CORRIGAN OSB, L.L.C.
PROPOSED ORIENTED STRAND BOARD FACILITY
POLK COUNTY, TEXAS
PERMIT APPLICATION NO. SWG-2015-00145
MITIGATION PLAN

INTRODUCTION

Corrigan OSB, L.L.C. (Applicant) proposes to construct an oriented strand board (OSB) facility within a 1,708-acre tract located southwest of the intersection of US Highway 287 and US Highway 59 in Corrigan, Polk County, Texas (Figure 1). The proposed project footprint includes the following project elements: 1) entrance road, 2) transmission right-of-way), and 3) facility, including perimeter storm water drainage canals and two storm water retention basins.

The project area has been actively managed for silviculture production for decades and likely since virgin timber was clear cut in the late 1800s. The top soils in the project area have very low nutrient content and are generally not suited for crop production. Most of the project area has been clear cut within the past 3 years prior to the commencement of construction of the OSB facility. The clear cutting was independent of the proposed OSB facility.

In addition to land disturbance associated with planting and harvesting trees, there are numerous fire breaks, logging roads, and low water crossings associated with timber operations within the project boundary. Streams in the project area exhibit symptoms (e.g. channel incision, channel straightening, excess sediment deposition, lack of old growth specimens along smaller channels) of hydrologic alterations and land disturbance generally associated with silviculture, especially before the implementation of best management practices by the industry.

A culverted section of stream along the facility entrance road has impacted two distinct jurisdictional waters: Bear Creek, an intermittent stream; and an unnamed ephemeral tributary to Bear Creek (Figures 2, 3). The impacts to the 430 linear feet (LF) of Bear Creek include: clearing/grading within the riparian zone, channel widening, installation of five (5) culverts measuring 10 feet in diameter and 174 feet in length, and installation of rip-rap for erosion control. Cleared areas in the riparian zone at the road crossing will be replanted with native hardwoods to the maximum extent practical taking into account the requirement to not plant trees that could fall on the power line that runs along the southern side of the entrance road. The areas that will not be planted with native hardwoods have been planted in a mixture of native grasses (Figure 3). Impacts to 180 LF of an unnamed ephemeral tributary include rerouting to join Bear Creek approximately 50 feet upstream of the former confluence and fill of the portion of the channel that was abandoned (Figure 3).

Based on the impacts to 610 linear feet of stream (0.78 acres), the total debits calculated for impacts associated with the entrance road and culverted crossing is 2288. The applicant proposes to conduct the permittee-responsible mitigation along the same stream reaches assessed to provide baseline for calculation of debits (Figure 4).

The project is not located within the primary service area of an approved mitigation bank or in-lieu fee program. The project area is located within the secondary service area of the approved Graham Creek Mitigation Bank. However, compensatory mitigation for the unavoidable impacts to streams and replacement of lost functions and services can be best achieved within the same watershed especially

along stream segments contiguous with (in the flow path of) those impacted. The proposed mitigation is designed to provide resource functions to address both unavoidable impacts of the road crossing and provide uplift for degradation of stream functions associated with historic land use practices.

OBJECTIVES

In addition to transporting water, sediment, organic matter, and nutrients, intermittent and ephemeral streams and the associated riparian buffers proposed for mitigation provide an important energy dissipation function for downstream reaches after heavy rains. The overall goals of the mitigation measures described in this plan are to enhance physical and chemical functions in Bear Creek and an unnamed tributary to Bear Creek (Figure 4).

Specific objectives include:

- Reduce surface runoff and sediment delivery to the streams;
- Reduce peak flows and enhance hydrologic function by restoring precipitation runoff relations and flow paths to conditions more similar to watersheds with native forest cover;
- Improve stream bank stability;
- Increase and provide a more sustainable supply of large woody debris; and
- Increase hardwood based detritus delivery to streams.

Specifically, the applicant proposes:

- Enhancement of 4277 LF of riparian buffer zones by light buffer planting within existing riparian zones, removing / regrading logging roads and firebreaks, converting monoculture pine to mixed hardwoods, and grading areas of soil disturbance within the pine monoculture.

- Stabilization of 520 LF of unstable streambank by planting species adapted to water fluctuation at and below the OHWM.

