May 4, 2004. Environeering has responded to two sets of comments from the TCEQ and NRDA Trustees, and submitted a revised ERA Report on February 4, 2005. The revised ERA Report was approved by the TCEQ in October 2006.

## **1.2 Restoration Construction**

In early 2002, OXY USA and the Trustees began NRDA settlement discussions regarding liability for natural resource damages. In July 2002, the Trustees determined the type and amount of habitat to be created to compensate for injuries to the environment caused by the refinery operations on site. The amount of habitat was based on a reasonable worst-case scenario for the type of

habitat impaired and duration of the impairment. Based on available site data and conservative assumptions, the Trustees determined the type and acres of habitat to be constructed under a reasonable worst-case scenario.

In October 2002, OXY USA presented new soil, sediment, groundwater, and surface water data. Based on these new data, the Trustees revised the reasonable worst-case scenario. In October 2006, OXY USA completed the majority of the construction for the preferred restoration project based on this revised reasonable worst-case scenario. The final restoration project includes the construction of wetlands, riparian and prairie habitats that will be preserved in perpetuity. A summary of the acreages constructed for each habitat type is presented in Table 1.1. Details of the specific construction and planting of the restoration project are presented in the October 31, 2006 Natural Resource Damage Restoration Construction Report for the Former Empire Oil Refinery Site Gainesville, Texas (Final Construction Report).

**Table 1.1** Summary of habitat construction identified as the preferred restoration alternative within the RP/EA

Habitat To Be Constructed	Area Required (Acres)	Area Constructed (Acres)
Wetlands/Aquatic	99.74	112.97
Woodlands/Riparian	3.55	4.00
Grasslands	29.17	30.54
TOTAL	132.46	147.51

## 2 Success Criteria

To objectively evaluate the progress of the restoration project, success criteria were established for each habitat created. Due to the complexities of a quantitative evaluation of success criteria standards, a qualitative or surrogate measurement of habitat function will be used. If there is disagreement among OXY USA and the Trustees as to the interpretation of the qualitative data, a quantitative evaluation will be designed and implemented. OXY USA will be responsible for the implementation of the restoration project, completing the monitoring plan and meeting success criteria. The Trustees will oversee monitoring efforts, review monitoring results and make decisions regarding corrective measures if success criteria are not met. Once site conditions have met the thresholds, it is assumed that the natural functions of the habitat have been achieved or will be achieved over time.

In all project areas, desirable species actively planted and seeded (identified in Appendix I) as well as desirable plants that naturally colonize, will be considered when evaluating success criteria. Survival of planted vegetation will be determined based on live vegetation, and will be assessed after the plants leaf out in the spring and before leaf drop in the autumn. Vegetative cover refers to

the percent of the soil or sediment surface that is obscured from view by the stems and leaves of vegetation when viewed from above. Stem density (number of plants) per acre will be expressed as the average for the total acreage planted.

Success criteria will be assessed through the use of monitoring reports, Milestones and Phase I and Phase II success criteria. Discussion of specific success criteria to be achieved during Phase I (including specific Milestones) and Phase II monitoring for each constructed habitat are provided in Subsections 2.1 through 2.3. Milestones are significant points in the development of the restoration project and are designed to work in conjunction with Phase I success criteria to help guide the project in reaching final success criteria as scheduled. Milestones are specific to each habitat type and may be achieved at any point during the Phase I monitoring, but must be achieved within three (3) years from certification of construction and planting and before a final Phase I certification is provided. Phase I monitoring and success criteria are designed to insure that the project is developing into a successful ecological resource. During this phase of the project, plants should be established and increasing in vegetative cover and propagation. Phase I monitoring begins when construction certification is issued and runs concurrently with Milestone criteria. Phase I success criteria may be achieved at any time during post construction and planting certification, however monitoring will continue for at least one (1) year and until all Milestones are achieved. If the project has not reached Milestones and/or Phase I success criteria by the end of three (3) years after construction and planting certification, a major corrective action will be undertaken as provided in Section 5.2.

Once the Milestones and Phase I criteria have been met and certified, the project will enter the Phase II success and monitoring criteria. Phase II monitoring is designed to insure the long term stability and viability of the project. Constructed habitats are required at a minimum to maintain vegetative cover requirement with no assistance or corrective actions. Phase II monitoring will continue until success criteria have been maintained without corrective action for two (2) consecutive years. If at the end of two (2) consecutive years without corrective action the constructed habitat has met all success criteria, the Trustees will certify that constructed habitat is complete. Once all portions of the project have been certified complete a final project certification will be provided as discussed in Section 8.

## **2.1 Success Criteria for Constructed Wetland**

Success criteria are the parameters, agreed to by OXY USA and the Trustees, under this Work Plan, which measures whether the required restoration action is being achieved. The following success criteria will be monitored for the constructed wetland habitat (Table 2.1):

- Percent survival of vegetation;

- Percent of vegetative cover;
- Hydro-Period (Minimum amount of water retained);
- Control of invasive species; and
- Maintenance of berms, spillways and hardened structures.

a. *Percent survival of planted material:*

For wetland plantings, annual monitoring Milestone and Phase I surveys shall verify that at least 50% of the planted vegetation has survived initial planting plus at least one (1) additional year subsequent to planting. If necessary, in areas where 50% plant survival is not achieved, corrective measures shall be implemented by replanting at original or greater densities. The first annual monitoring event will be early summer following the first anniversary of planting.

b. *Percent vegetative cover:*

No later than two (2) years after planting, the annual monitoring surveys shall verify that the constructed wetland at least meets the minimum Milestone requirement of 30% vegetative cover of aquatic plants. If the plantings do not achieve 30% cover after two (2) years of growing time, corrective measures shall be implemented by replanting and/or re-seeding at original or greater densities. To achieve Phase I and II standards, the constructed wetland must achieve and maintain 60% vegetative cover from desirable aquatic species and, all berms, soil areas and non-hardened spillways must maintain 85% vegetative cover from desirable species. In the event success criteria are not achieved or maintained, a corrective measure shall be implemented by replanting and/or re-seeding at original or greater densities.

c. *Hydro-Period (Minimum duration and amount of water retained):*

The restoration project shall be designed and maintained such that, by the third (3) year following construction, the wetland will support a minimum of 99.74 acres of emergent vegetation for at least 6 months annually. Flooded potholes and open water comprising 20-30% (19.95-29.92 acres) of the project size will retain at least 3 feet of water throughout the year.

d. *Control of non-native and invasive species:*

The relative density of non-native and invasive plant species shall be maintained at less than 10% of the vegetated cover per acre of the constructed wetland habitat and not more than 20% non-native and invasive species for constructed spillways and dikes. Non-native and invasive species shall be controlled through physical and chemical means as provided in Section 7. The following list of invasive and non-native species is to be restricted to a combined total of less than 10% vegetative cover per acre:

