



TERRA TECHNOLOGIES

MITIGATION PLAN

Moberly Crossings Development Parcel

U.S. Army Corps of Engineers Permit Number: MVS-2008-838

MITIGATION OBJECTIVES

The objective of this mitigation project is to establish 2.4 acres of high quality herbaceous wetlands that will compensate for the unavoidable impacts to 2.4 acres of herbaceous wetlands resulting from the Moberly Crossings development project in Moberly, Missouri. The herbaceous wetlands created by this mitigation project will be sited within the Salt River watershed where the project impacts are located. They will improve water quality by filtering surface and subsurface water that drains across the property and will treat water that floods the site when the Middle Fork of the Salt River overflows its banks and floods portions of the property or causes backwater flooding from the smaller streams that are located on or adjacent to the subject site.

The aquatic resources created by this proposed mitigation project will have a direct positive effect on the physical, chemical, and biological integrity of the Salt River watershed. From a biological standpoint, the proposed mitigation will result in 2.4 acres of wildlife habitat in an area that has been significantly altered by agricultural impacts. The improved aquatic resource will be a vast improvement over the impacted resources which have been functionally impaired by surrounding development.

SITE SELECTION

The mitigation site was selected by Terra Technologies for several reasons, including its location directly adjacent to the Middle Fork of the Salt River and the high likelihood of successfully establishing wetland conditions. Please refer to Figures 1 and 2 for site location and topographic information. There are several features of the mitigation site that make it favorable for the creation of wetlands, including the presence of hydric soils (Figure 4), close proximity to a large amount of existing wetlands mapped by the U.S. Fish & Wildlife Service's National Wetlands Inventory (Figure 5), and a location adjacent to two streams that likely flood portions of the property under backwater conditions created by high water levels in the Salt River. The success of this mitigation site is also assured because the subject site is within the geomorphic floodplain of the Middle Fork of the Salt River which appears to be still well-connected to its floodplain as shown by drainage patterns evident in aerial photographs (See Figure 3). The practicability of this mitigation endeavor is ensured through the use of sound soil ecological principles and practices. Herbaceous species planned for the site will be established from local sources.

The proposed mitigation site is within the same watershed as the impacts and will therefore compensate for the project impacts within the same watershed boundaries. The proposed improvements will serve to positively impact the water quality needs of the watershed. As such, the U.S. Army Corps of Engineers

(USACE) has decided that off-site permittee-responsible mitigation is more appropriate than other compensatory mitigation options for this project, specifically out-of-watershed mitigation bank credits. While the 2008 Final Mitigation Rule issued by the USACE and the U.S. Environmental Protection Agency states that mitigation banks are the first priority of all mitigation options the impact site was not within the service area of an approved mitigation bank. Therefore, the use of a Wetland Bank will be unable to address the water quality needs within the Salt River watershed and the proposed mitigation project will have a more direct positive impact on the Salt River watershed than any other mitigation option.

SITE PROTECTION INSTRUMENT

Swallow Tail, LLC will hold title to the subject mitigation site. This company specializes in mitigation land management and is the sponsor of multiple mitigation sites across Missouri and Kansas, including approved wetland & stream mitigation banks. A conservation easement, proposed for assignment to the Midwest Mitigation Oversight Association, will be filed with the Recorder of Deeds in Macon County, Missouri to provide independent verification that the site is preserved through perpetuity. The Midwest Mitigation Oversight Association is a Missouri Limited Liability Company whose sole purpose is to hold conservation easements and provide independent verification of property use oversight per the specific details of the site specific conservation easement.

BASELINE INFORMATION

Description of Impact Site

The impact site is located in Moberly, Missouri just east of the intersection of U.S. Highway 63 and U.S. Highway 24. This site has historically been in agricultural production and is mostly dominated by upland pasture grasses such as tall fescue (*Festuca arundinacea*) although there is a lowland swale running through the property. This swale contains 2.4 acres of jurisdictional wetlands which consists primarily of cattails (*Typha* spp.) and rice cutgrass (*Leersia oryzoides*). The impacted herbaceous wetlands are of relatively poor quality vegetatively and provide minimal wildlife habitat benefits. The proposed Moberly Crossings development project will result in unavoidable impacts to these existing wetlands.

