APPENDIX E

DRAFT MITIGATION PLAN FOR THE THREE OAKS MINE

MITIGATION PLAN FOR
PROPOSED THREE OAKS MINE
LEE AND BASTROP COUNTIES, TEXAS
USACE PROJECT NUMBER: 199900331
HJN 990022 MI

PREPARED FOR:

ALCOA INC.
ROCKDALE, TEXAS

PREPARED BY:

HORIZON ENVIRONMENTAL SERVICES, INC.

JULY 2002

DRAFT

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INTRODUCTION

The proposed Three Oaks Mine Permit Area contains 161.5 acres of jurisdictional "waters of the US," of which 108.7 acres (67%) are on-channel ponds, 44.1 acres (27%) are ephemeral to intermittent streams, and 8.7 acres (6%) are small, depressional wetlands.

On-channel ponds on the proposed mine area generally range from 0.5 to 5 acres in size and most are heavily utilized by livestock, with highly disturbed edges and little vegetation. Water clarity and quality is usually poor due to high nutrient loading from cattle use. Some ponds in the permit area have lower use by livestock and exhibit vegetated shorelines and aquatic macrophytes. Water clarity and quality in these ponds is significantly improved. Typical shoreline and aquatic vegetation includes smartweed (*Polygonum* sp.), cattail (*Typha* sp.), spikerush (*Eleocharis* sp.), flatsedge (*Cyperus* sp.), rattlebush (*Sesbania* sp.), pondweed (*Potamogeton* sp.), and water-lilies (*Nuphar* sp. and *Nymphae* sp.).

Streams in the permit area are predominantly ephemeral, with several being intermittent. Streams are variously vegetated from herbaceous grasslands to mature woodlands. Woodlands occur along many streams as narrow, remnant strips amid cleared pastures or mesquite grasslands. Typical woodland species of these riparian zones include water oak (*Quercus nigra*), post oak (*Q. stellata*), sugar hackberry (*Celtis laevegata*), cedar elm (*Ulmus crassifolia*), yaupon (*Ilex vomitoria*), occasional native pecan (*Carya illinoensis*), and American elm (*Ulmus americana*).

Wetlands in the permit area are typically small depressions associated with stream floodplains ranging in size from a few hundred square feet up to 1 or 2 acres. All wetland areas are herbaceous and seasonally inundated or saturated. Typical wetland species include smartweed, flatsedge, spikerush, rattlebush, bulrush (*Juncus* sp.), and sumpweed (*Iva annua*). Black willow (*Salix nigra*), green ash (*Fraxinus pensylvanica*), and buttonbush (*Cephalanthus occidentalis*) occur sporadically in these wetland areas.

The proposed mining and ancillary activities will result in impacts to jurisdictional areas that are short- and long-term, with some impacts being considered permanent (e.g., permanent stream reroutes). Short-term (or temporal) impacts will result from the mining process where 3 to 5 years may pass from point of disturbance until reclamation takes place. Reclamation will be continuously on-going following mining. Long-term impacts will result from certain streams being rerouted multiple times as mining progresses across the landscape; from the short-term loss of mature riparian woodlands; and where long-term facilities and haul roads will exist. Due to the location of some streams relative to the mine blocks, permanent relocation will be necessary, resulting in permanent impacts to portions of those streams.

The overall goal of this mitigation plan is to provide for effective mitigation for short-term, long-term, and permanent impacts through avoidance, minimization, and/or compliance reclamation and mitigation. Temporal impacts will be mitigated through temporary wetland enhancements within the active mine, as well as mitigation up front in a dedicated off-site area. Long-term impacts will be mitigated through mine reclamation that is focused on the re-creation of high-quality streams and riparian zones, along with ponds and wetlands that are similar or improved from the current condition. Reclamation in the mine area will replace an equivalent measure of jurisdictional areas in the disturbed zones. An off-site extended mitigation area along Middle Yegua Creek will provide a high-quality, advance compensation area for riparian and wetland habitats that will be permanently dedicated by deed restriction for mitigation purposes to compensate for short- and long-term impacts.

1.0 AVOIDANCE AND MINIMIZATION WITH ALTERNATIVES ANALYSIS

1.1 ALTERNATIVE ENERGY SOURCES AND LIGNITE RESERVES

Off-site alternatives considered other than the preferred alternative and the no-action alternative can be separated into 2 groups: a) those that would not directly impact aquatic environments, and b) those that would.

1.1.1 Off-Site Alternatives That Would Not Directly Impact Aquatic Environments

The lignite recovered at Three Oaks Mine will be used to provide a long-term, economically stable fuel supply for the Rockdale Power Generating Station, which provides electrical power to the Rockdale aluminum smelter and the TXU grid system. There are a number of alternate fuels available that can be used at the Rockdale Power Generating Station that would not affect surface waters in the immediate area; however, these have been determined to be economically infeasible. The available options are as follows:

- power purchased from the commercial utility grid
- coal from the western US
- natural gas

Three Oaks Mine lignite can be produced for about $0.95/Million British Thermal Units (MM Btu). Power purchased from the electric grid would cost about the equivalent of $2.70/MM Btu. Natural gas would cost approximately $2.30/MM Btu (calculated using the average cost over the past couple of years) and would have cost as much as $4.00/MM Btu during the summer of 2001. As these recent price fluctuations show, long-term natural gas prices are very unpredictable. Coal from the western US would cost about $1.49/MM Btu, according to an estimate by the US Army Corps of Engineers (USACE). Additionally, transportation contracts with the railroads (necessary for western coal delivery) are for 5-year terms, maximum. These transportation costs are the largest component of the cost of western coal. Consequently, in addition to costing 50% more, the long-term price of western coal is unpredictable due to likely increasing transportation costs.

If long-term fuels costs are greater than $1.25/MM Btu, then aluminum cannot be produced at costs that are competitive on the world market. Consequently, lignite from Three Oaks Mine is the only available fuel supply that is economically feasible for aluminum production at the Rockdale smelter. Additionally, local lignite is the only fuel source that is controlled by Alcoa Inc. (Alcoa), meaning that, in addition to being the lowest-cost fuel supply, the costs of this fuel supply can be held stable for decades.

Although these 3 alternatives have been rejected, it should be noted that each of the options listed above has the potential for impacting the aquatic environment at some other location. Power purchased from the utility grid may require additional surface coal mining in other locations within the state, thereby impacting aquatic environments at a different location.

Likewise, the exploration, development, and transportation of additional natural gas reserves will have impacts on aquatic environments and when coal from the western US is delivered to locations in Texas, rail lines will necessarily traverse aquatic environments. Further, surface coal mining in the western US has impacts to aquatic environments, as well.

1.1.2 Off-Site Alternatives That Would Impact Aquatic Environments

Lignite fuel sources need to be within a short distance of the power plant to be an economically feasible fuel source and local lignite reserves are limited to the lignite deposits in the lower Calvert Bluff formation. This limits practical reserve recovery to approximately 20 miles northeast or southwest of the plant. Within these limitations, Alcoa has considered the following:

- continuing its mining operations at the Sandow Mine, chasing deeper reserves
- mining lignite reserves located to the north of Sandow Mine, a reserve referred to as the Milam reserve

Alcoa has mined nearly all lignite seams with less than 200 feet of overburden within the Sandow Mine. These lignite seams, however, continue past the 200-foot depth, dipping toward the southeast at a rate of about 100 feet per mile. Alcoa has seriously considered mining deeper at the Sandow Mine to recover these deeper reserves and has evaluated a variety of cost models for this scenario. After deliberation, though, Alcoa does not regard this option to be viable because of safety and economic considerations. Thousands of acres of new reserves would have to be purchased, and a large capital investment would be required to purchase earth-moving equipment capable of such deep mining. Additionally, employee safety due to slope-stability for such deep mine pits would be a major concern in the unconsolidated overburden.

Alcoa has also considered mining reserves located northeast of Sandow Mine in Milam County: the Milam reserve. However, property-control issues in recent years have effectively eliminated the Milam reserve as a feasible option. The last company to control the reserve as a logical unit sold individual parcels to many different individuals, and the difficulty of acquiring contiguous parcels of property of the size needed for development of a mine limits the viability of this option. To be able to acquire this property would take more than a decade, yet the Sandow Mine reserves will be depleted in about 2 years.

Further, if the above-considered locations were to be mined, it is highly likely that either option, whether it is the deep Sandow reserves or the Milam reserve, would have a greater impact on aquatic environments than mining at the proposed Three Oaks Mine. This is because the Three Oaks Mine site is located at the drainage divide between the Colorado River and the Brazos River – meaning, essentially, that the site is situated on the top of a hill and has relatively few surface water features. Consequently, there are generally fewer surface-water features per acre at the Three Oaks Mine than at either of the alternate locations considered, which are located lower in their respective watersheds. Although Alcoa has conducted no detailed evaluations of the aquatic environments of these locations, a cursory appraisal of US Geological Survey (USGS) quad sheets for these locations confirms this supposition.

1.2 ON-SITE AVOIDANCE AND MINIMIZATION MEASURES

The areal extent of a surface mine is, by nature, controlled by the distribution of subterranean lignite reserves and the technological processes necessary for recovery. Effective and efficient recovery of these reserves limits the potential minimization of surface disturbance over the reserves. Due to the highly bifurcated nature of the area's surface waters, altering project design to achieve avoidance and minimization of impacts to surface water features is not practicable over the area of reserve recovery. However, outside the area of reserve recovery, avoidance and minimization can and has been achieved within the design of the project. For example, within the entire Three Oaks Mine Permit Area, there are 161.5 acres of "waters of the US"; yet, the project has been designed to limit disturbance to only 67.4 acres of "waters of the US," leaving nearly 60% of jurisdictional areas undisturbed.

Avoidance alternatives incorporated into the project include designing minimally impactive sedimentation ponds that are constructed by excavating the storage capacity from higher-elevation, off-stream locations rather than by amassing storage capacity through dam construction within stream channels and their buffer zones. Similar considerations are incorporated into the design of diversions and diversion berms. Additionally, Alcoa typically uses a number of small, off-channel sedimentation ponds located close to the point of sediment production, rather than using fewer, yet larger, on-stream sedimentation structures located further downstream of the mining activity. This practice avoids in-stream construction of dams and sedimentation of many hundreds of additional feet of streams and channels.