Water hyacinth	<i>Eichhornia crassipes</i>	(non-native)
Hydrilla	<i>Hydrilla verticillata</i>	(non-native)
Torpedo grass	<i>Panicum repens</i>	(invasive)
Alligator weed	<i>Alternanthera philoxeroides</i>	(invasive)
East Indian hygrophila	<i>Hygorphila polysperma</i>	(non-native)
Common Reed	<i>Phragmites australis</i>	(invasive)
Cattail	<i>Typhus spp.</i>	(invasive)
Cocklebur	<i>Xanthium strumarium</i>	(invasive)
Jonquapin	<i>Nelumbo lutea</i>	(invasive)

e. *Maintenance of berms, spillways and hardened structures:*

All dikes, berms and spillways must show no signs of significant erosion or structural failure. In the event dikes or spillways show signs of significant erosion or collapse, corrective action to stabilize those structures will be undertaken until final project certification has been received.



**Table 2.1:** Summary Table Success Criteria for Constructed Wetland

Success Criteria		Milestone	Grow-out (Phase I)	Maintenance (Phase II)	Corrective Action
Description	Criteria	Deadline*	Duration**		
Percent Survival of Planted Material	50%	1 year after planting	1 Year	-	Replanting and/or re-seeding at original or greater densities
Initial Vegetative Cover	30%	2 years after planting	-	-	Replanting and/or re-seeding at original or greater densities
Vegetative Cover within Constructed Area	60%	-	1 Year	2 Years	Replanting and/or re-seeding at original or greater densities
Vegetative Cover Dikes / Spillways (Excluding Hardened Structures)	85%	-	1 Year	2 Years	Replanting and/or re-seeding at original or greater densities
Minimum Duration of Water Retained, Wetland ≥ 6 months/year)	99.75 acres	3 years after construction	1 Year	2 Years	
Minimum Amount of Water Retained, Perennial Flooded Potholes ≥ 3 ft deep water	20-30% of project (19.95 - 29.92 acres)	3 years after construction	1 Year	2 Years	
Non-native and Invasive Species Control, Wetlands	<10%	-	1 Year	2 Years	Controlled through physical and chemical means as provided in Sections 2.1(d) and 7
Non-native and Invasive Species Control, Dikes and Spillways	<20%	-	1 Year	2 Years	Controlled through physical and chemical means as provided in Sections 2.1(d) and 7
Maintain dikes and spillways	to spec	-	1 Year	2 Years	In the event dikes or spillways show signs of significant erosion or collapse, corrective action to stabilize those structures will be undertaken

\* Maximum time allowed to meet criteria    \*\* Minimum duration required prior to certification of monitoring criteria

## 2.2 Success Criteria for Riparian Enhancement

The following success criteria will be monitored for the riparian enhancement (Table 2.2):

- Planting density and
- Percent survival of vegetation

*a. Planting density:*

In order to more closely mimic the natural environment, the riparian woody habitat restoration site included patches of both dense and sparse vegetation. To facilitate monitoring, the boundaries of the dense planting areas will be staked to distinguish them from the sparse planting areas. In the dense and sparse planting areas, an average of 193 and 48 trees/shrubs per acre, respectively, shall be planted in accordance with the Final Construction Report and as represented in Figure 2.1. In order to meet Phase I&II success criteria, the riparian habitat must maintain a minimum of 50% survival in each area (97 trees/shrubs in dense and 24 trees/shrubs per acre in sparse). In areas where plant density is not achieved, corrective measures shall be implemented by replanting at original or greater densities.

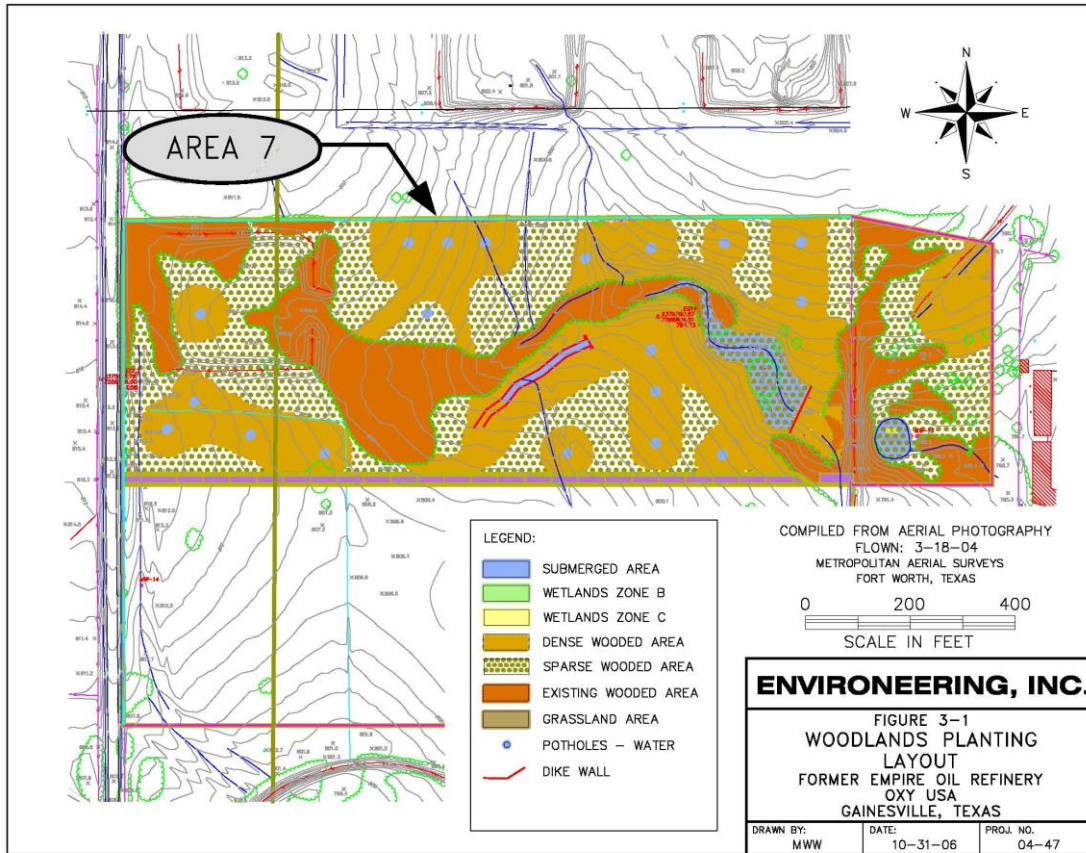
*b. Percent survival of bare root and transplanted stock:*

For tree and shrub plantings, annual Phase I and II monitoring surveys must document that at least 50% of the planted vegetation has survived. In each area as defined in the Final Construction Report, where 50% plant survival is not achieved, corrective measures shall be implemented by replanting at original or greater densities.