SITE SELECTION

The applicant proposes to conduct the permittee-responsible mitigation along stream reaches adjacent to both upstream and downstream of the impacted area (Figure 4). The mitigation area covers approximately 23 acres from the applicant's property boundary upstream of the Bear Creek crossing downstream to the powerline right of way. Streamside management zones (SMZs) are present along all of the streams proposed for mitigation, but riparian zones are functioning below potential due to the impacts associated with long-term silviculture in the area. Logging road, fire breaks, and monoculture stands of pines are located within 200 feet of the streams. The characteristics and extent of the proposed mitigation coupled with the juxtaposition of the mitigation to the area impacted provide for a high likelihood of providing adequate compensatory mitigation for the impacts.

SITE PROTECTION INSTRUMENT

The project area is owned by the applicant. A permanent conservation easement will be placed on the areas to protect the mitigation work in perpetuity. The conservation easement will be held by a 501(c)3 entity, or other qualified land management entity approved by the US Army Corps of Engineers (USACE) Galveston District (SWG). Initial contact has been made with the Texas Land Conservancy. Other qualified management entities may be considered.

BASELINE INFORMATION

The project is located southwest of the intersection of Texas State Highway 287 and Texas State Highway 59 in Corrigan, Texas in Polk County at latitude 30°58'17.626"N and longitude 94°50'40.327"W (Figure 1). The project is located in the Major Land Resource Area (MLRA) 133B – Western Coastal Plain and in US Environmental Protection Agency (EPA) Level IV ecoregion Southern Tertiary Uplands. The activities are located in the Pine-Hardwood forest vegetation type (McMahan et al., 1984). Native vegetation includes shortleaf, longleaf, and loblolly pine. Hardwoods native to the area include oaks, elms, hickories, pecan, black walnut, tupelo, and sweetgum. Understory species include woody shrubs and small trees such as yaupon, wax myrtle, hornbeam, and rusty blackhaw viburnum. Invasive species, including Chinese tallow, Japanese climbing fern, chinaberry, mimosa, Chinese privet, and soda apple have been documented in the Pineywoods region of Texas.

The project area is underlain by fine sandy-loam soils of the Laska-Colita-Oakhurst soil complex. According to the National Hydric Soils List (NRCS 2014), none of the soil mapping units found within the project area are designated as hydric. Soils in the project area formed in the mudstone, siltstone, sandstone, shale, and diagenetic limestone of the Catahoula Formation. The soils are classified as moderately-well drained and moderately-rapidly permeable.

Based on geologic maps and field observations, the impacted streams in the project area (impacted and mitigation) are up gradient of the colluvial-alluvial transition zones of Bear and Dry Creek (Figure 2). The well-defined channels in the rest of the project area are entrenched (naturally) due to scouring/down-cutting of the stream bed during high flow events. This scouring results in the top of banks being higher than bank-full discharge.

The characteristics of stream segments (bed substrate, entrenchment, embeddedness, sinuosity etc.) in the project area are strongly influenced by the erodibility of bed and bank parent material (e.g. sand vs limestone) of the Catahoula formation colluvium. Bedrock (mudstone, siltstone, and limestone) controls are present along much of the stream bed and banks in the intermittent segment accessed in the primary channel of the Bear Creek watershed.

The proposed mitigation is located along streams in the upper most sections of the Bear Creek watershed. Flow in the channel is intermittent and there is limited interaction with the water table. The dominant mechanism for flow generation is by shallow interflow flow concentrating at the toes of slopes and direct precipitation on saturated areas adjacent to the channels during extended rainfall events. Channel development is dependent upon the duration and magnitude of flow. In headwater areas of the ephemeral streams, headcuts formed by groundwater seepage from the headwall and interruptions in the continuity of bed and bank are commonplace.

ASSESSMENT OF STREAMS PROPOSED FOR MITIGATON

CK Associates (CK), on behalf of the permittee delineated waters of the United States and evaluated stream condition along the 4277 linear feet of stream of the proposed mitigation (Figure 4). Stream condition assessments (Level 1) and the calculation of debits / credits were conducted following the procedures outlined in the US Army Corps of Engineers – Galveston District Stream Condition

Assessment 2013 manual. A copy of the stream assessments and calculation of debits for the impacted streams are provided in Attachment A.

Ordinary High Water Mark (OHWM) was determined utilizing field indicators outlined in Regulatory Guidance Letter Number 05-05. The distance along the channel between transect endpoints was measured with a hip chain or measuring tape. Transect locations were mapped using a Trimble® GeoXT® Differential Global Positioning System (DGPS) utilizing real-time corrections.