Once Alcoa's water-control plan is in place, engineers and environmental specialists continually review and modify the plan with an eye toward further revisions that might avoid or minimize impacts to aquatic environments. For instance, in the current water-control scenario, there are 4 perimeter sedimentation ponds (SP-1, SP-2, SP-3, and SP-5) (see Section 8 for more data). Yet, when the plan was first submitted to the Railroad Commission of Texas (RCT) and the Texas Natural Resource Conservation Commission (TNRCC), the plan included 5 sedimentation ponds. Staff engineers had determined that, by bringing the blending facility further south, closer to the active mine area, 1 sedimentation pond (SP-4) could be eliminated, thus reducing the size of the disturbance footprint and minimizing the potential for impacts to aquatic environments. Alcoa has sited all ancillary mine buildings and facilities to avoid aquatic environments.

Finally, Alcoa typically designs and constructs haul roads and access roads on high ground, minimizing the number and size of stream crossings, and designs crossing streams at right angles rather than more expedient, yet more impactive skewed crossings.

1.3 MITIGATION ALTERNATIVES

In addition to the project-design alternatives addressed above, several mitigation options were evaluated. The 3 mitigation options identified include: a) participating in an "In-Lieu Fee" program; b) providing off-site mitigation for anticipated impacts; and c) mitigating on the site as impacts occur. Participation in an "In-Lieu Fee" program is likely not feasible due to the scope of the proposed project. The cost per linear foot of stream channel typically determined to be necessary to conduct appropriate mitigation would be prohibitive for a project of this scale. Additionally, the scope of the required mitigation would likely be beyond the capabilities of the mitigation provider. Finally, if this option were pursued, it is likely that the resultant mitigation may not be within close proximity to project impacts or within the same watershed. Off-site mitigation provides a valuable mitigation option due to the breadth of area within the undisturbed portion of the Three Oaks Mine Permit Area. The mitigation would be within the same watershed and possibly provide a refugia for animals within the disturbance area. Also, an off-site mitigation area within the Mine Permit Area would be relatively easily encumbered with a deed restriction, maintained, and monitored. As this document will address, on-site mitigation that occurs continuously with reclamation can be problematic. Innovative ways to address this problem will be discussed in the following. Alcoa has chosen a combination of off-site mitigation and on-site reclamation to provide an effective mitigation plan for necessary project impacts.

2.0 DIRECT AND INDIRECT PERMANENT AND TEMPORARY IMPACTS

Impacts to jurisdictional "waters of the US" within the proposed Three Oaks Mine Permit Area are considered to be largely temporary based on the proposed reclamation plan that will accomplish a minimum of a 1 to 1 mitigation ratio on the site for all proposed impacts. No indirect impacts are anticipated due to the stringent water-quality standards that must be met during active mining and reclamation.

Table 2-1 summarizes proposed project impacts and avoidance in linear feet (LF) and acres (AC). Stream impacts are separated based on their nature and the quality of their associated riparian zones. The following provides a brief description of the quality designations. Low-quality streams are defined as ephemeral streams that traverse open pastureland and have minimal hydric vegetation or are highly eroded. Medium-quality streams are defined as ephemeral or intermittent streams that have a narrow, relatively undisturbed vegetated corridor (e.g., woodland, native herbaceous rangeland, or hydric depressions) and that are somewhat stable. Finally, ephemeral or intermittent streams that have a broad, mature riparian corridor vegetated by desirable woodlands are characterized as high quality. Please note that a single riparian corridor may have all 3 quality designations, each describing different reaches of the stream

TABLE 2-1
DIRECT IMPACTS TO "WATERS OF THE US" BY TYPE AND QUALITY

"Waters of the US"	Permit Area		Disturbance Area		Avoidance	
	(LF)	(AC)	(LF)	(AC)	(LF)	(AC)
Stream Low-Quality			51,511	6.7		
Stream Medium-Quality			123,537	13.3		
Stream High-Quality			23,370	3.6		
Subtotal	**348,422**	**44.1**	**198,418**	**23.6**	**150,004**	**20.5**
Pond		108.7		38.5		70.2
Wetland		8.7		5.3		3.4
Total		**161.5**		**67.4**		**94.1**

3.0 MITIGATION PLAN GOALS AND OBJECTIVES

The goal of this proposed mitigation plan is to provide the maximum on-site, in-kind mitigation practicable within the constraints present. Measures will be taken to ensure appropriate mitigation for short-term, long-term, and permanent impacts within the disturbance area. The proposed mitigation plan incorporates innovative designs for stream channel reclamation, including riparian corridor plantings with floodplain terraces similar to those found in existing mature riparian corridors within the Three Oaks Mine Permit Area. On-site reclamation seeks to restore stream corridors to as natural a condition as possible within a reasonable time frame. Many stream corridors are anticipated to have a higher quality post-reclamation than pre-disturbance. The goal of the off-site mitigation is to restore and enhance an intermittent stream floodplain to the highest quality riparian habitat within the Three Oaks Mine Permit Area and protect it in perpetuity. A mitigation site of this nature can provide a refuge for wildlife displaced during active mining and protect a valuable wildlife corridor in perpetuity.

3.1 RECLAMATION

On-site reclamation seeks to improve water quality within the Three Oaks Mine Permit Area by instituting practices superior to the current Best Management Practices (BMPs) and to exceed regulatory requirements for water discharged off of the site. The total linear feet of streams disturbed (based on the pre-mining condition) will be replaced during final reclamation, and extensive riparian corridor restoration/creation will be conducted. Riparian corridor restoration will be based on the pre-mining quality of impacted streams. Low-quality ephemeral streams will be mitigated at a minimum ratio of 1 to 1 (based on the linear distance of the stream). Medium-quality streams will be mitigated at a minimum ratio of 1.5 to 1. Finally, high-quality streams will be mitigated at a minimum ratio of 2 to 1. Planting appropriate tree, shrub, and herbaceous species will further enhance all restored stream corridors. The riparian corridors to be created along restored streams will generally be of significantly higher quality then those currently present. Herbaceous wetlands will be mitigated at a minimum ratio of 2 to 1. Restored wetlands will be an integral part of the restored riparian corridors, and appropriate plantings of hydrophytic and aquatic vegetation will ensure that desirable native species with wildlife habitat value will dominate these features. Ponds will be reclaimed at a minimum of ratio 1.5 to 1.

TABLE 3-1
MITIGATION RATIOS AND ACREAGE TOTALS

"Waters of the US"	**Disturbance Area**		**Mitigation Ratio**	**Required Mitigation**	
	(LF)	**(AC)**		**(LF)**	**(AC)**
Stream Low-Quality	51,511	6.7	1 to 1	51,511	6.7
Stream Medium-Quality	123,537	13.3	1.5 to 1	123,537 + enhancement	20.0
Stream High-Quality	23,370	3.6	2 to 1	23,370 + enhancement	7.2
Stream Subtotal	**198,418**	**23.6**	**NA**		**33.9**
Pond	N/A	38.5	1.5 to 1		57.8
Wetland	N/A	5.3	2 to 1		10.6
Total	**N/A**	**67.4**			**102.3**

3.2 OFF-SITE MITIGATION AREA

Impacts will be mitigated by creating an off-site mitigation area within the undisturbed portion of the Three Oaks Mine Permit Area concurrent with the initiation of active mining. In this manner, mitigation will have demonstrated success prior to the majority of impacts occurring. The mitigation site seeks to restore and enhance an existing riparian corridor that has previously been degraded by clearing and heavy cattle use. The entire mitigation area will be protected by a deed restriction to ensure its existence in perpetuity. The selected site was determined (with US Army Corps of Engineers [USACE] personnel input) to have very high potential for mitigative value. As will be described in the following, the approximately 55-acre site is located along Middle Yegua and Mine creeks and will be referred to as the Middle Yegua Mitigation Site.

As shown in Table 3-1, total mitigation acreage for long-term impacts is 102.3 acres composed of 33.9 acres of streams, 57.8 acres of ponds, and 10.6 acres of herbaceous wetlands. A minimum of 23.6 acres of streams and 5.3 acres of herbaceous wetlands will be restored in the mine reclamation (1 to 1 for the impacts). No off-site mitigation will be required for ponds, as pond acreage will be restored on the site in excess of calculated mitigation requirements during mine reclamation. The balance of required mitigation that will not be performed on the site during reclamation will be accomplished off the site at the Middle Yegua Mitigation Site. As described in Section 6.4, mitigation will be composed of wetland creation, existing riparian corridor enhancement, and wetland preservation. Based on calculations provided in Table 3-2, 10.3 acres of streams and 5.3 acres of wetlands must be mitigated off the site at the Middle Yegua Mitigation Site. Based on the mitigation ratios (assigned by type of proposed mitigation), 20.6 acres of stream (riparian corridor) enhancement and 5.3 acres of wetland creation will be required.

In addition to mitigating for the balance of required mitigation for long-term impacts, the Middle Yegua Mitigation Site will also provide mitigation for short-term impacts associated with the time between disturbance and reclamation of any particular “waters of the US.” Short-term impacts for stream and wetland mitigation performed on the site as part of reclamation will be mitigated at a rate of 0.5 to 1. Therefore, 11.8 acres of streams and 2.7 acres of wetland mitigation is required. Stream mitigation will be via enhancement, so mitigation will be performed at a ratio of 2 to 1; whereas wetland mitigation will be in the form of wetland creation at a ratio of 1 to 1.

Therefore, total mitigation acreage required at the Middle Yegua Mitigation Site is 52.2 acres based on the 20.6 acres and 5.3 acres for mitigation of long-term stream and wetland impacts, plus 23.6 acres and 2.7 acres for mitigation of short-term impacts to streams and wetlands. In addition to the 52.2 acres of required mitigation acreage, the Middle Yegua Mitigation Site contains approximately 3.2 acres of existing wetlands that will be preserved, so the mitigation site will total approximately 55 acres.