**Table 2.2:** Summary Table Success Criteria for Riparian Enhancement

Success Criteria			Grow-out (Phase I)	Maintenance (Phase II)	Corrective Action
Description	Planting Requirement	Criteria	Duration*		
Percent Survival of Planted Material		50%	1 Year	2 Years	Replanting at original or greater densities
Planting Density - Dense	193 tree/shrub per acre	97 tree/shrub per acre	1 Year	2 Years	Replanting at original or greater densities
Planting Density - Sparse	48 tree/shrub per acre	24 tree/shrub per acre	1 Year	2 Years	Replanting at original or greater densities

\* Minimum duration required prior to certification of monitoring criteria



**Figure 2.1:** Riparian enhancement planting from Figure 3-1 in the Final Construction Report.

### 2.3 Success Criteria for Prairie Restoration

The following success criteria will be monitored for the prairie restoration (Table 2.3):

- Percent of vegetative cover and desirable species composition and
- Control of invasive and non-native species.

a. *Percent vegetative cover for seeded plantings:*

Two (2) years after planting, the annual monitoring surveys shall verify that the areas that were planted have met the minimum Milestone of no less than 60% total vegetative cover, and at least 50% relative cover from desirable native species (Table A-1 in Appendix A). To achieve Phase I and II success criteria, the constructed prairie must have at least 80% total vegetative cover and at least 80% relative cover from desirable native species (Table A-1). In areas that do not meet minimum vegetation coverage and desirable species composition, corrective measures shall be implemented by replanting and/or re-seeding at original or greater densities.

b. *Control of non-native and invasive species:*

All non-native and invasive species shall be controlled through physical and chemical means as provided in Section 7. The vegetative cover for the following list of non-native species is to be restricted to less than a combined total of 20% vegetative cover per acre:

- Johnsongrass (*Sorghum halpense*.)
- Tall Fescue (*Festuca arundinacea*)
- Yellow Sweetclover (*Melilotus officinalis*)
- Bermuda grass (*Cynodon dactyloides*)

**Table 2.3:** Summary Table Success Criteria for Prairie Restoration

Success Criteria		Milestone	Grow-out (Phase I)	Maintenance (Phase II)	Corrective Action
Description	Criteria	Deadline*	Duration**		
Initial Vegetative Cover	60%	2 years after planting			
Initial Native Species Composition	50%	2 years after planting			
Vegetative Cover	80%		1 Year	2 Years	Replanting and/or re-seeding at original or greater densities
Native Species Compositions	80%		1 Year	2 Years	Replanting and/or re-seeding at original or greater densities
Non-native and Invasive Species Control	< 20%		1 Year	2 Years	Controlled through physical and chemical means as provided in Sections 2.3(b) and 7

\* Maximum time allowed to meet criteria \*\* Minimum duration required prior to certification of monitoring criteria

## 2.4 Adverse Conditions

The unpredictability of weather in North Central Texas, as well as the current and historical weather patterns may necessitate some accommodation for adverse weather conditions in considering the establishment and timing of planting and monitoring. In the event that below average rainfall has occurred during the Phase I monitoring, if appropriate, additional time for the establishment of the vegetation will be automatic and equivalent to the time of below monthly average rainfall but shall not exceed two (2) consecutive years. If, after the additional establishment time has elapsed, the project area still does not meet minimum vegetative cover, the Trustees and OXY USA will meet to discuss appropriate corrective measures. Corrective measures at a minimum shall include replanting and/or re-seeding at original or greater densities but may include other jointly agreed upon alternatives. Other unanticipated adverse weather or conditions that may impact the success of the project will be addressed as provided by the Consent Decree.

### **3 Monitoring Schedule and Criteria**

Monitoring will address measurement of the foregoing success criteria, in summary:

- Constructed wetland success criteria, both in terms of meeting hydro-period and depth goals, as well as vegetation survivorship and cover;
- Riparian enhancement planting survivorship and cover;
- Prairie restoration vegetative cover and species composition.

The following subsections detail specific monitoring characteristics for each constructed habitat that will be used to gauge the success criteria specified in Section 2.

Monitoring will follow construction and planting certification in a two phase process. If after one (1) annual monitoring event, the data collected during Phase I monitoring indicates that the Phase I success criteria and Milestones have been met, OXY USA will provide its final Phase I monitoring report and request for project certification to the Lead Administrative Trustee (LAT) for Trustee evaluation. After receiving the report, the LAT may establish a date for an inspection by the Trustees or request further information before issuing a certification of acceptance as described in Section 8. Once Milestones and Phase I success criteria are achieved and approved, the project will enter Phase II monitoring. Phase II monitoring will continue until the constructed habitat continues to maintain at least the minimum success criteria without a corrective action (as defined in Section 5) for at least two (2) consecutive years. Once projects meet the Phase II monitoring criteria, OXY USA will apply to the Trustees for final project certification. Same as the Phase I request for certification, the LAT may establish a date for an inspection by the Trustees or request further information before issuing a certification of acceptance. All projects are expected to fully meet Milestones and success criteria within the third (3) year following construction and planting certification, and to continue to meet those criteria for all years up through the final annual monitoring report and the issuance of a letter of final project certification.

#### **3.1 Wetland Monitoring**

The goal of the wetland-monitoring program is to evaluate the establishment and development of emergent and submerged vegetation in and around the wetland areas of the project site. The anticipated timeframe for establishment is three (3) to five (5) years after the construction and planting phase.

Characteristics to be monitored include:

- Vegetative cover as specified in Section 2.1 (qualitative)
- Growth of invasive undesirable vegetation (qualitative)
- Constructed structures integrity (qualitative)
- Pond integrity (qualitative)
- Wildlife utilization (qualitative)
- Size of the constructed habitat (quantitative based on aerial photographs)

### **3.2 Riparian Enhancement Monitoring**

The goal of the riparian woodlands area-monitoring program is to determine the survival rate of planted materials, determine the stalk density of the area, and the relative health of the ecosystem. The riparian / woodland habitat will be monitored once per year, at the end of the growing season.