Rosgen G stream types (G1-G5) are present along the streams impacted and proposed for mitigation as extensive down-cutting and no floodplains are present. As previously stated, streams in the project area, both those impacted and those proposed for stream mitigation, are located up gradient of the colluvial-alluvial transition zones of Bear and Dry Creek (Figure 2). The streams in the project area have become entrenched in colluvium by natural processes that likely were accelerated and magnified as a result of land clearing associated with the cutting of the virgin long-leaf pine / cedar forest in the late 1800s. It is well documented that forestry practices during the late 1800s were predominately cut and abandon. Channel incision has progressed to produce Rosgen G channels, consequently, there is no sediment deposition outside of the active channel and floodplains do not develop. Therefore, the application of traditional stream mitigation techniques designed to re-establish connections to floodplains are not suitable for mitigation in this project area.

Type G streams can have very high bank erosion rates and a high sediment supply, resulting in high bedload and suspended sediment transport rates. Channel degradation and side-slope rejuvenation processes are typical in G stream and were observed throughout much of the project area. Rosgen G stream are sensitive to increase in stream flow magnitude. Stream bank vegetation can have a strong influence on erosion potential (Table 1).

Stream Type	Sensitivity to Disturbance[a]	Recovery Potential[b]	Sediment Supply[c]	Streambank Erosion Potential	Vegetation Controlling Influence[d]
G1	low	good	low	low	low
G2	moderate	fair	moderate	moderate	low
G3	very high	poor	very high	very high	high
G4	extreme	very poor	very high	very high	high
G5	extreme	very poor	very high	very high	high
G6	very high	poor	high	high	high

[a] Includes increases in streamflow magnitude and timing and/or sediment increases.
[b] Assumes natural recovery once cause of instability is corrected.
[c] Includes suspended and bedload from channel derived sources and/or from stream adjacent slopes.
[d] Vegetation that influences width/depth ratio-stability.

Table 1. Rosgen stream types observed along streams proposed for mitigation. Extracted from Stream Restoration Design (National Engineering Handbook 654 Technical Supplement 3E).

Based on the guidance presented in Table 1, mitigation measures designed to reduce stream flow magnitude and those that can provide vegetation to influence width/depth ratio-stability are the most suitable to address the impacts in this project area. The enhancement of riparian buffer zones combined with stabilization of unstable streambanks is proposed to provide adequate compensation for unavoidable impacts associated with construction entrance road and culverted crossing.

DETERMINATION OF CREDITS

A summary of credits is provided in Table 2. The LF of compensatory mitigation was measured in the field with a hip chain and in the office digitizing the centerline based on field delineations. The calculations and adjustments were based on a maximum of 0.5 credits per linear foot for light buffer planting and 1 credit per linear foot for stream bank planting for stabilization. Adjustments (reduction) in the credits for 150 LF of stream along Bear Creek were made to account for the lack of 100 LF of buffer along the right descending stream bank due to the proximity to the access road and power line right of way (Figure 4).

Based on the impacts to 610 linear feet of stream, the total debits calculated for impacts associated with the entrance road and culverted crossing is 2288. The total credits for the proposed mitigation along 4227 LF feet stream is 2546.

	Linear feet	Riparian Planting Credits	Stream Bank Planting Credits		Credits
Ephemeral upstream left bank	962	0.5			481
Bear Creek Intermittent Upstream	1319	0.5			660
Adjustment Intermittent Upstream - near ROW	150	0.25			-38
Bear Creek Intermittent Downstream	1846	0.5			923
Bear Creek Intermittent Upstream	200		1		200
Bear Creek Intermittent Downstream	320		1		320
Totals	4277				2546

Table 2. Summary of credits.

MITIGATION WORK PLAN

Mitigation activities will be performed as needed based on site conditions. This will include planting native hardwoods within first 100 feet of riparian buffer as needed to achieve a desired density of 250 to 537 stems per acre, depending on the current age and condition of the stand. The same will be done in the outer 100-200 feet along both banks using a species composition that includes a mixture of native hardwoods and pine species (longleaf and loblolly pine) at a ratio of 60% pine and 40% hardwoods. Some cutting may be required in the 200 foot buffer to achieve this outcome. The minimal amount of grading and site preparation required to ensure seedling survival will be utilized. Removal and restoration of logging roads, firebreaks, and areas of historic disturbance due to logging operations will require more grading compared to areas within existing silviculture. Invasive species will be removed manually or sprayed with herbicide prior to planting.