Description of Mitigation Site

The proposed mitigation site is located in the Claypan Till Plains Ecoregion of Missouri in Macon County. The approximate center of the site is at 39°38'23.33"N and 92°20'03.55"W. It resides in the southwest quarter of Section 23 Township 56N Range 13W. The proposed mitigation site is part of a larger common tract area consisting of approximately 85 acres of agricultural land which is surrounded by agricultural lands on all sides. The mitigation site is currently within an agricultural field planted with soybeans.

The ecological and physical properties of the site indicate that it provides an exceptional location for wetland creation, which will serve to enhance the physical, chemical, and biological integrity of the site and its watershed. Historically, it is likely that the vegetative community would have consisted of native wet prairie grasses and forbs such as prairie cordgrass (*Spartina pectinata*), sedges (*Carex* spp.) and

switchgrass (*Panicum virgatum*) as well as a number of hydrophytic trees such as cottonwood (*Populus deltoides*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), American elm (*Ulmus americana*) and sycamore (*Platanus occidentalis*). The vast majority of the mitigation site is mapped as Moniteau silt loam, 0-2% slopes, occasionally flooded while the eastern-most portion of the mitigation site is mapped as Chequest silty clay loam, 0-2% slopes, occasionally flooded. Both of these soil types are considered fully hydric by the U.S. Department of Agriculture's Natural Resources Conservation Service.

DETERMINATION OF CREDITS

The proposed amount of compensatory mitigation (number of credits) needed for the Moberly Crossings project was determined by the USACE by using a 1:1 replacement ratio for herbaceous wetlands within the Salt River watershed. Because 2.4 acres of herbaceous wetlands will be impacted, 2.4 acres of wetlands will be established to satisfy the mitigation requirements.

MITIGATION WORK PLAN

Mitigation construction will begin roughly concurrently with the initiation of site impacts which will likely be in the spring of 2010. Earthwork will be the first stage of the project followed by seeding and planting. Because this site has favorable soils and a high water table, significant excavation will not be necessary. Instead, microtopography will be established across the site to catch, disperse and hold water through the creation of basins and berms constructed in such a way to mimic natural contours. Erosion control measures will be undertaken as necessary to prevent sediment from entering the Middle Fork of the Salt River or any of its tributaries. Although the Middle Fork of the Salt River may occasionally flood the site, a high water table, overland flow and overbank flow from the onsite streams will likely be the primary sources of hydrology.

After earthwork is completed, the site will be planted with a diverse mixture of native wetland plants. The entire site will be seeded and herbaceous species will be planted from deep cell plugs, and 1- or 2-quart containers. All plant stock will be acquired from a nursery specializing in native plants and will be installed by a qualified restoration contractor.

MAINTENANCE PLAN

Maintenance activities will predominantly be completed throughout the spring, summer, and fall months from April to October of each year. Necessary maintenance activities will be identified during any site visits, including each annual site visit. These maintenance activities may include, but are not limited to, chemical and mechanical removal of exotic, invasive and undesirable species; power trimming of native grasses and forbs; reseeding in areas that native vegetation has not fully established; and prescribed burning as necessary to ensure the continued health and survivorship of native wetland vegetation. Maintenance will be performed each year until a predominance of native vegetation is established and thereafter as necessary to ensure long-term success of the mitigation effort.

PERFORMANCE STANDARDS

The goal of this mitigation project is to establish 2.4 acres of herbaceous wetlands. The performance standards that will be used to measure project success are intended to demonstrate the presence or absence of wetland conditions within the mitigation site.

The mitigation site will contain 2.4 acres of herbaceous wetlands that will:

- Be dominated by hydrophytic vegetation
- Show evidence of wetland hydrology
- Contain hydric soils or show signs of hydric soil development
- Contain a minimal amount of bare ground
- Contain a minimal amount of invasive or undesirable plant species

MONITORING REQUIREMENTS

Monitoring will be conducted on an annual basis after the first growing season with concurrent reports submitted to the USACE St. Louis District Regulatory Office for review and approval. The wetland area will be monitored by establishing a total of nine permanent sampling locations located along three transects that will run parallel with the mitigation site boundaries. Conditions will be assessed at each sample site by identifying individual species of vegetation and assessing individual and absolute percent cover in sample plots and by taking a photo reference of wetland conditions. Hydrology will be monitored at the sample locations by measuring surface water depth, assessing soil moisture, and documenting visual signs of hydrology. Terra Technologies shall submit to the USACE an annual monitoring report no later than October 31st of each year that is in accordance with USACE Regulatory Guidance Letter 06-03 (Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Creation, Restoration, and/or Enhancement of Aquatic Resources).