TABLE 3-2
OFF-SITE MITIGATION REQUIREMENT

CALCULATION FOR LONG-TERM (DIRECT) IMPACTS					
"Waters of the US"	**Required Mitigation (AC)**	**On-site Reclamation Mitigation (AC)**	**Balance of Mitigation (AC)**	**Mitigation Ratio**	**Required Off-site Mitigation (AC)**
Streams	33.9	23.6	10.3	2 : 1 (E*)	20.6
Wetlands	10.6	5.3	5.3	1 : 1 (C**)	5.3

CALCULATION FOR SHORT-TERM (TEMPORAL) IMPACTS					
"Waters of the US"	**Required Mitigation (AC)**	**Temporal Impact Ratio**	**Balance of Mitigation (AC)**	**Mitigation Ratio**	**Required Off-site Mitigation (AC)**
Streams	23.6	0.5:1	11.8	2 : 1 (E)	23.6
Wetlands	5.3	0.5:1	2.7	1 : 1(C)	2.7

TOTAL FOR LONG- AND SHORT-TERM IMPACTS	**52.2**

(E) Ratio based on enhancement of existing riparian corridor
(C) Ratio based on creation of wetlands

4.0 MITIGATION AREA DESCRIPTION

As previously described, the Middle Yegua Mitigation Site is located along reaches of Middle Yegua and Mine creeks. The approximate 55-acre mitigation site is situated east of the disturbance area and extends almost to the Three Oaks Mine Permit Area boundary in the central-eastern portion of the proposed Three Oaks Mine. This mitigation site was chosen due to its location along Middle Yegua Creek (which will not be significantly impacted during mining), the fact that it contains many of the undisturbed wetlands, and the presence of a large floodplain that has natural hydrology for wetland and riparian corridor development (Figure 4-1). This site was previously cleared of most trees except mature pecan and has been used extensively for cattle grazing.

Native pecan is the predominant tree species within the riparian zone. Sugar hackberry, cedar elm, and Ashe juniper *(Juniperus ashei)* are also present in low numbers in scattered areas. Due to the minimal canopy coverage (approximately 40%) and heavy cattle grazing, the understory is sparse in most areas. Understory species include yaupon, deciduous holly *(Ilex decidua)*, elbow bush *(Forestiera pubescens)*, mustang grape (*Vitis mustangensis)*, greenbrier *(Smilax bona-nox),* and various grasses.

Although the riparian corridor within the proposed mitigation site is currently of medium quality, there are significant enhancement opportunities to improve the overall quality, long-term sustainability, and species composition. Numerous areas within the riparian corridor have an open canopy. These openings (approximately 60% of the total acreage) will be targeted for enhancement with additional tree, shrub, and herbaceous plantings, as well as wetland creation.

MAP SOURCE:
AERIAL PHOTOGRAPHY:
ALCOA (AUGUST 2001)

EXPLANATION

- THREE OAKS PERMIT BOUNDARY (JULY 2000)
- DISTURBANCE BOUNDARY (JUNE 11, 2002)
- STREAM
- MITIGATION BOUNDARY AREA = APPROX. 55 ACRES
- 3' STREAM WIDTH
- STOCK PONDS
- WETLANDS

N

0 300 600
FEET

FIGURE 4-1

MIDDLE YEGUA MITIGATION SITE
THREE OAKS MINE
BASTROP AND LEE COUNTIES, TEXAS

ALCOA INC.
ROCKDALE, TEXAS

USACE APPLICATION NO. 199900331
JUNE 18, 2002

"Do Not Scale This Drawing"

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5.0 JURISDICTIONAL DETERMINATION

Section 404 jurisdictional areas within Three Oaks Mine Permit Area are composed of streams, stock ponds constructed on-channel, and small, depressional wetlands. Based on the mapped determination, jurisdictional acreages are as follows

Streams with Ordinary High-water Mark (OHWM)	44.1 acres
Ponds with OHWM	108.7 acres
Non-Forested Wetlands	8.7 acres
TOTAL	161.7 acres

No forested wetlands occur on the site.

The most widely distributed jurisdictional areas on the subject site are ephemeral and intermittent creeks, tributaries, and drainages with an OHWM. These jurisdictional areas traverse grassland, mesquite-grassland, upland woodland, and riparian woodland vegetative types throughout the proposed mine area. Typically, riparian vegetation is restricted to the immediate banks of these channels.

Stock ponds on the subject site were determined to be jurisdictional if constructed on a jurisdictional channel. Stock ponds constituted the majority of the jurisdictional areas by acreage. The perimeter of most of the stock ponds evaluated was devoid of vegetation. If herbaceous species did persist in the stock ponds, it was frequently limited to smartweed, spikerush, flatsedge, and rattle-bush. The outer perimeter of the ponds may contain black willow, eastern cottonwood (*Populus deltoides*), sugar hackberry, and/or cedar elm.

Jurisdictional wetlands on the subject site tend to be depressional areas near ephemeral creeks or impounded by stock pond embankments or roadways. Areas determined by Horizon to be wetlands are frequently dominated by herbaceous species such as smartweed, spikerush, flatsedge, and rush (*Juncus* sp.). Occasional canopy species include black willow, eastern cottonwood, sugar hackberry, and cedar elm. The soils are primarily clayey sands with 10YR4/2 and 10YR5/2 matrix colors. Mottles are rare to common throughout the top 12 inches of the soil.

The riparian woodlands on the subject site generally tend to be remnant corridors surrounded by previously cleared land. The most extensive riparian woodlands occurred along Willow Creek, Mine Creek, Middle Yegua Creek, and tributaries of Big Sandy Creek. Riparian woodlands are typically characterized by a dense overstory canopy and a well-developed understory and shrub layer.

None of the riparian woodland communities evaluated met jurisdictional criteria. Overstory species include native pecan, water oak, American elm, green ash, cedar elm, and sugar hackberry. A variety of vine species, predominately greenbriar, poison ivy (*Toxicodendron radicans*), and grape (*Vitis* sp.) commonly grow on trees in the overstory and understory. The herbaceous vegetation is generally patchy depending on the density of the canopy and abundance of litter. Soils in these areas are typically loamy sands with matrix colors of 10YR 6/3, 10YR 7/4, and 10YR 8/4. Mottling is rare. No obvious evidence of hydrology (e.g., water marks, sediment deposits, or scouring) is present.

6.0 DETAILED MITIGATION PLAN

6.1 MITIGATION PLAN OVERVIEW

The proposed mitigation plan will be conducted wholly within the Three Oaks Mine Permit Area. The mitigation plan strives to mitigate in kind at a minimum ratio of 1 to 1 and up to 2 to 1 for impacts to higher-quality aquatic environments. Measures will be taken to mitigate for short-term, long-term, and permanent impacts within the disturbance area.

Due to the on-going nature of mining, short-term impacts will occur throughout the life of the mine. Short-term impacts to be mitigated are defined as the time between disturbance and reclamation of any particular "waters of the US" in the disturbance area. Since reclamation is contemporaneous with mining, short-term impacts should not exceed the area of "waters of the US" that would be disturbed due to 3 years of mining. The short-term mitigative measures addressed in this plan include the construction and enhancement of temporary stream channels, wetlands, and ponds that will provide wildlife habitat; improving water quality; and maintaining open waterbodies. Proposed enhancements to temporary waterways, wetlands, and aquatic habitats include the following:

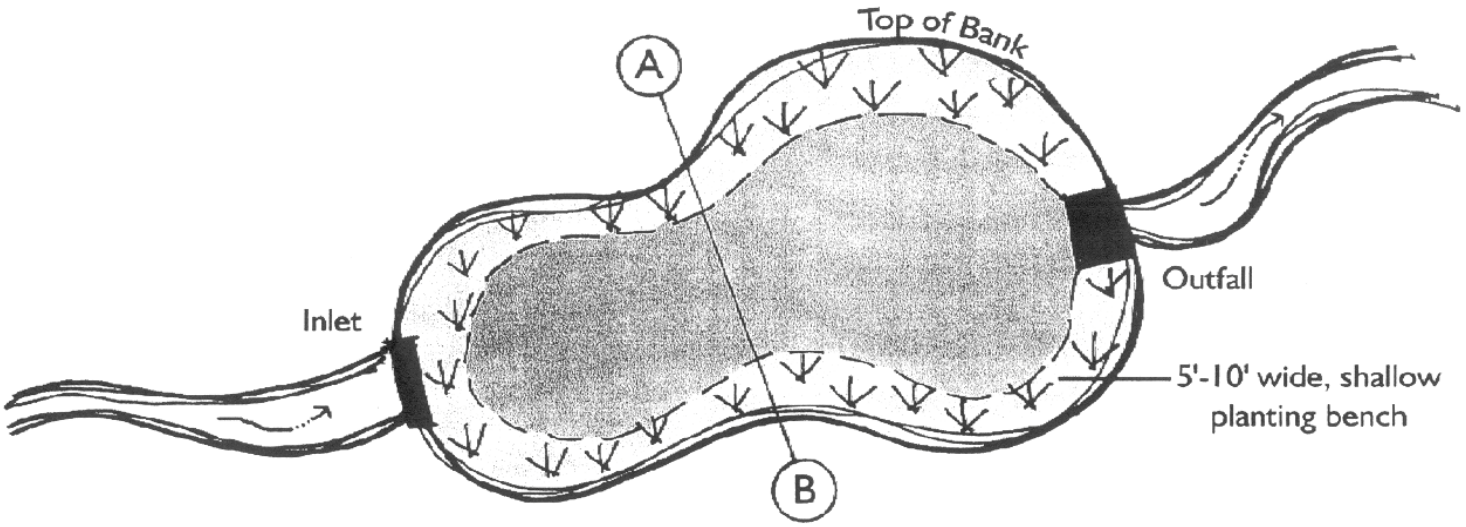
- planting cattail (*Typha latifolia*) and giant bulrush (*Scirpus californicus*) around the perimeter of temporary sedimentation ponds to provide enhanced water-quality treatment and habitat value
- placement of small check-dams or low-sill weirs in drainage channels to sedimentation ponds; the small retention area behind the weirs will be planted with wetland vegetation for additional water-quality treatment and habitat value
- use of depressurization water for the creation of temporary wetlands

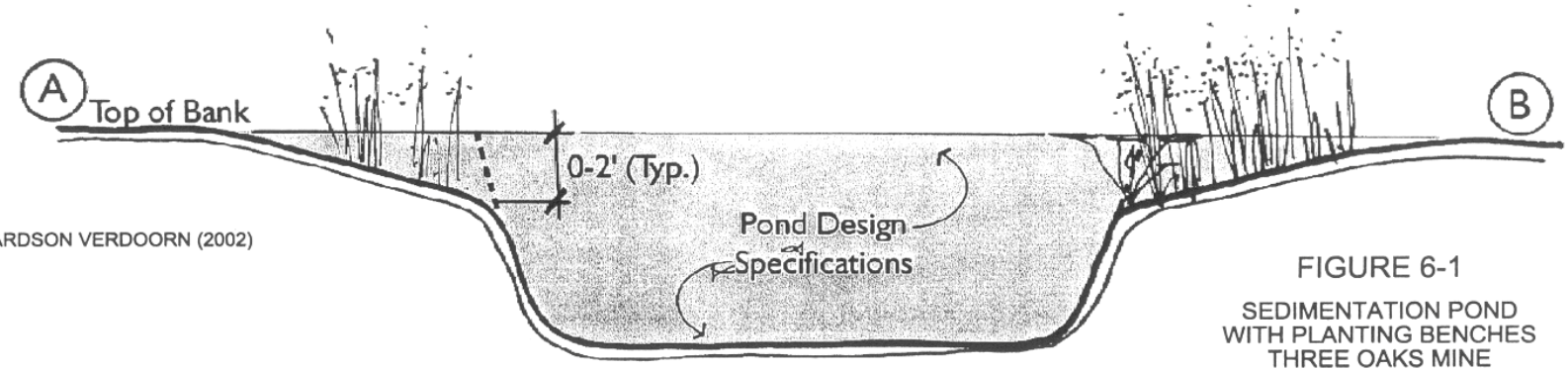
In addition to these enhancements and modifications to the mining process, Alcoa will enhance and deed-protect the approximately 55-acre Middle Yegua Mitigation Site. This portion of the mitigation plan will be initiated during the first year of mining to provide additional short-term mitigation to compensate for impacts in the first years of mining. Monitoring within the mitigation site will ensure success prior to the majority of the proposed impacts occurring.