The riparian and stream bank planting will be conducted during periods when soil temperatures are conducive to seedling survival, usually between November and February in this area. The permittee is a long-established forestry company with a highly skilled workforce and extensive experience in the project area. The grading and planting is targeted to begin in 2017. The planting and grading time may extend to a second planting season.

MAINTENANCE PLAN

The applicant will be responsible for all maintenance and management activities. The applicant will consult a mitigation specialist and/or the USACE in the event modifications to the Mitigation Plan are required. Invasive species will be monitored and controlled with selective removal and/or spraying. No vehicle traffic will be allowed in the mitigation areas after planting. Replanting will occur if vegetation density does not meet success criteria.

PERFORMANCE STANDARDS

A minimum of 250 stems per acre must be present at the end of the first, second, and fourth springs following the planting (i.e. Year 1, Year 2, and Year 5). Trees established through natural recruitment will be included in the tally. By Year 5, the mitigation area will be virtually free (approximately 5% or less on an acre-by-acre basis) of exotic/invasive species included in the Texas Invasive Plant and Pest Council database. We anticipate vegetation and timber stand improvement activities will be established within a five-year time period.

MONITORING REQUIREMENTS

Monitoring requirements for the compensatory mitigation will adhere to the 2008 Final Compensatory Mitigation Rule and the USACE Regulatory Guidance Letter 08-03. Monitoring will be conducted twice a year for the first year after all mitigation activities are complete and annually for a period of 5 years. Written reports will be submitted to the District Engineer annually on or before July 1 and will include results of the summary of status of riparian plantings, summary of activities to remove and/or control exotic/invasive species, photo documentation of the mitigation areas, and, if necessary, recommendations for corrective actions to meet performance criteria.

The applicant is the responsible party for conducting the monitoring. The applicant may use the services of an environmental consultant to perform monitoring, analyze data, and prepare monitoring reports.

LONG-TERM MANAGEMENT PLAN

The long term management of the mitigation project will be the responsibility of the applicant. The final mitigation monitoring report submitted in Year 5 will include a summary of management needs and the funding mechanisms to meet these needs. The Applicant is a well-established timber products company with extensive land management experience. A conservation servitude will be placed on the mitigations areas.

ADAPTIVE MANAGEMENT PLAN

Hazards that might affect successful restoration include floods, catastrophic fire, invasive species, wind damage, droughts, insect/disease, and herbivory. In addition, errors during plan implementation could also reduce the likelihood of meeting performance goals. If monitoring or observation during plan

implementation indicates a potential for not meeting performance goals remediation options will be developed and submitted to the USACE SWG.

If, during the course of monitoring it is determined that ability to achieve performance standards has been jeopardized, the applicant will notify the USACE SWG of the need to develop a Plan of Corrective Action. The Plan of Corrective Action may be prepared using in-house technical staff or outside engineering and consulting services as required.