Characteristics to be monitored include:

- Tree and shrub survival as specified in Section 2.2 (quantitative)
- Control of invasive undesirable vegetation (qualitative)
- Wildlife utilization (qualitative)
- Size of the constructed habitat (quantitative based on aerial photographs)

### **3.3 Prairie Restoration Monitoring**

The goal of the grassland-monitoring program is to evaluate the establishment and development of desired species introduced as part of the restoration project. The anticipated timeframe for establishment is three (3) to five (5) full growing seasons after seeding. Several growing seasons may be necessary before all the species in the seed mix are established and foliar cover requirements are met. Many plant species will not germinate until certain climatic conditions are met and some seeds can remain dormant for many years. Grassland establishment and development will be observed annually beginning in the later part of the first full growing season following seeding. The prairie habitat will be monitored once per year, at the end of the growing season.

Characteristics to be monitored include:

- Vegetative cover as specified in Section 2.3 (qualitative)
- Control of invasive undesirable vegetation (qualitative)
- Wildlife utilization (qualitative)
- Size of the constructed habitat (quantitative based on aerial photographs)

## **4 Monitoring Techniques**

Monitoring of the habitat construction projects will involve a cooperative effort between OXY USA and the Trustees. OXY USA will be responsible for implementing the monitoring and reporting plan and the Trustees will oversee monitoring efforts and evaluate results and the need for corrective actions. OXY USA will utilize qualitative methods to monitor the site. However, in the event that the parties cannot agree upon the results of a qualitative survey relative to the meeting of success criteria, a quantitative survey will be designed and conducted as provided in Section 4.2.

## **4.1 Qualitative Monitoring Methods**

Qualitative techniques will be used to monitor the growth and establishment of plants during the monitoring phase of the project. Qualitative field surveys will be performed within the wetland, riparian and grassland habitat restoration project areas to determine general site conditions, vegetative cover, wildlife utilization, the control of invasive species, damage caused by vandalism, erosion, etc. as provided in Section 3. Observations made during the inspections will be recorded on field data sheets. Any deficient areas will be noted and mapped. Field data and observations will be compared to success criteria (Section 2) to determine if the project has met the success criteria for a given habitat. OXY USA in conjunction with the Trustees will use field surveys, photographic logs, and aerial photographs as presented in annual monitoring or corrective action reports to determine if success criteria are being met for the project areas and assist in identifying areas that may require corrective actions.

Consistent, representative viewing locations will be identified by the Trustees and OXY USA for each restoration area to provide a visual basis for determining vegetative growth, cover and survival. Annual field surveys will include observations at the same viewing locations making it easier to interpret data and formulate conclusions. Photographs of each project area will be taken from the identified monitoring locations to provide visual documentation of development over time during each annual field surveys and project development. Geographic location (projected to the Universal Transverse Mercator [UTM] Zone 14, National American Datum [NAD] 1983 spatial projection), date, time, weather conditions, and photographic equipment used will be noted for each photograph taken. When practicable, equipment and time of day that the photographs are taken will remain consistent for annual monitoring events.

Aerial photographs of the entire restoration project site will be taken to document site conditions and serve as baseline for conservation easement purposes. At a minimum, aerial photographs will be taken following completion of construction and planting certification, as well as during and at the end of Phase I and Phase II monitoring. These photographs will be compared to aerial photos of the site taken prior to the project commencement. Aerial photographs will be provided in digital format, Orthorectified, one (1) foot resolution and projected to the UTM Zone 14, NAD 1983 spatial projection.

## **4.2 Quantitative Monitoring**

In the event that quantitative monitoring is required to resolve disagreement of qualitative survey results, OXY USA shall provide notice upon determination of disagreement. OXY USA and the Trustees will attempt to informally resolve disputed results. However, if resolution can not be reached within sixty (60) days of receipt by the Trustees of the notice of disagreement, OXY USA will submit for Trustee approval a Quantitative Assessment Monitoring Work Plan, including an implementation schedule,

within ninety (90) days of the Trustees' receipt of the notice of disagreement. The Trustees shall review the Work Plan and provide comment or approval within a reasonable amount of time from their receipt of the document. In the event that OXY USA and the Trustees fail to reach consensus on a quantitative monitoring plan, the Dispute Resolution section and any other remedies available under the Consent Decree between OXY USA and the Trustees may be invoked.

## **5 Corrective Actions**

If any of the monitoring surveys show that the Milestone or success criteria described in Section 2 are not being met, OXY USA will notify the LAT and shall conduct minor or Trustee approved major corrective actions. Corrective actions will occur as soon as seasonally and logistically feasible and no later than the beginning of the next planting season. Should corrective measures fail to result in the project meeting required success criteria after three (3) replanting efforts, the Trustees will reevaluate the restoration project and determine the need for further corrective measures or alternative actions. If any major corrective measures are required, a corrective measures report will be prepared after the major corrective measures are implemented and will be submitted to the Trustees within sixty (60) days after implementation (Section 6.2).

Plant survival through the first growing season is an important early Milestone for the potential success of the constructed wetlands and other habitats. OXY USA and the Trustees expect that, on a small scale, there will be varying success rates for survival of plants from the initial planting, with certain areas of the constructed habitat being more successful than others. If an inspection demonstrates that survival of planted vegetation at the end of the first growing season still has not met success criteria, OXY USA will meet with the Trustees to discuss possible causes and whether corrective action, including a major corrective action, is needed.

### **5.1 Minor Corrective Actions**

During Phase I monitoring, normal routine maintenance of the project or habitat areas is expected. Routine maintenance includes activities that may be considered minor corrective actions. OXY USA may conduct any minor corrective actions that it believes are necessary to assist or enhance the growth and development of the project or habitat area. OXY USA may perform such activities without prior approval from the Trustees, however, the Trustees may suggest that a minor corrective action be undertaken. Examples of minor corrective actions include the following:

- Replanting or reseeding portions of the habitat, where individual replanted or reseeded areas are less than 10% of the constructed restoration habitat areas as specified in the Final Construction Report.
- Removal of debris and other obstructions from the restoration site.



- Removal of unacceptable plant species specified in Section 2.1(d) and 2.3(b) of this document.

OXY USA and the Trustees agree that, during Phase II, except for the removal of debris from the restoration site, minor corrective actions will not be performed without prior approval of the Trustees. Minor corrective actions will be reported as part of the annual Phase I and II monitoring reports.

## **5.2 Major Corrective Actions**

After Certification of Completion of Habitat Construction, the LAT, on behalf of the Trustees, may require OXY USA to undertake a corrective action in order to meet the Milestone and or success criteria specified in Section 2 of this document. Prior to performing any major corrective action, OXY USA will obtain approval of the Trustees to proceed with the proposed corrective action. Major corrective actions may include, but are not limited to:

- Replanting, replacing or reseeding portions of the habitat, where individual replanted, replaced or reseeded areas are greater than 10% of the constructed restoration habitat areas as specified in the Final Construction Report.
- Adjustment of the elevation of spill ways and dikes.
- Adjustment of the elevation of the wetland.
- Removal of invasive species over 40% of the constructed habitat area or requiring reconstruction.