6.2 TEMPORARY RECLAMATION

6.2.1 Temporary Sedimentation Ponds

As previously stated, numerous temporary sedimentation ponds will be constructed during mining. To increase sediment removal from the water column, cattails and giant bulrush will be planted around the perimeter of each pond within 60 days of pond construction. Sedimentation ponds will be constructed with a shallow planting bench, 5 to 10 feet wide along the perimeter of the ponds wherever practicable (Figure 6-1). Planting benches will gently grade from the surrounding ground elevation to a depth not to exceed 2.5 feet.





SOURCE: RICHARDSON VERDOORN (2002)

FIGURE 6-1

SEDIMENTATION POND
WITH PLANTING BENCHES
THREE OAKS MINE
BASTROP AND LEE COUNTIES

ALCOA INC.
ROCKDALE, TEXAS

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The planting bench will be constructed outside of the original design specifications for each pond and will, therefore, increase the capacity of each pond. If these benches significantly alter RCT designs, they will be constructed and planted after the RCT approves the new design. Cattail and giant bulrush will be installed on 10-foot centers throughout the shallow planting benches.

Species utilized are restricted to cattails and giant bulrush for several reasons. Both species are prolific and become established very quickly, spreading via vegetative propagation and seed. Both species will vegetate areas having hydrologic regimes ranging from saturated soils to approximately 2.5 feet of water. Sturdy stems provide dense stands that significantly slow waters, increasing sedimentation rates. Most importantly, both species have been proven to have excellent nutrient uptake rates that will significantly increase water-quality outfall from the ponds.

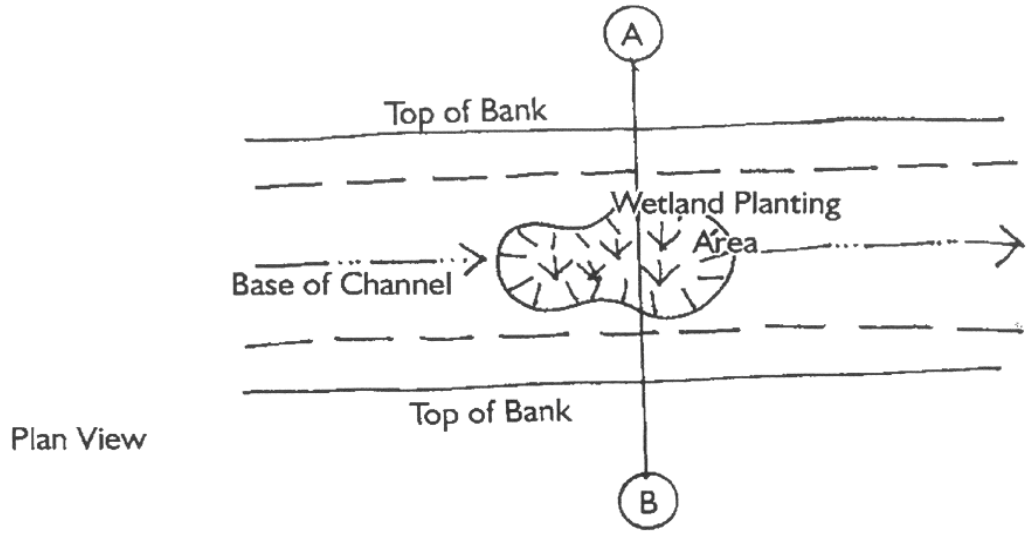
6.2.2 Pools in Temporary Stream Channels

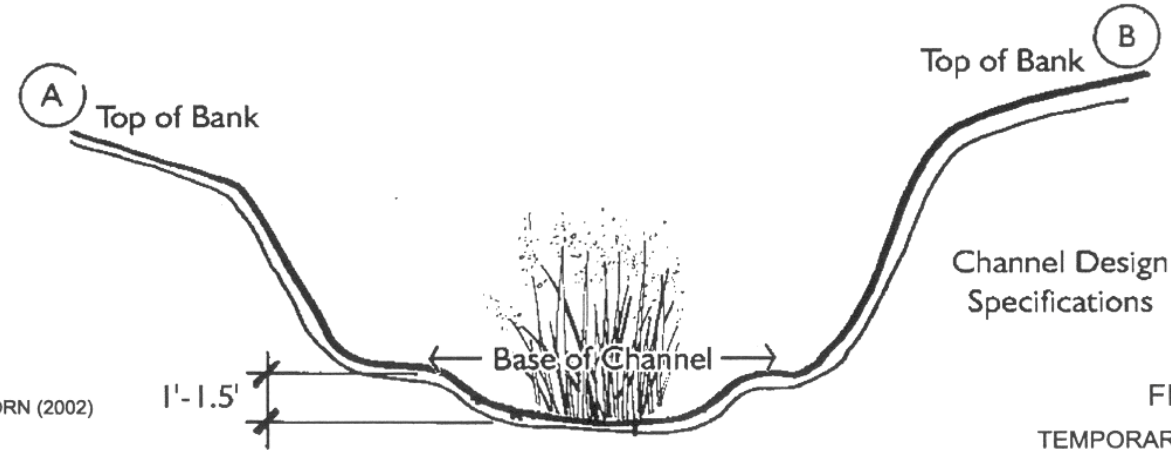
During active mining, existing streams on the site are frequently relocated. Constructed stream channels are typically trapezoidal channels that are seeded with upland grasses throughout in an effort to stabilize sideslopes and prevent erosion. Frequently, these constructed stream channels are ephemeral or have a trickle flow in the base of the channel. Excavation of shallow pools (1 to 1.5 feet deep) in the stream channels will create small wetland depressions and improve sediment deposition (Figure 6-2). The elongated pools will be 20 to 40 feet long, but will not abut stream channel sideslopes to reduce the potential for erosion. The pools will be excavated at a minimum of every 500 feet along the constructed temporary stream channels and will be planted with hydrophytic vegetation at a rate of 200 plants per acre. Plants will be bare-root or in planting sleeves from nursery-grown stock. Species to be utilized include spikerush, soft bulrush (*Juncus effusus*), sedge, and flatsedge. Species selection will be based on plant availability and predicted hydrology within the stream channel.

6.3 FINAL RECLAMATION

6.3.1 Phased Construction for Permanent Streams

As discussed previously, several techniques will be utilized during mining operations to mitigate for short-term impacts. Most of the techniques are aimed at improving water quality and maintaining wildlife habitat in the interim between disturbance and permanent restoration of "waters of the US." Although the temporary stream channels do provide some mitigative value, they typically do not provide as many linear feet of channel as existed in the pre-mining condition. Additionally, the stream channels are trapezoidal and planted with upland herbaceous vegetation selected primarily for its capacity to prevent erosion. As part of the permanent stream restoration, temporary stream channels will be eliminated and replaced with more natural stream channels and wooded riparian corridors that form a dendritic pattern.





Channel Design Specifications

SOURCE: RICHARDSON VERDOORN (2002)

FIGURE 6-2

TEMPORARY STREAM CHANNEL
WITH POOL
THREE OAKS MINE
BASTROP AND LEE COUNTIES

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Performing this type of permanent stream channel restoration on an annual basis is not practical due to the linear nature of strip mining. Land is reclaimed in long, linear strips and is highly regulated by the RCT. It is impractical to restore short segments of streams following each linear "cut." Additionally, post-construction contours are somewhat different from pre-mining contours based on the depth and number of seams to be mined. Therefore, this mitigation plan proposes to delay permanent stream restoration for a period of 3 to 5 years (depending on site-specific conditions and drainage patterns) to enable creation of a stream system with secondary and (potentially tertiary) tributaries within a large, restored drainage basin (watershed). There are several advantages to waiting a few years to perform permanent stream restoration. The RTC has strict guidelines regulating erosion and settling within restored mine lands. By allowing 3 to 5 years prior to permanent stream restoration, the reclaimed lands will have time to settle. Additionally, if some areas require re-grading or soil amendments, those improvements could be made and would also have time to stabilize. By allowing the planted grasses to mature, the permanent stream restoration areas will be much less susceptible to erosion during earth-moving activities and surface water runoff to the permanent streams will also contain less sediment load. However, the most significant benefit will be to allow enough land to be reclaimed that significant lengths or reaches of streams (including tributaries) can be constructed. Utilizing this methodology will provide the most natural stream restoration and surface water drainage patterns. The projected post-mining surface contours for the Three Oaks Mine Permit Area contain numerous large ponds surrounded by gently rolling hills. These hills and gently sloping plains surrounding the ponds lend themselves well to the construction of a dendritic stream system.