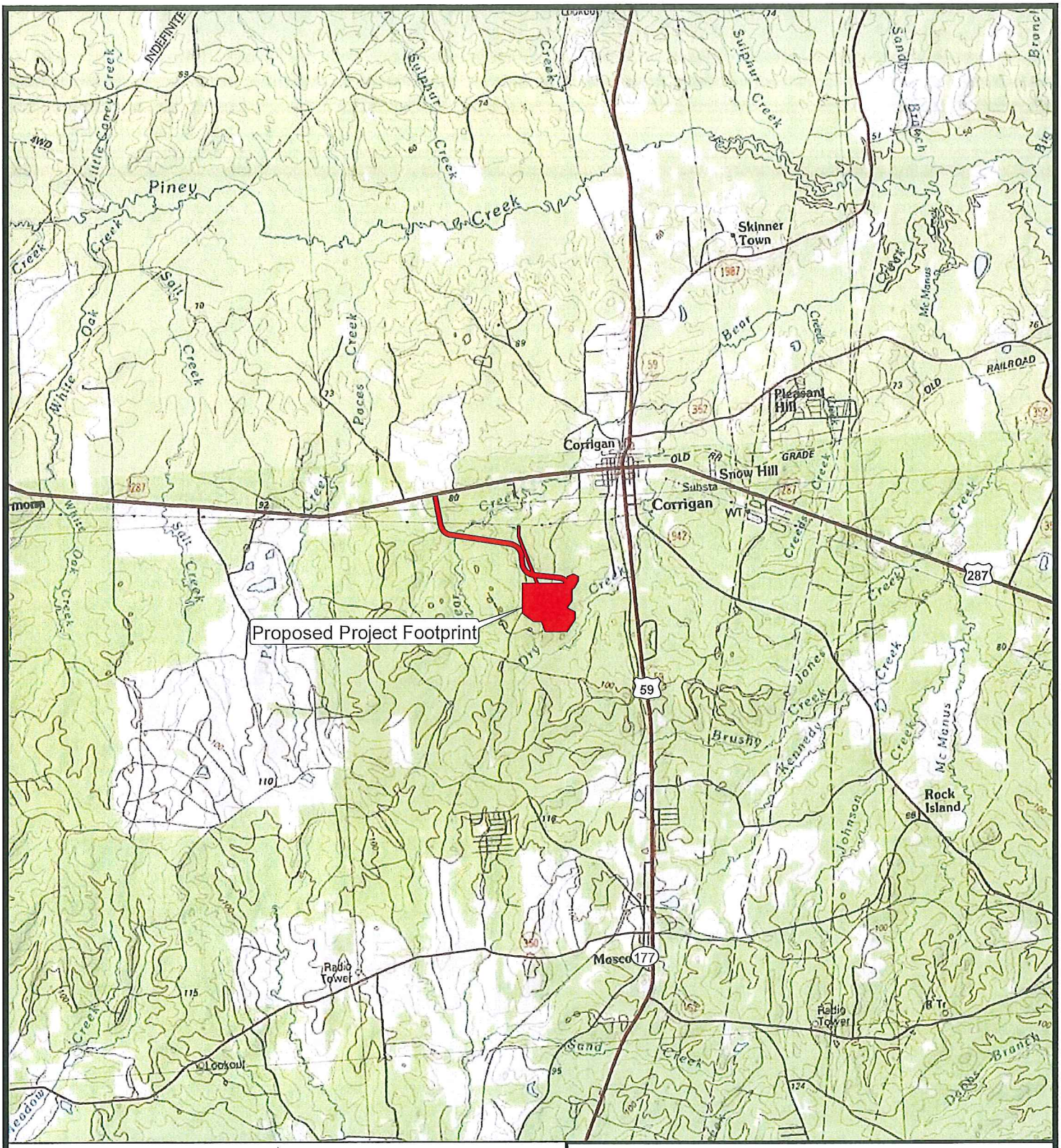
FINANCIAL ASSURANCES

The applicant will purchase a USACE approved performance bond for the period of construction through the end of the monitoring activities. The amount of the performance bond will include the cost of implementation as well as the estimated cost to conduct monitoring and any additional mitigation activities in the event that the original mitigation is not successful.

The short-term financial assurance comprises a performance bond that covers the scope of work from mobilization through submittal of the Year 5 final report. The long-term financial assurance comprises an endowment to be established prior to the end of Year 5 to cover easement monitoring, property management, and enforcement by a USACE SWG approved third party entity.