If OXY USA and the Trustees agree that major corrective action is appropriate or if the LAT, on behalf of the Trustees, issues a letter requiring major corrective action, OXY USA will be responsible for implementing the major corrective action subject to dispute resolution under the Consent Decree. Any area requiring a major corrective action will be considered to be at Phase I monitoring as provided in Sections 2 and 3. Once the Phase I success criteria are met and the LAT has issued a notice that the constructed habitat is considered to be established, in accordance with Sections 2 and 3, Phase II monitoring will begin. If after two (2) years of Phase II monitoring, the constructed habitat has not achieved the Phase II success criteria, OXY USA and the Trustees will meet to determine why that success criteria has not been met and whether major corrective action is appropriate.

## **6 Record Keeping and Reporting**

OXY USA will be responsible for documenting and demonstrating that the restoration project is meeting the Milestone, success criteria and monitoring requirements specified in Sections 2 and 3. OXY USA will include the results of all field monitoring efforts (i.e. notes, calculations, photographs, aerial photography) and activities to document achievement of success criteria. This documentation will be compiled into the following reports and provided to the LAT for Trustee review:

- Annual Grow-out (Phase I) Monitoring Reports: an annual report documenting progress toward meeting success criteria goals will be submitted following Certification of Project Construction Completion until Phase I success criteria are achieved.
- Annual Maintenance (Phase II) Monitoring Reports: an annual report will be submitted, documenting that each specific habitat has continued to meet the Phase II success criteria for two (2) consecutive years following certification of Phase I.
- Corrective Action Report: If the monitoring surveys (Phase I or II) show that the success criteria described in Section 2 are not being met, OXY USA will notify the LAT and conduct any minor or major corrective actions in accordance with Section 5. The report should include the following information: which success criteria or Milestones were not being met, actions taken to correct problems, start and end dates of corrective actions taken, photographs, and other supporting documentation. Corrective action reports may be included in annual monitoring reports.
- Certification Report: The certification report will include all of the components of the Phase I and II reports for which certification is being requested and may be submitted as a replacement for that year's annual monitoring report.

## **6.1 Phase I and Phase II Annual Monitoring Reports**

When either Phase I or Phase II surveys are conducted, a formal monitoring report will be prepared to document the field survey methods required by Section 4. Results and analyses associated with each monitoring event, including field notes and photographs will be used to document current conditions and progress toward achieving or maintaining the success criteria set forth in Section 2. The report will include at a minimum the following:

- A summary of qualitative and quantitative (if necessary) data collected.
- Monitoring results and analyses, including tables and photographs (when appropriate).
- A copy of the all field notes, logs and data collected.

- Aerial photographs and site maps showing data collection locations and results, as appropriate (Geographically referenced using UTM Zone 14, NAD 1983 spatial projection).
- Summary of any minor corrective actions taken.
- Observations that suggest whether significant problems may exist, an evaluation of possible causes and any recommended major corrective actions.
- Results/outcomes from any previous corrective actions.
- Requests for corrective actions or project certifications.

Additionally the following observations and actions should be made or carried out during each monitoring event:

- Record pond depths relative to surface elevation of the planting area, and conditions of the primary channel connections.
- Record and generally locate on the site map the presence and approximate numbers and density of any wildlife (including aquatic invertebrates, fish and birds as appropriate) observed during the monitoring.
- Remove trash from the site.

## **6.2 Corrective Action Reports**

In the event of a major corrective action, OXY USA will provide to the LAT a corrective action report as provided in Section 5.2 for major corrective measures. If any corrective action is required during Phase II monitoring, OXY USA will notify the LAT. During Phase II, all corrective actions will be documented in a corrective action report or as part of the annual monitoring report. Corrective action reports should clearly document areas not achieving success criteria and the corrective actions taken. Corrective action reports should focus on those success criteria not being met. Corrective action reports may be submitted as part of the Phase I or II annual monitoring report.

## **6.3 Certification Reports**

Certification reports will include all of the components of the respective annual Phase I or Phase II report (Section 6.1) for the habitat or project area for which certification is being requested along with a formal request for certification. The certification request should clearly document which area or areas have achieved success criteria and what

certification (i.e. Phase I, Phase II or Project Completion) is being requested. A certification report may be submitted as a replacement for that year's annual monitoring report or as a supplemental report as necessary.

## **7 General Site Management and Invasive Species Control**

OXY USA will utilize best management practices in the implementation and management of the restoration property to ensure the presence of non-native and invasive vegetation does not exceed criteria set out in Section 2. To achieve this goal certain activities to manage and control non-native and invasive plant species as identified in Sections 2.1 d and 2.3 b may be required. OXY USA is permitted to control invasive or non-native species using approved herbicides and pesticides in accordance with their EPA labeling and application. This may include an isopropylamine salt of glyphosate base herbicide and a dimethylamine (DMA) salt of dicamba and 2,4-D, Ally, and Amber. Ally and Amber are herbicides with metsulfuron methyl and triasulfuron, respectively, as the primary ingredient. The primary application of DMA, Ally, and Amber will be as a broad leaf weed killer for the grasslands and in the wetlands (limited to the Figure B2 Zone C), and shall be applied only in accordance with approved labeling and as may be warranted in order to meet applicable success criteria. Trustee approval shall be obtained prior to the use of any other chemical treatment intended to control invasive species for the duration of the monitoring period.

## **8 Certification and Completion Compensatory Restoration Requirements**

This document takes into consideration that at the time of settlement OXY USA, of its own accord, responsibility and liability, has undertaken construction, initial planting and establishment criteria for the restoration project and has documented and demonstrated the completion of construction and some of the other required restoration activities to date. As such the Trustees will consider performance to date for the constructed habitats and at their discretion may approve individual project areas or habitats for satisfying construction, planting, Milestone, Phase I or Phase II success and/or monitoring criteria. Certification may occur in a phased process with some areas receiving certification before others or the restoration project may be certified as a whole. Requests for certification will include all elements of the annual monitoring reports (Phase I, Phase II), corrective action and/or certification reports as specified in Sections 6 and may be submitted as part of these reporting requirements. Phases of the restoration project that require certification include:

- Construction and Planting Certification
- Grow-Out (Phase I) monitoring
- Maintenance(Phase II) monitoring
- Corrective Actions
- Restoration Project Certification

At any time (after entry of the Consent Decree to which this Work Plan is appended) that OXY USA concludes that they have achieved the success criteria (for Phase I or II) as specified in Section 2 for any of the restoration habitat(s), OXY USA will submit a request for certification to the Trustees. The Trustees shall evaluate the request and a site inspection shall be undertaken, within sixty (60) days after receipt of the request for certification. Within thirty (30) days after the date of the inspection, if the Trustees determine that success criteria have been achieved, the Trustees shall issue a written certification of completion for the appropriate restoration habitat(s) as described in Sections 2 and 3.