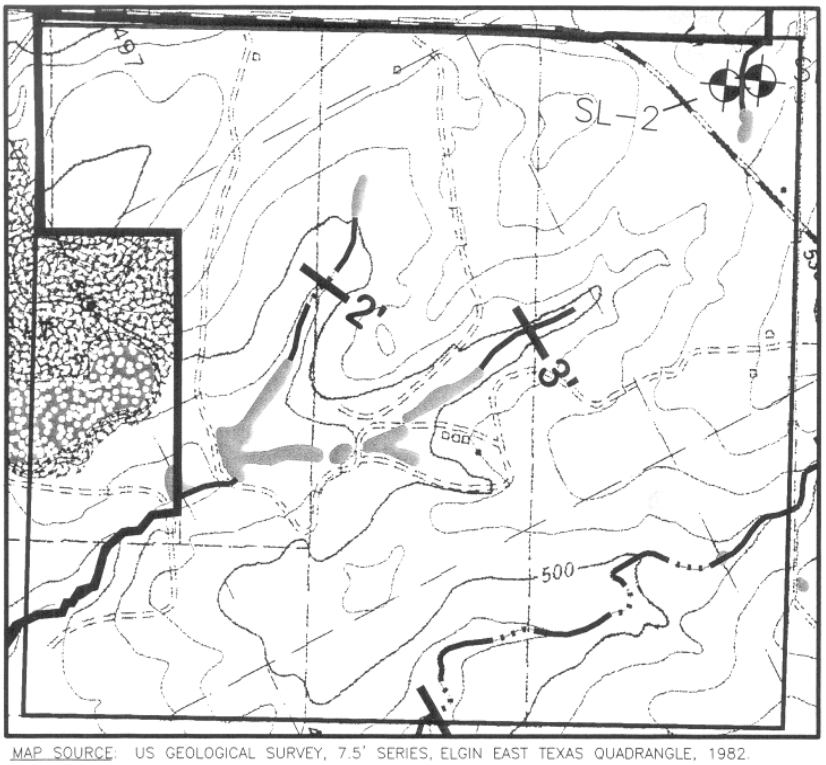
A preliminary stream channel conceptual design was performed on a small section of land within the southwestern corner of Three Oaks Mine Permit Area (Figure 6-3). An analysis was conducted of pre-mining conditions versus post-mining conditions, including length of jurisdictional streams, pond acreage, wetland acreage, and riparian corridor. The following table presents the results of this analysis.

TABLE 6-1
CONCEPTUAL RESTORATION OF "WATERS OF THE US" ANALYSIS

	PONDS (AC)	STREAMS (LF)	WETLANDS (AC)	RIPARIAN CORRIDOR (AC)
PRE-MINING	7	7500	0	0*
POST-MINING	27	6000	0	130

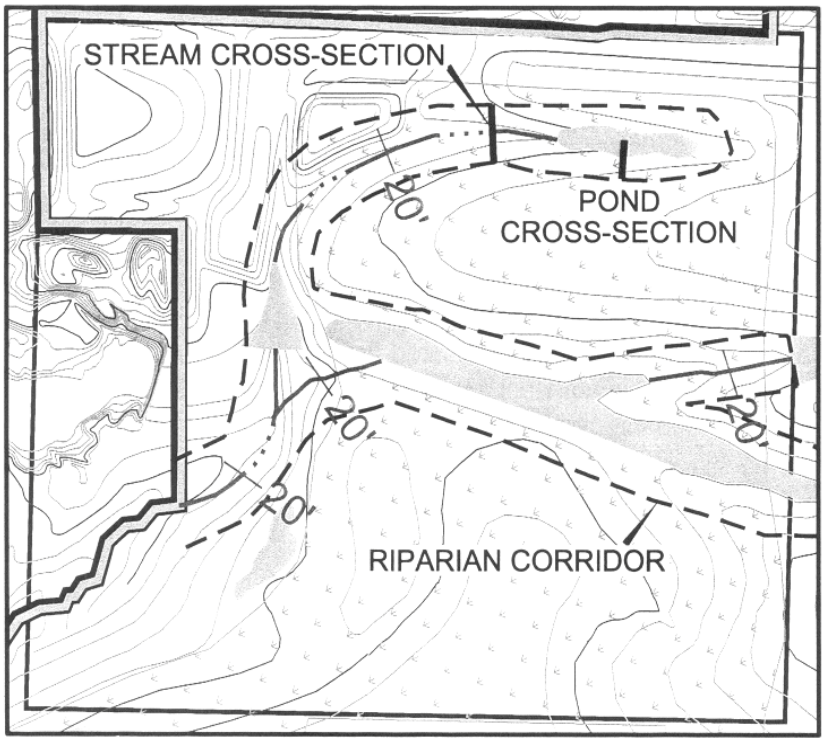
*Riparian corridor acreage in pre-mining condition based on vegetation analysis.

This analysis is conceptual only and not meant as an accurate representation of the proposed mitigation. The Post-Mining Contour Map (which this analysis is based on) provides a very generalized depiction of the surface contours after the area has been reclaimed; however, it does not show final contours or micro-topography.



MAP SOURCE: US GEOLOGICAL SURVEY, 7.5' SERIES, ELGIN EAST TEXAS QUADRANGLE, 1982.

PRE-MINING CONDITION



CONCEPTUAL POST-MINING CONDITION

EXPLANATION

FISH AND WILDLIFE POST MINE LAND USE

RIPARIAN CORRIDOR

0 600 1200
FEET

FIGURE 6-3

CONCEPTUAL RESTORATION OF WATERS OF THE U.S.
BASTROP AND LEE COUNTIES

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Although this pre- and post- mine map shows a deficit for stream-channel length, actual reclamation will yield greater lengths than this computer-generated conceptual map. Although reclaimed lands typically do follow the general projected contours, actual surface elevations have significant undulations and micro-topography that is not reflected in this type of analysis. Therefore, creation of numerous secondary and potentially tertiary stream channels is possible, but will be based on site-specific conditions that cannot easily be projected. The analysis does indicate the significant increase in riparian corridor and pond acreage projected in the post-mining condition.

6.3.2 Stream Channel Design

The permanent stream channels will be significantly different from the temporary, trapezoidal channels. Within previously reclaimed areas, stream corridors will be cut into broad, gentle swales that will be created post-mining. Restored streams will meander with a sinuosity that is appropriate for specific site conditions. Typical streams will have meander lengths 2 to 5 times the width of the meander. All restored streams will be constructed with a minimum of 1 floodplain terrace to mimic natural conditions and to provide for a broad, wooded riparian corridor (Figure 6-4). The stream design includes creating braided low-flow channels within the broad stream channel base (Figure 6-5). Braided channels would maximize wet areas within the base of the constructed channel and would minimize erosive forces. Oxbows and small depressional areas will also be included to increase wetland habitats in the base of the channel.

With the exception of the braided channels, the base of the stream channel would be sparsely planted throughout. Native tree, shrub, and herbaceous species will be selected based on their inundation tolerance. Recommended species are provided in Table 6-2. Sideslopes from the base of the channel to the lower floodplain terrace will be gentle (greater than 4 to 1) to reduce potential erosion along the stream banks. The lower floodplain terrace will be constructed at an elevation anticipated to be frequently flooded. In larger streams with appropriate hydrology, an upper floodplain terrace will be created at an elevation predicted to be seasonally flooded. Sideslopes will be gentle (greater than 4 to 1). The width of the floodplain terraces will vary greatly based on the size of the stream and site-specific parameters. Both the lower and upper floodplain terraces will be planted with numerous native species to help restore a broad riparian corridor.

To further enhance the constructed riparian corridor, the lower floodplain terrace of some streams will have shallow depressions and low rock berms installed (Figure 6-6). The rock berms and shallow depressions will be constructed sporadically within the lower floodplain terrace of appropriate streams where enhancement of the hydrologic regime is determined to be most effective. Because of the greater flexibility of new stream-channel construction compared to enhancing existing high-quality corridors, the shallow depressions (1 to 1.5 feet deep) will be more frequent in the base of the constructed stream channels and associated floodplain terraces and will likely be more irregularly shaped. Berms will also be utilized more frequently for sideslope and channel stabilization, as well as water impoundment. However, no concrete or grouted rock structures will be utilized.

TABLE 6-2
RECOMMENDED SPECIES LIST

HARDWOOD TREES	SCIENTIFIC NAME	PLANTING AREA
Bald Cypress	*Taxodium distichum*	SW, FF
Black Cherry	*Prunus serotina*	SF, UP
Black Hickory	*Carya texana*	UP
Black Walnut	*Juglans nigra*	SF, UP
Blackjack Oak	*Quercus marilandica*	UP
Bur Oak	*Quercus macrocarpa*	SF, UP
Cedar Elm	*Ulmus crassifolia*	SF, UP
Live Oak	*Quercus virginiana*	UP
Mexican Plum	*Prunus mexicana*	UP
Osage Orange	*Maclura pomifera*	UP
Pecan	*Carya illinoensis*	FF, SF, UP
Post Oak	*Quercus stellata*	UP
Red Mulberry	*Morus rubra*	SF, UP
Redbud	*Cercis canadensis*	UP
Shumard Oak	*Quercus shumardii*	SF, UP
Sugarberry	*Celtis laevigata*	SF, UP
Sweetgum	*Liquidambar styraciflua*	SF, UP
Texas Persimmon	*Diospyros texana*	SF, UP
Texas Red Oak	*Quercus buckleyi*	UP
Water Oak	*Quercus nigra*	SF, UP
Water Hickory	*Cayra aquatica*	SW, FF
Winged Elm	*Ulmus alata*	SF, UP

SHRUBS	SCIENTIFIC NAME	PLANTING AREA
American Beautyberry	*Callicarpa americana*	UP
American Elderberry	*Sambucus canadensis*	SF
Azaleas	*Rhododendron* spp.	UP
Bayberry, Waxmyrtle	*Myrica cerifera*	FF, SF, UP
Buttonbush	*Cephalanthus occidentalis*	SW, FF
Carolina Buckthorn	*Rhamnus caroliniana*	SF, UP
Coralberry	*Symphoricarpas orbiculatus*	UP, SF
Deciduous Holly	*Ilex decidua*	SF, UP
Elbowbush	*Foresteria pubescens*	UP
Farkleberry	*Vaccinium arboreum*	SF, UP
Fragrant Sumac	*Rhus aromatica*	SF, UP
Hawthorn	*Crateagus* spp.	SF, UP
Honey Mesquite	*Prosopis glandulosa*	UP
Roughleaf Dogwood	*Cornus drummondii*	SF, UP
Shining Sumac	*Rhus copallina*	UP
Yaupon	*Ilex vomitoria*	SF, UP

VINES	SCIENTIFIC NAME	PLANTING AREA
Carolina Jessamine	*Gelsemium sempervirens*	SF, UP
Dewberry, Blackberry	*Rubus* spp.	SF, UP
Greenbriars	*Smilax* spp.	SF, UP
Peppervine	*Ampelopsis arborea*	SF, UP
Trumpet Creeper	*Bignonia radicans*	SF, UP
Trumpet Honeysuckle	*Lonicera sempervirens*	SF, UP
Virginia Creeper	*Parthenocissous quinquefolia*	SF, UP
Wild Grape	*Vitis* spp.	SF, UP