ATTACHMENTS: Figures 1-4

AUG 19 2016



0 1 2
Miles

U.S.G.S. 100K SERIES QUAD MAP, LIVINGSTON, TX

N
S

esri Partner Network Silver

Corrigan OSB, L.L.C.
Corrigan, Texas

Department of the Army Permitting

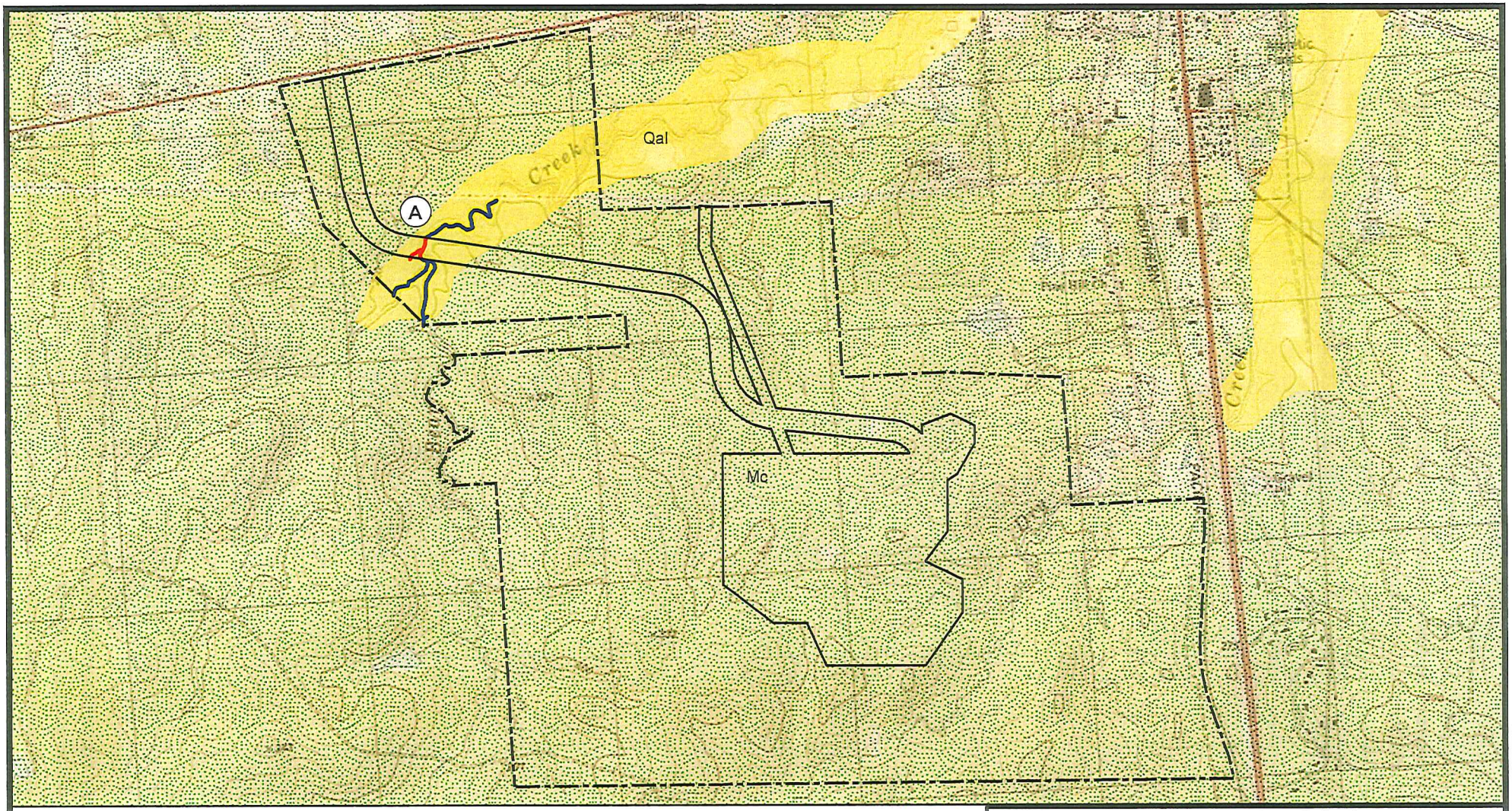
Site Location Map

Polk County

CK Associates Environmental Consultants

Drawn:	CAL/AM10.4
Checked:	WLB
Approved:	TEW
Date:	08/15/2016
Dwg. No.:	A12356-59

Figure 1



Legend

- Impacted
- Non-Impacted
- Proposed Project Footprint
- Property Boundary

Geologic Formations

- Qal - Alluvium
- Mc - Colluvium Catahoula

N

S

0 2,000 4,000

Feet

esri Partner Network Silver

REFERENCE

USGS 24K SERIES QUAD MAP, CORRIGAN, TX.

Corrigan OSB, L.L.C.