All of the following performance standards are based on meeting the hydrophytic vegetation, hydric soils, and wetland hydrology criteria in the *Interim Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Midwest Region*. As this is an interim manual, the delineation methods described in the final delineation manual will be used after its release.

Permanent sample points and photo points will be established with metal posts in the first year of monitoring. The monitoring period will be for five years, unless the USACE determines that the mitigation project has not met the stated performance standards and requires additional years of monitoring. The site will be monitored for invasive species and animal damage during these visits.

The mitigation site will be determined as a success when all of the following criteria have been met by the completion of the required annual monitoring period:

1. Wetland Hydrology: All areas proposed for wetland establishment must show evidence of wetland hydrology. The attainment of wetland hydrology will be determined by the presence of sufficient indicators to satisfy the wetland hydrology criteria included in the *Interim Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Midwest Region* across the vast majority of permanent sampling points.

2. **Hydrophytic Vegetation:** All areas proposed for wetland establishment must meet the required hydrophytic vegetation criteria in the *Interim Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Midwest Region*. Specifically, at least 51% of the relative vegetative cover in wetland areas will be of species that are classified as Facultative, Facultative Wetland or Obligate Wetland.
3. **Hydric Soils:** All areas proposed for wetland establishment must show evidence of hydric soils by meeting the criteria described in the *Interim Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Midwest Region*. Evidence of wetland hydrology will be sufficient to show that the hydric soils criterion is being met as it may take many years before certain indicators of hydric soils develop.
4. **Vegetative Cover:** The mitigation site will have at least a 75% absolute vegetative cover, except in areas of near-constant inundation that cannot support such a high absolute vegetative cover percentage. If areas do not meet any requirements related to survival rate or vegetative cover, appropriate planting and/or seeding activities will be initiated.
4. **Invasive Species:** Management of invasive species will be undertaken as is suitable to maintain biodiversity and wetland function. Species on the list of Highly Aggressive Invasive Species (Table 1) will be eradicated upon observation and shall not, in the aggregate, cover more than 5% of the absolute cover of the mitigation site. In addition, a combination of the absolute cover of species on the Highly Aggressive Invasive Species list and the absolute cover of species on the Undesirable Species list (Table 2) shall not comprise more than 20% of the mitigation site.

Table 1. Highly Aggressive Invasive Species

Scientific Name	Common Name
Alliaria petiolata	Garlic Mustard
Carduus nutans	Musk Thistle
Cirsium arvense	Canada Thistle
Dipsacus fullonum	Common Teasel
Dipsacus lanciniatus	Cut-leaf Teasel
Elaeagnus umbellata	Autumn Olive
Euonymus fortunei	Wintercreeper
Euphorbia esula	Leafy Spurge
Festuca spp.	Tall Fescue
Lespedeza cuneata	Sericea lespedeza
Lonicera japonica	Japanese Honeysuckle
Lonicera morrowii & Lonicera maackii	Bush Honeysuckles
Lythrum salicaria	Purple Loosestrife
Melilotus alba & Melilotus officinalis	Sweet Clover (White & Yellow)
Phalaris arundinacea	Reed Canarygrass
Pueraria lobata	Kudzu
Rhamnus cathartica	Common Buckthorn
Rosa multiflora	Multiflora Rose
Securigera varia	Crown Vetch
Sesbania exaltata	Sesbania
Sorghum halepense	Johnson Grass
Typha spp.	Cattails