FORBS	SCIENTIFIC NAME	PLANTING AREA
Bluebonnets	*Lupinus* spp.	UP
Bundleflower	*Desmanthus* spp.	UP
Partridge Pea	*Cassia fasiculata*	SF, UP
Beebalms	*Monarda* spp.	UP
Common Sunflower	*Helianthus annus*	UP
Coneflowers	*Rudbeckia* spp.	UP
Crotons	*Croton* spp.	SF, UP
Dayflowers	*Commelina* spp.	SF, UP
Engelmann Daisy	*Engelmannia pinnatifida*	UP
Fleabanes	*Erigeron* spp.	SF, UP
Gayfeathers	*Liatris* spp.	SF, UP
Heath Aster	*Aster ericoides*	UP
Maximillian Sunflower	*Helianthus maximiliani*	UP
Prairie Coneflower	*Ratibida columnaris*	UP
Sensitivebriar	*Schrankia nuttallii*	UP

GRASSES	SCIENTIFIC NAME	PLANTING AREA
Beaked Panicum	*Panicum anceps*	SF
Broomsedge Bluestem	*Andropogon virginicus*	UP
Florida Paspalum	*Paspalum floridanum*	FF, SF
Green Sprangletop	*Leptochloa dubia*	FF, SF
Indiangrass	*Sorghastrum nutans*	SF, UP
Purpletop	*Tridens flavus*	UP
Sideoats Grama	*Bouteloua curtipendula*	UP
Switchgrass	*Panicum virgatum*	SF, UP

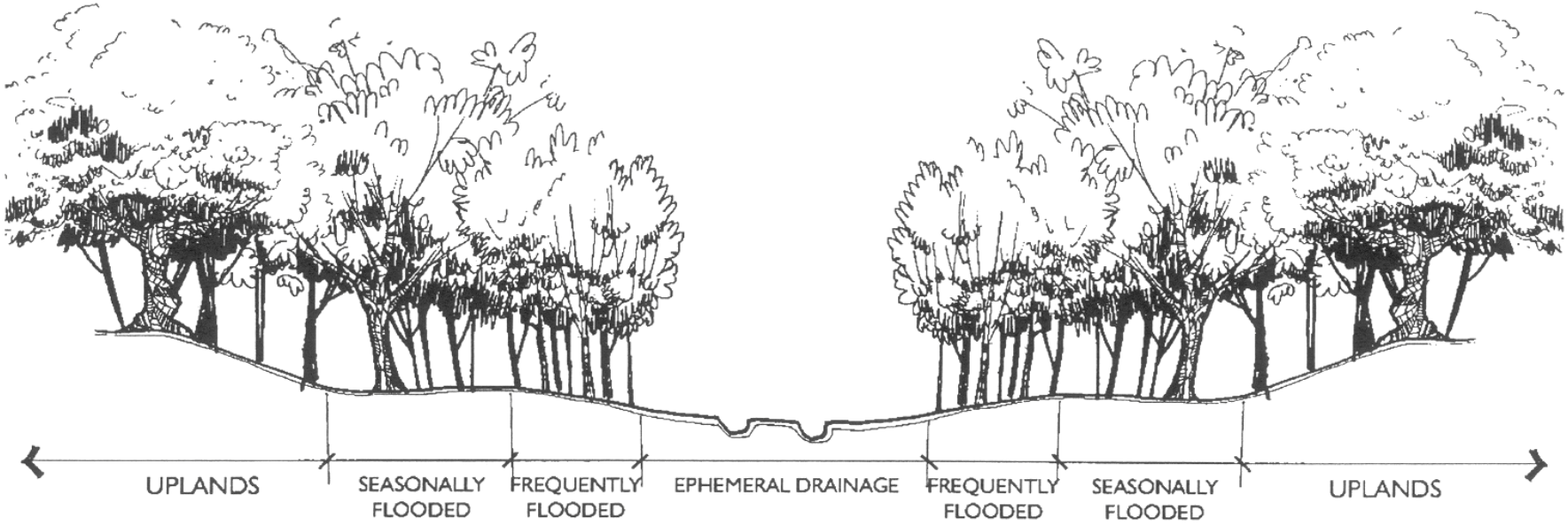
HYDRIC AND AQUATIC	SCIENTIFIC NAME	PLANTING AREA
Arrowhead	*Sagittaria* spp.	SW
Barnyardgrass	*Echinochloa* spp.	FF
Bulrush	*Scirpus* spp.	SW
Common Cattail	*Typha latifolia*	SW
Duckweeds	*Lemnaceae* spp.	SW
Japanese Millet	*Echinocloa crus galli*	SW
Naid	*Najas* spp.	SW
Pondweed	*Potamogeton* spp.	SW
Spikerushes	*Eleocharis* spp.	SW, FF
Water Primrose	*Ludwigia peploides*	SW, FF
Water Lotus	*Nelumbo lotea*	SW
Marsh Millet	*Zizaniopsis miliacea*	SW

SW= standing water

FF= frequently flooded

SF= seasonally flooded

UP= upland



SOURCE: RICHARDSON VERDOORN (2002)

FIGURE 6-4

STREAM TERRACE DESIGN
THREE OAKS MINE
BASTROP AND LEE COUNTIES

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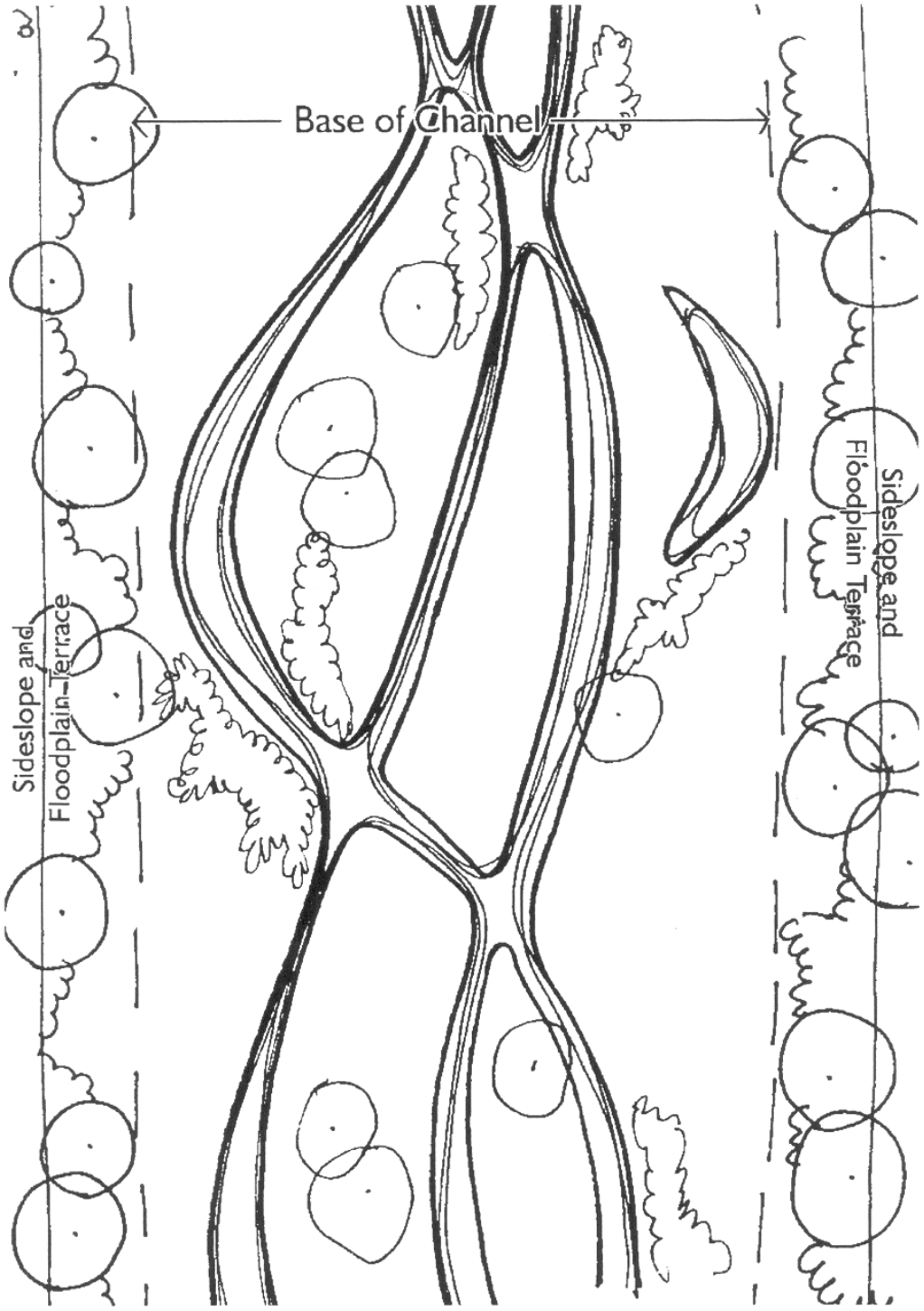

SOURCE: RICHARDSON VERDOORN (2002)