Corrigan, Texas

Department of the Army Permitting

Bear Creek Crossing Location Map

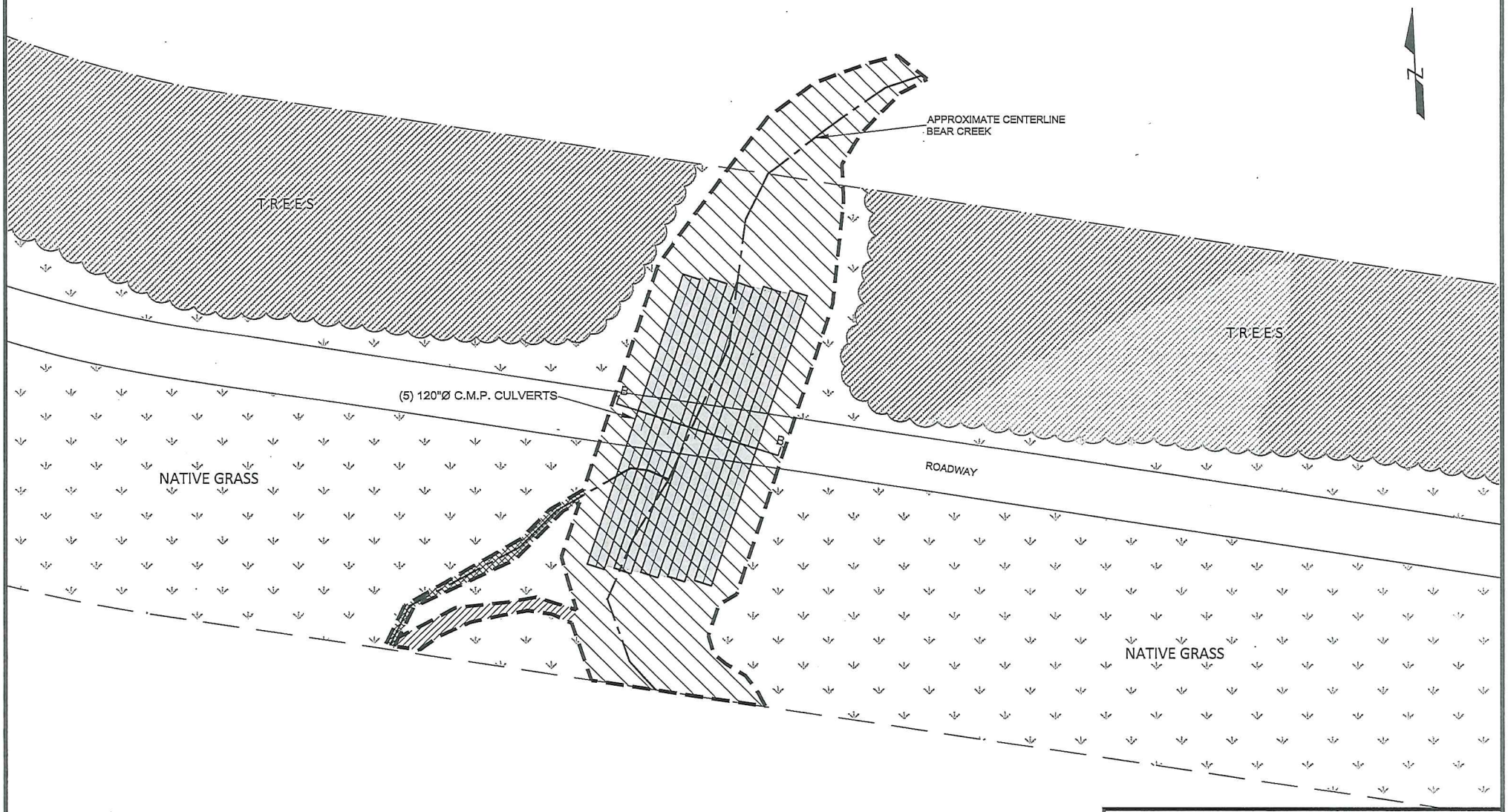
Polk County

CK Associates Environmental Consultants

Drawn:	CAL/AM10.4
Checked:	WLB
Approved:.	TEW
Date:	08/17/2016
Dwg. No.:	A12356-63

Figure 2

AUG 19 2016



LEGEND

- APPROXIMATE CENTERLINE PRECONSTRUCTION
- APPROXIMATE LIMITS OF IMPACT
- EPHEMERAL FILLED
- EPHEMERAL REROUTE
- MECHANIZED LAND CLEARING AND FILL DEPOSITION
- LIMITS OF CULVERTS (APPROX. 174')

0' 80' 160'

SCALE: 1" = 80'

Limits of Impact determined from field GPS data prior to construction, recent aerial photos, and construction drawings provided by Johnson & Pace Inc.