If the Trustees' determine that success criteria have not been achieved, the Trustees shall provide written notice within thirty (30) days after the date of inspection detailing any and all deficiencies. After OXY USA addresses those deficiencies, a certification request will be resubmitted to the Trustees. This process of requesting certification and identifying deficiencies will continue following the above mentioned procedures until the Trustees have issued certification.

Once all monitored habitats have received Phase I certification and achieved the Phase II monitoring success criteria as specified in Sections 2 and 3, OXY USA will submit a request for final project certification to the Trustees. The Trustees shall evaluate the request and a site inspection shall be undertaken, within sixty (60) days after receipt of the request for certification. Within thirty (30) days after the date of the inspection, if the Trustees determine that all success criteria for all habitats have been achieved, the Trustees shall issue a written certification of completion (the "Final Restoration Project Certification").

If the Trustees' determine that all success criteria have not been achieved for all habitats, the Trustees shall provide written notice within thirty (30) days after the date of the inspection detailing any and all deficiencies. After OXY USA has addressed these deficiencies, a certification request will be resubmitted to the Trustees. This process of requesting certification and identifying deficiencies will continue following the above mentioned procedures until the Trustees issue the Final Restoration Project Certification.

## **APPENDIX A: Selected Plant Species**

**Table A-1: Grasses Planted**

Common Name	Genus and species	Seed Mix	
		Area 8	Area 9
Big Blue Stem	<i>Andropogon gerardii</i>	20-30%	10-15%
Little Blue Stem	<i>Schizachyrium sp.</i>	15-20%	45-55%
Canada Wildrye	<i>Elymus canadensis</i>	0-5%	-
Indian Grass	<i>Sorghastrum nutans</i>	20-30%	10-15%
Sideoats Grama	<i>Bouteloua curtipendula</i>	5-10%	5-15%
Texas Winter Rye	<i>Secale cereale</i>	0-5%	-
<b>Alternative or other acceptable species</b>		0-5%	0-5%
Barnyard Grass	<i>Echinochloa muncata</i>		
Texas Millet	<i>Panicum texanum</i>		
Black Eyed Susan	<i>Rudbeckia hirta</i>		
Purple Coneflower	<i>Echinacea purpurea</i>		
Flax	<i>Linum sp.</i>		
Coneflower	<i>Ratibida sp.</i>		
Partridgepea	<i>Cassia chamaecrista</i>		
Indian Blanket	<i>Gaillardia pulchella</i>		
Indian Paintbrush	<i>Castilleja coccinea</i>		
Gayfeather	<i>Liatris sp.</i>		

**Table A-2: Wetland Plantings Zones**

<b>Zone A</b>	
Common Name	Genus and species
American Pondweed	<i>Potamogeton nodosus</i>
Illinois Pondweed	<i>Potamogeton illinoensis</i>
Perennial Smartweed	<i>Polygonum hydropiperoides</i>
Slender naiad	<i>Najas guadalupensis</i>
Square Stem spikerush	<i>Eleocharis quadrangulata</i>
Flatstem spikerush	<i>Eleocharis macrostachya</i>
Softstem bulrush	<i>Scripus validus</i>
Arrowhead	<i>Sagittaria latifolia</i>
Duck Potato	<i>Sagittaria graminea</i>
Bullsedge	<i>Carex sp.</i>
Pickerelweed	<i>Pontederia cordata</i>
Juncus	<i>Juncus effuses</i>
<b>Zone B</b>	
Common Name	Genus and species
Slender spikerush	<i>Eleocharis acicularis</i>
Flatstem spikerush	<i>Eleocharis macrostachya</i>
Softstem bulrush	<i>Scripus validus</i>
Bullsedge	<i>Carex sp.</i>
American Bulrush	<i>Scirpus sp.</i>
Waterwillow	<i>Justicia americana</i>
Juncus	<i>Juncus effuses</i>

Prairie Cordgrass	<i>Spartina pectinata</i>
Yellow Indiangrass	<i>Sorghastrum nutans</i>
Switchgrass	<i>Panicum virgatum</i>
Eastern Gamagrass	<i>Tripsacum dactyloides</i>
<b>Zone C</b>	
<b>Common Name</b>	<b>Genus and species</b>
Prairie Cordgrass	<i>Spartina pectinata</i>
Switchgrass	<i>Panicum virgatum</i>
Indian Blanket	<i>Gaillardia pulchella</i>
Buffalo Grass	<i>Buchloe dactyloides</i>
Blue Sage	<i>Salvia azurea</i>
Purple Coneflower	<i>Echinacea pallida</i>
Low Ruellia	<i>Ruellia humilis</i>
Oklahoma Blackberry	<i>Rubus oklahomus</i>
American Elderberry	<i>Sambucus Canadensis</i>
American Beautyberry	<i>Callicarpa Americana</i>
Trumpet Honeysuckle	<i>Lonicera sempervirens</i>
Indigo Bush (False Indigo)	<i>Amorpha fruticosa</i>
Swamp Privet	<i>Forestiera acuminata</i>
American Elm	<i>Ulmus Americana</i>
American Sycamore	<i>Platanus occidentalis</i>
Eastern Redbud	<i>Cercis Canadensis</i>
Texas Persimmon	<i>Diospyros texana</i>
Common Honey Locust	<i>Gleditsia triacanthos</i>



**Table A-3: Woodland Plantings**

<b>Grasses</b>	
<b>Common Name</b>	<b>Genus and species</b>
Big Blue Stem	<i>Andropogon gerardii</i>
Little Blue Stem	<i>Schizachyrium sp.</i>
Canada Wildrye	<i>Elymus canadensis</i>
Indian Grass	<i>Sorghastrum nutans</i>
Sideoats Grama	<i>Bouteloua curtipendula</i>
Texas Winter Rye	<i>Secale cereale</i>
<b>Trees</b>	
<b>Common Name</b>	<b>Genus and species</b>
American Elm	<i>Ulmus americanus</i>
Winged Elm	<i>Ulmus alta</i>
Shumard Oak	<i>Quercus shumardii</i>
Post Oak	<i>Quercus stellata</i>
Burr Oak	<i>Quercus macrocarpa</i>
Eastern Redbud	<i>Cercis canadensis</i>
Texas Persimmon	<i>Diospyros texana</i>
Black Walnut	<i>Jugiperus nigra</i>
Pecan	<i>Carya illinoensis</i>
Green Ash	<i>Fraxnus pennsylvanica</i>
American Sycamore	<i>Plantanus occidentalis</i>
Rough Leaf Dog Wood	<i>Cornus drummondii</i>
Cottonwood	<i>Populus deltoides</i>
Sassafras	<i>Sassafras albidum</i>
Black Willow	<i>Salix nigra</i>
<b>Shrubs</b>	
<b>Common Name</b>	<b>Genus and species</b>
Yaupon Holly	<i>Ilex vomitoria</i>
American Beautyberry	<i>Callicarpa americana</i>
Swamp Privet	<i>Forestiera acuminata</i>
Downy Viburnium	<i>Viburnium rufidulum</i>
Coralberry	<i>Symphoricarpos orbiculatus</i>