FIGURE 6-5

PLAN VIEW OF
BRAIDED STREAM CHANNEL
THREE OAKS MINE
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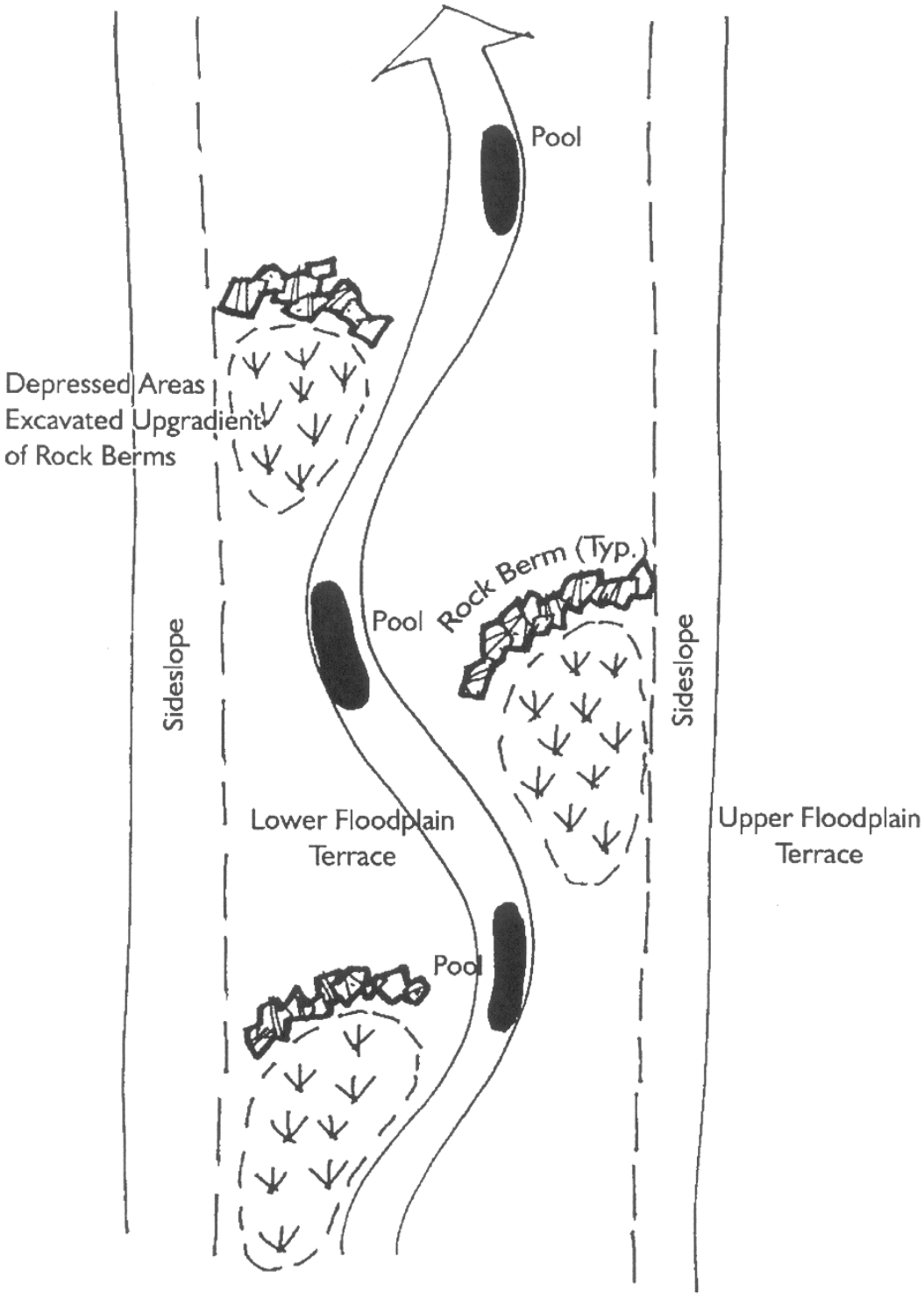

SOURCE: RICHARDSON VERDOORN (2002)

FIGURE 6-6

PLAN VIEW OF
CHANNEL ENCHANCEMENTS
THREE OAKS MINE
BASTROP AND LEE COUNTIES

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This form of stream channel restoration and riparian corridor creation will provide in excess of the required wetland mitigation. Created wetlands will also be more typical of the historical (natural) site conditions than currently represented on the site. Most of the wetlands currently present on the site are related to stock pond impoundments or impoundments caused by elevated, improperly culverted roads. By re-establishing broad, wooded riparian corridors with wetland depressions, many of the important functions and values that wetlands are capable of providing (which are not currently being provided or which are minimally provided) will be reintroduced to the area.

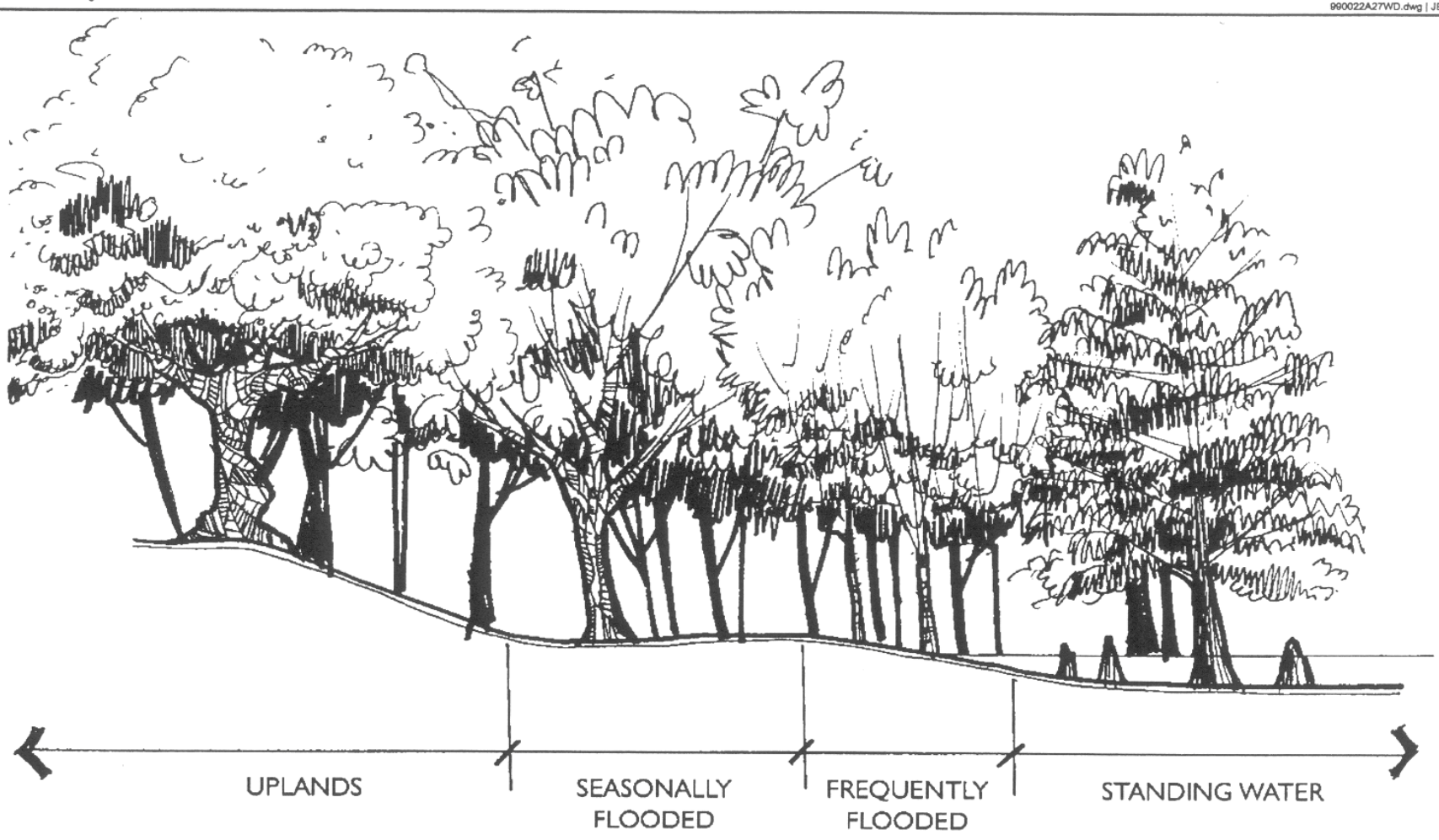
6.3.3 Pond Design

Similar to wetland design, ponds retained or constructed on the site as part of the permanent reclamation and mitigation will be integrated into the riparian corridor design. As with streams, ponds will be constructed with a minimum of 1 lower floodplain terrace that is designed at an elevation to be frequently flooded. Where surrounding topography allows, larger ponds will have a second terrace that is designed to be seasonally flooded (Figure 6-7). To mimic natural conditions and to prevent erosion, sideslopes will be gentle (greater than 4 to 1). Wherever practicable, ponds will be constructed with a shallow planting bench (5 to 10 feet wide, not to exceed 2.5 feet deep) around their perimeter. Native tree, shrub, and herbaceous species will be planted throughout the planting bench and terrace(s) based on their inundation tolerance. Recommended species are provided in Table 6-2.

6.4 MIDDLE YEGUA MITIGATION SITE

This portion of the mitigation plan will be initiated during the first year of mining to provide additional compensation for short-term impacts in the first years of mining. The grading and planting will be completed within 2 years of receipt of all appropriate permits. Although the riparian corridor within the proposed mitigation site is currently impacted and of medium quality, there are significant enhancement opportunities to improve the overall quality, long-term sustainability, and species composition. As will be discussed later, the mitigation site will be surveyed and a fence erected to ensure that no further impacts occur due to cattle grazing, etc.

As discussed previously, the mitigation site currently has canopy coverage of approximately 40%, with the sparsely vegetated openings dominated by shrub and herbaceous species. These “openings” (approximately 60% of the total acreage) will be targeted for enhancement. Enhancements include excavating small, shallow depressions within the floodplain; planting herbaceous hydrophytic species within the depressions; adding low rock berms and snag piles; and planting trees and shrubs throughout the corridor to enhance species diversity.



SOURCE: RICHARDSON VERDOORN (2002)

FIGURE 6-7

POND DESIGN WITHIN
RIPARIAN CORRIDORS
THREE OAKS MINE
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The excavated depressions will vary significantly based on site-specific parameters and are projected to occupy approximately 8.0 acres. An effort will be made to situate the depressions so mature, desirable trees and shrubs are avoided wherever possible. Some depressions will simulate oxbows, while others will have a more circular shape. Typically, the depressions will be 0.25 to 0.50 acres in size and will not exceed 2.5 feet in depth. Sideslopes will be gentle (greater than 5 to 1) to mimic natural conditions. The depressions will be planted with primarily herbaceous species; however, several hydrophytic trees and shrubs will be installed around the perimeter of these features where space allows. Excavated material will be formed into raised islands in the floodplain area (but not within jurisdictional areas) and vegetated with trees and shrubs to create refuge areas during flood events.

If trees are removed to create the depressions, the resultant logs will be placed in piles in the floodplain to create wildlife habitat and potentially impound water during high flows. Low rock berms may also be installed parallel to the stream channel to further impound floodwaters similar to those described in Section 6.3.2 (See Figure 6-6). The berms will be up to 12 inches tall and 20 feet long and will be interspersed throughout the lower terraces perpendicular to the creek channel. The berms may be constructed from a variety of natural rock material available ranging from small diameter (2- to 6-inch) rock in gabion baskets to large-diameter rock native to the site. The berms are intended to detain water to increase the hydroperiod in the area immediately upgradient, so that these areas will support hydrophytic species and eventually may develop wetland characteristics.