Corrigan OSB, L.L.C.
Corrigan, Texas

Department of the Army Permitting

Detail A Plan View

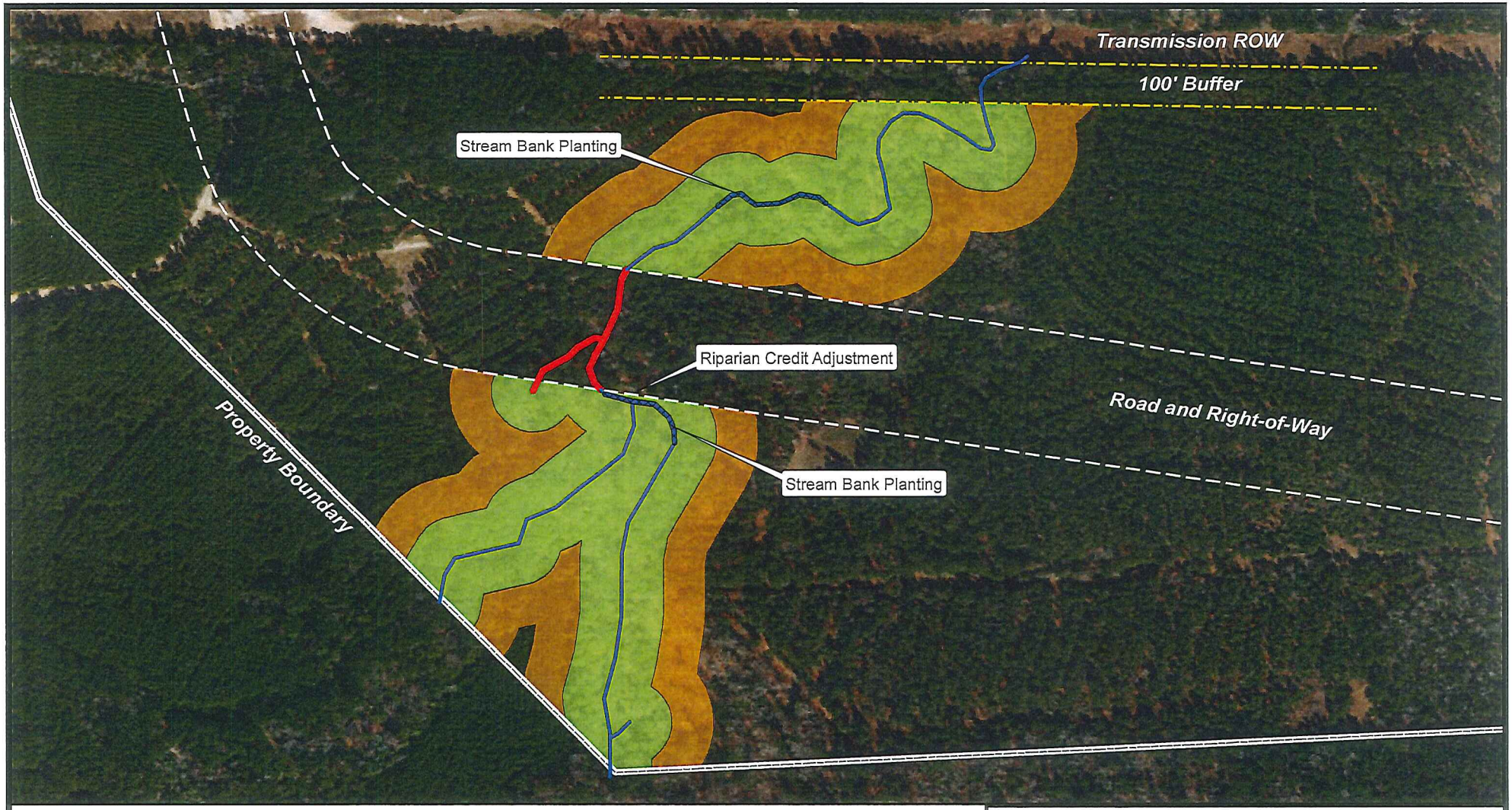
Polk County

CK Associates Environmental Consultants

Drawn:	CAL/ACAD
Checked:	WLB
Approved:	TEW
Date:	08/16/2016
Dwg. No.:	A12356-61

Figure 3

AUG 19 2016



Legend

- Impacted
- Non-Impacted (Mitigation)
- Stream Bank Planting
- 100-Foot Buffer
- 200-Foot Buffer

N

S

0 300 600

Feet

esri Partner Network Silver

REFERENCE

Imagery: 2015 Texas 0.5m Orthoimagery, Polk County.

Corrigan OSB, L.L.C.

Corrigan, Texas

Department of the Army Permitting

Compensatory Mitigation

Polk County

CK Associates Environmental Consultants

Drawn:	CAL/AM10.4
Checked:	WLB
Approved:	TEW
Date:	08/17/2016
Dwg. No.:	A12356-64

Figure 4

AUG 19 2016