## **Appendix B: Summary of Habitat Construction Standards and Success Criteria**

**Table B1: Habitat Construction Standards and Success Criteria**

**Section 2.1 Constructed Wetland Habitat**

Construction Standard*	Success Criteria**		Milestone	Grow-out (Phase I)	Maintenance (Phase II)	Corrective Action****
	Description	Requirement	Deadline***	Duration****		
<p><b>Original Planting Densities</b></p> <p><b>Wetland Planting Zones (Figures B1 &amp; B2):</b></p> <p><b>Zone A,</b> Similar in characteristic to the U.S Army Corp of Engineers hydrologic zones I and II, defined as permanently, semi permanently to nearly permanently inundated or saturated, with emergent vegetation. Plants will be selected from Table A-2 (Appendix A) Zone A selection list. Planting densities for emergent, herbaceous vegetation will be on 3 foot centers in areas of water depth of 18 inches or less.</p> <p><b>Zone B</b> Similar in characteristic to the Corp’s hydrologic zone III and IV, defined as regularly or seasonally inundated or saturated, with partially submerged or “boggy-like,” soils containing vegetation that will thrive under partially saturated conditions. Plants will be selected from Table A-2 (Appendix A) Zone B selection list. Planting densities will be on 10 foot centers.</p> <p><b>Zone C</b> Similar in characteristic to the Corp’s hydrologic zone V, defined as irregularly inundated or saturated, for more than 5 percent of the growing season with hydrophytic vegetation present. Plants will be selected from Table A-2 (Appendix A) Zone C selection list. Planting densities will be on 15 foot centers for emergent and woody vegetation.</p>	Percent Survival of Planted Material	50%	1 Years after Planting	1 Year		Replanting and/or re-seeding at original or greater densities.
	Initial Vegetative Cover	30%	2 Years after Planting			Replanting and/or re-seeding at original or greater densities.
	Vegetative Cover within constructed area	60%	-	1 Year	2 Years	Replanting and/or re-seeding at original or greater densities.
	Vegetative Cover Dikes / Spillways (Excluding Hardened Structures)	85%	-	1 Year	2 Years	Replanting and/or re-seeding at original or greater densities.
	Minimum Duration of Water Retained, Wetland ≥ 6 months/year)	99.75 Acres	3 Years after Construction	1 Year	2 Years	
	Minimum Amount of Water Retained, Perennial Flooded Potholes ≥ 3 ft deep water	20-30% of project (19.95-29.92 acres)	3 Years after Construction	1 Year	2 Years	
	Non-native and Invasive Species Control, Wetlands	<10%	-	1 Year	1 Year	Controlled through physical and chemical means as provided in Section 2.1(d), 7.
	Non-native and Invasive Species Control, Dikes and Spillways	<20%	-	1 Year	1 Year	Controlled through physical and chemical means as provided in Section 2.1(d), 7.
	Maintain dikes and spillways	To Spec	-	1 Year	2 Years	In the event dikes or spillways show signs of significant erosion or collapse, corrective action to stabilize those structures will be undertaken.