Table 2. Undesirable Species

Scientific Name	Common Name	Month	Factor	Method
Abutilon spp.	Velvet Leaf	July-Oct	Discovery	1,2
Anthriscus spp.	Parsley	April-July	Discovery	1,3
Arctium spp.	Burdock	July-Sept	Height=1 feet	1,3,4
Cannabis spp.	Hemp	July-Sept	Discovery	1,2
Carduus spp.	Musk Thistle	May-Sept	Discovery	3
Centaurea spp.	Knapweed	May-Sept	Height=2 feet	3
Chenopodium spp.	Lamb's Quarters	May-Sept	Height=2 feet	1,2
Cicuta spp.	Water Hemlock	June-Sept	Height=2 feet	1,3
Cirsium spp.	Thistles (All)	May-Sept	Discovery	3
Conium spp.	Poison Hemlock	May-Aug	Height=2 feet	1,3
Croton spp.	Woolly Croton	July-Sept	Height=2 feet	1,2
Datura spp.	Jimson Weed	July-Sept	Discovery	1,3
Kochia spp.	Fireweed, Mexican	July-Sept	Height=1 feet	1,2
Lactuca spp.	Prickly Lettuce	June-Oct	Discovery	1,3
Lotus spp.	Birdsfoot Trefoil	May-Sept	Discovery	3
Maclura pomifera	Osage Orange	June-Oct	Discovery	2,3
Sonchus spp.	Sow Thistle	May-Oct	Discovery	1,3
Sorghum spp.	Sorghum hybrids	June-Nov	Discovery	3
Vicia spp.	Vetch	May-Oct	Discovery	1,3
Xanthium spp.	Cocklebur	July-Nov	Discovery	1,3

Methods of removal include:

- (1) Extirpation
- (2) Hand cut
- (3) Chemical spray
- (4) Seedhead separation

LONG-TERM MANAGEMENT PLAN

It is the intention of Swallow Tail, LLC to maintain the property in perpetuity as highly functioning habitat in accordance with the terms of the conservation easement. Swallow Tail, LLC will be responsible for long-term management and maintenance of the property and all habitat features, with financing coming from their operations budget. Long term management activities may include chemical and mechanical removal of exotic species, power trimming of native grasses and forbs, and prescribed burning as necessary to ensure the continued health and survivorship of native wetland vegetation. The previously described conservation easement shall stay with the property in the unforeseen instance that the title to the property is transferred to another party.

ADAPTIVE MANAGEMENT PLAN

If the site cannot be constructed in accordance with this mitigation plan, Terra Technologies will notify the USACE. Any significant modifications in the mitigation plan must be approved by the USACE. After initial site construction Swallow Tail, LLC shall maintain the property using an adaptive management approach that will provide flexibility when dealing with unforeseen issues. Swallow Tail, LLC shall implement all facets of site maintenance in perpetuity. Swallow Tail, LLC and Terra Technologies have extensive experience with successional plant assemblages and the mitigation site will be planted with an initial planting assemblage that contains species that are adapted to early successional conditions as well as plentiful sunlight. As the site matures, Swallow Tail, LLC shall continue to plant herbaceous species at the site that are appropriate to each successional stage in order to accentuate the species assemblages as deemed appropriate given the site conditions at the time of assessment.

Additionally, if site monitoring and maintenance activities determine that the project as planned is unable to meet the stated performance standards, then Swallow Tail, LLC will approach the USACE with suggestions of design changes, site modifications, or revisions to monitoring or maintenance requirements in order to ensure that the mitigation site provides aquatic resource benefits similar to the objectives described in this mitigation plan.

If water flow over any berm used to elevate water levels is greater than anticipated, then a turf reinforcement matrix material or angular rock may be used on graded surfaces for stabilization. Any other adaptive management actions will be addressed as they occur during construction. Terra Technologies is retained by Swallow Tail, LLC to provide construction oversight and long-term inspection and monitoring of the project area.

FINANCIAL ASSURANCES

Financial assurances for the mitigation project will be provided by Swallow Tail, LLC in the form of an irrevocable letter of credit for \$5,000 (five thousand dollars) from a designated financial authority that is a member of the Federal Deposit Insurance Corporation (FDIC) to the USACE naming the Midwest Mitigation Oversight Association as the responsible party to receive financial assurance in the event of the applicant's failure to complete the mitigation action. If the Midwest Mitigation Oversight Association is granted the financial assurances, they will select a competent restoration contractor to carry out the necessary remedial actions directed by the USACE. Upon completion of mitigation construction, the letter of credit will be reduced to \$1,000 (one thousand dollars) for remaining maintenance and monitoring actions until the performance standards have been achieved.

Submitted on November 30, 2009 by,
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