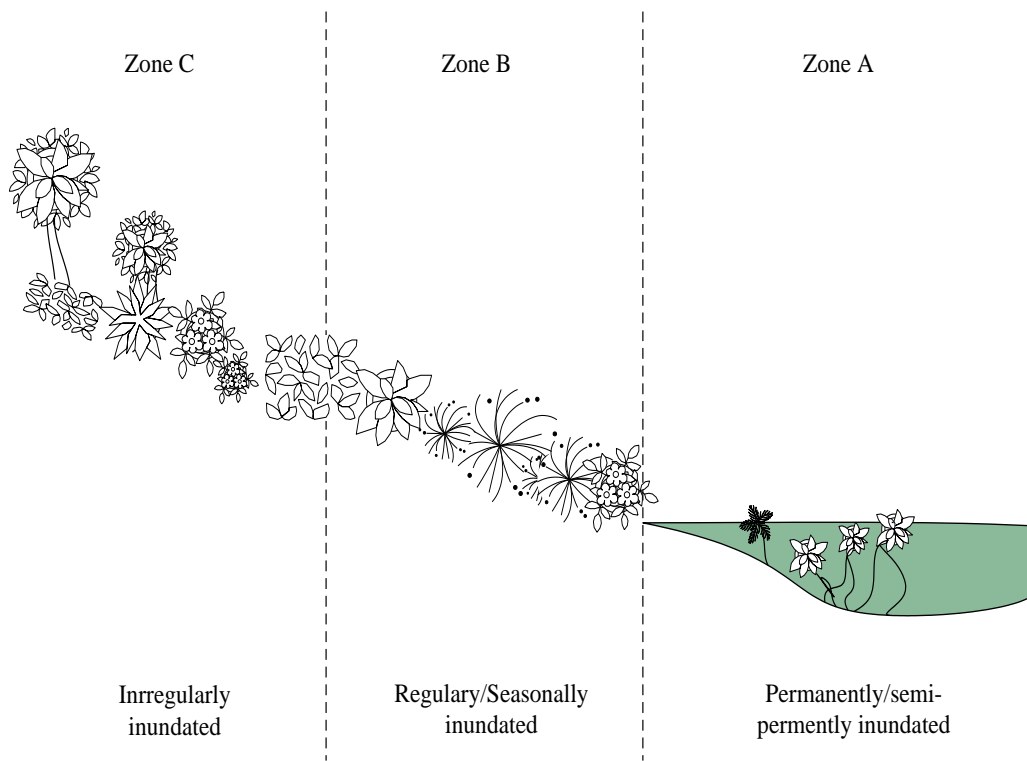


**Table B1: Habitat Construction Standards and Success Criteria Continued**

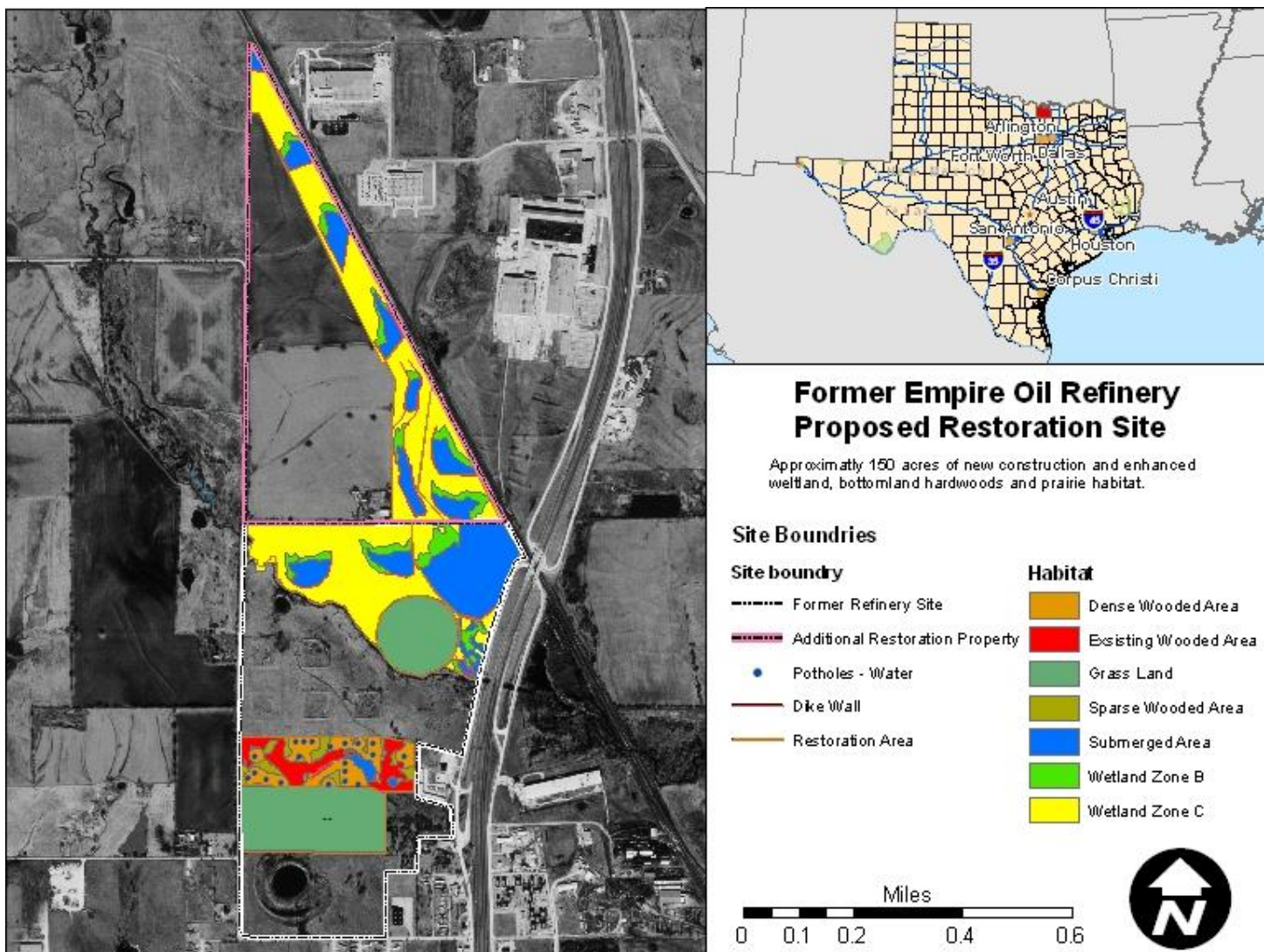
<b>Section 2.2 Riparian Woodland Habitat</b>						
<b>Construction Standard*</b>	<b>Success Criteria**</b>		<b>Milestone</b>	<b>Grow-out (Phase I)</b>	<b>Maintenance (Phase II)</b>	<b>Corrective Action*****</b>
<b>Original Planting Densities</b>	<b>Description</b>	<b>Requirement</b>	<b>Deadline***</b>	<b>Duration****</b>		
Tress and Shrubs will be selected from Table A-3 (Appendix A) and planted at the rate specified for dense or sparse planting. Dense planting - 15 feet between rows and 15 feet between trees, initial planting density 193 trees per acre. Sparser planting rate 48 trees per acre. Shrubs plant density will be 10 to 15 percent of the planting density of the trees for both sparse and dense areas. Tree and shrub plantings will be done throughout the area in a random pattern, not in a row or rectangular spacing.	Percent Survival of Planted Material	50%		1 Year	2 Years	
	Planting Density - Dense	97 tree/shrub per acre		1 Year	2 Years	Replanting at original or greater densities
	Planting Density - Sparse	24 tree/shrub per acre		1 Year	2 Years	Replanting at original or greater densities
<b>Section 2.3 Grassland Habitat</b>						
<b>Construction Standard*</b>	<b>Success Criteria**</b>		<b>Milestone</b>	<b>Grow-out (Phase I)</b>	<b>Maintenance (Phase II)</b>	<b>Corrective Action*****</b>
<b>Original Planting Densities</b>	<b>Description</b>	<b>Requirement</b>	<b>Deadline***</b>	<b>Duration****</b>		
Seeds will be selected from Table A-1 (Appendix A) and applied in the percentage listed.	Initial Vegetative Cover	60%	2 Years after Planting			
	Initial Native Species Composition	50%	2 Years after Planting			
	Vegetative Cover	80%		1 Year	2 Years	Replanting and/or re-seeding at original or greater densities
	Native Species Compositions	80%		1 Year	2 Years	Replanting and/or re-seeding at original or greater densities.
	Non-native and Invasive Species Control	< 20%		1 Year	2 Years	Controlled through physical and chemical means as provided in Sections 2.3(b) and 7.

\* Summarized from the Natural Resource Damage Restoration Construction Report for the Former Empire Oil Refinery Site Gainesville, Texas. October 31, 2006 Enviroengineering Inc. Houston, TX \*\* All standards and requirements listed are minimum success criteria, additional monitoring and or grow-out may be required if corrective actions are taken. \*\*\* Maximum time allowed to meet criteria \*\*\*\* Minimum duration required for certification of monitoring criteria

\*\*\*\*\* Should corrective measures fail to result in the required success criteria after three replanting efforts, the Trustees will reevaluate the restoration project and determine the need for further corrective measures or alternative actions.



**Figure B1:** Schematic of Wetland Zones Former Empire Oil Refinery Gainesville, Texas



**Figure B2:** Habitat Zones for the Former Empire Oil Refinery Restoration Project