6.5 DEPRESSURIZATION WATER FOR WETLANDS

Depressurization water may be utilized to subsidize water on an as-needed basis for establishing temporary wetlands and permanent wetland vegetation.

7.0 EXISTING LIENS AND ENCUMBERANCES

There are no known liens on any of the property in the Three Oaks Mine Permit Area. The property is encumbered by numerous rights-of-way (ROWs) and easements for power lines, phone lines, gas lines, water lines, and public roads. Plans are to permanently reroute these utilities and roads around the mining project, but agreements have not been reached with all of the owners of the ROWs and easements. It is possible that some of these easements and ROWs could still exist after mining (the reroute could be temporary). It is not possible to accurately predict which ones might continue to exist.

Additionally, Alcoa owns very little of the property to be mined. Most of the area to be disturbed is leased to Alcoa by CPS and others. These leases give Alcoa the right to mine the property and reclaim the land, but no perpetual rights. The leases obligate Alcoa to use all reasonable efforts to release the lands from the lease for unrestricted use by the owners.

The land ownership issue will affect Alcoa's mitigation plan. Alcoa believes it can obtain a deed restriction for the approximate 55-acre Middle Yegua Mitigation Site. It would not be appropriate to assume that deed restrictions could necessarily be obtained for the jurisdictional areas to be created in the reclaimed area of the mine. The location and actual extent of these future waters is not known and no reasonable property owner is likely to agree to deed restrictions for areas of unknown location and unknown size. It should be noted that these future "waters of the US" created by mine reclamation will be protected by the same rules and regulations that are prompting this mitigation plan. Any significant disturbance to these future "waters of the US" would require approval of the USACE. As a part of its mitigation plan, Alcoa will notify each property owner of the location of "waters of the US" that have been created on his/her property prior to the release of the property from the mining lease. Alcoa will also notify the USACE of the release of the property and furnish the USACE with the name and address of the current owner.

8.0 BEST MANAGEMENT PROCEDURES UTILIZED DURING MINING

Measures proposed for protecting adjacent streams, wetlands, and other aquatic areas are twofold:

- those designed to ensure that mine discharges do not degrade downstream water quality such that aquatic habitats are negatively impacted
- those designed to ensure that mine operations do not impact downstream aquatic habitats by causing significant decreases in water quantity

8.1 MINE DISCHARGE PROTECTIVE MEASURES

Alcoa uses a series of sediment control ponds and diversions to capture and treat water from the active mine areas. Additionally, Alcoa uses a variety of BMPs to minimize sediment contributions from areas disturbed by mining and construction. These practices generally result in water quality discharges from the mine of better quality than the natural stream flow, particularly with respect to sediment loading. A comparison of the existing water quality within the Three Oaks Mine Permit Area to the anticipated water quality of mine discharges follows, as well as a discussion of the water treatment systems and BMPs to be used at Three Oaks Mine.

8.1.1 Baseline Water Quality

Substantial baseline water-quality information was collected from the streams and drainages within the proposed Three Oaks disturbance area. This information is sufficient to assess the quality of water originating from the proposed mine area that is currently available to downstream aquatic habitats. Of the various water-quality constituents monitored, the most likely constituents to be impacted by the proposed surface mining activities are pH, iron, Total Dissolved Solids (TDS), and Total Suspended Solids (TSS).

TABLE 8-1
BASELINE WATER QUALITY SUMMARY

Constituent	Minimum	Maximum	Average
pH	6.1 s.u.	8.8 s.u.	7.1 s.u.
TSS	10.6 mg/l	218 mg/l	58.2 mg/l
TDS	50 mg/l	1860 mg/l	475 mg/l
Iron	0.5 mg/l	7.9 mg/l	2.9 mg/l

Of these constituents, benthic organisms are most sensitive to sediment loading (TSS). Suspended solids cause turbidity and reduce the amount of sunlight into the water column, thereby reducing the density of primary producers and limiting photosynthetic activity. Additionally, subsequent deposition of large amounts of sediment can create problems for aquatic organisms by covering up habitat and filling in slow-moving areas of streams. Consequently, the pre-mine TSS concentrations should be compared to anticipated active-mine and post-mine TSS concentrations to assess whether mine discharges would negatively impact adjacent downstream aquatic habitats.

8.1.2 TNRCC Effluent Limitations

Three outfalls have been designated in the Texas Pollution Discharge Elimination System (TPDES) permit application for Three Oaks Mine. These outfalls are located on stream channels at the approximate mine permit boundary (Figure 8-1), and they are considered to be "conceptual outfalls." Releases from any sedimentation ponds (managed waters) that are located within the watershed of a "conceptual outfall" will pass through the outfalls. Other waters will also pass through the outfalls, including depressurization releases, stormwater runoff from undisturbed areas, and any naturally occurring baseflow in the stream. Since the designated outfalls are "conceptual outfalls" that pass managed waters as well as large volumes of water from undisturbed areas, specification of flow or quality limits at the outfall is not appropriate. Instead, the TNRCC more appropriately places limitations upon the outfalls of the individual sedimentation ponds, wherever they may be located within the watershed. All discharges from the sedimentation ponds, regardless of the flow rate, are required to comply with quality limitations.

During construction and the active mining phase, the effluent monitoring and reporting requirements and the effluent limitations are based on 40 CFR Part 434.45 and are as follows:

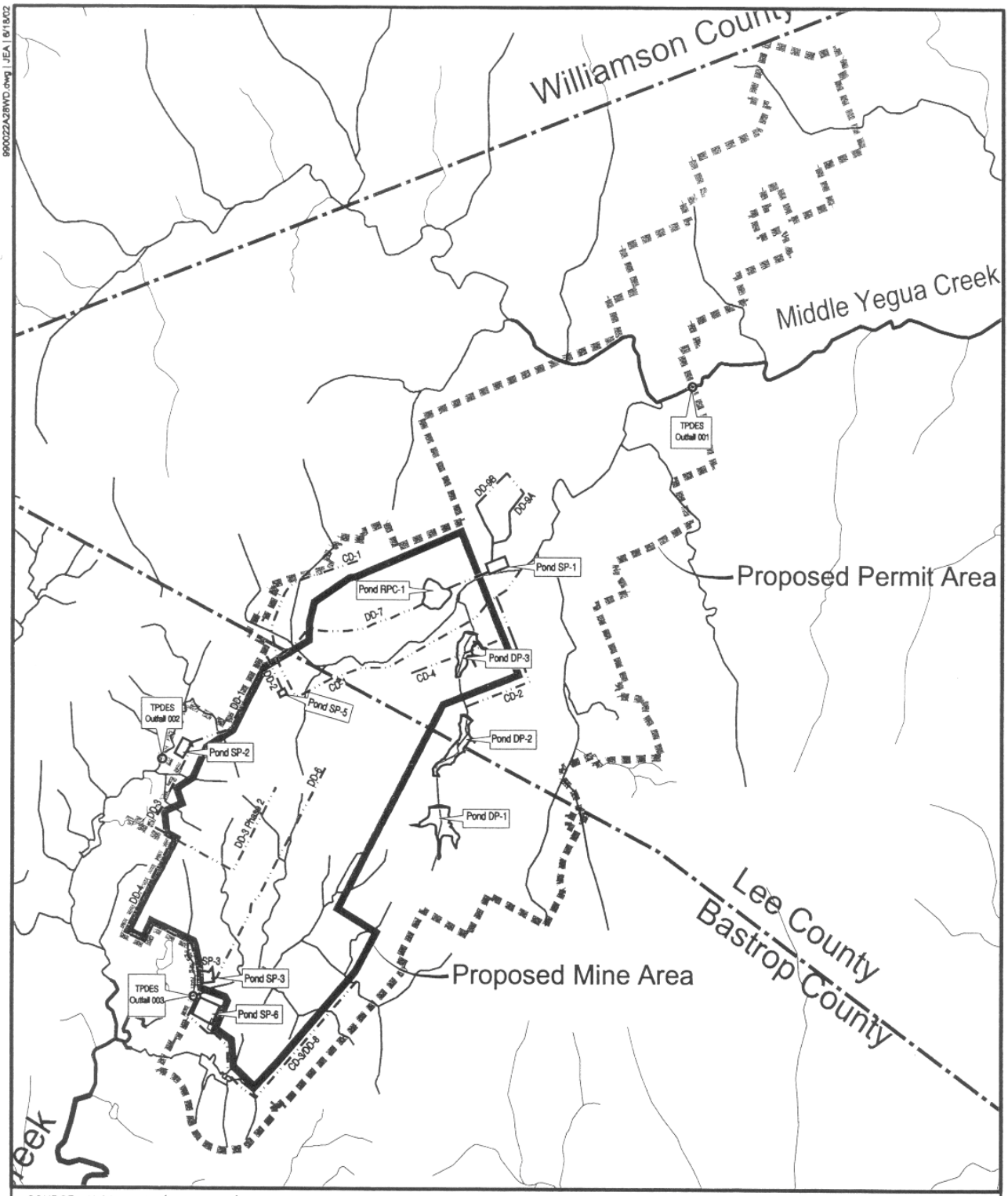
TABLE 8-2
EFFLUENT LIMITATIONS

Outfall Number	Pollutant	Daily Average	Daily Maximum
001, 002, and 003	Flow	Report MGD	Report MGD
	TSS	35 mg/l	70 mg/l
	Iron, Total	3.0 mg/l	6.0 mg/l
	TDS	Report mg/l	Report mg/l
	pH	6.0 s.u. (min)	9.0 s.u.

Thus, the effluent limits stipulated by the TPDES permit ensure that discharges from Three Oaks sedimentation ponds will have TSS concentrations that are significantly lower than those occurring in the streams naturally. The TPDES permit requires that the maximum TSS concentration be 70 mg/l or less, where the maximum concentration measured during the baseline-monitoring period was 218 mg/l. Likewise, TPDES requires that the average TSS concentration be 35 mg/l or less, where the baseline average concentration was 58 mg/l. Consequently, if TPDES permit requirements are met, the water quality of mine discharges will not degrade downstream aquatic habitats.

8.1.3 Sedimentation Control and Treatment Structures at Three Oaks Mine

Alcoa is certain that discharges from the Three Oaks Mine will comply with TPDES effluent limitations. This certainty is based on Alcoa's experience at its existing Sandow Mine, where similar sediment control methods and treatment structures are used. Alcoa has a good track record of meeting the TPDES effluent water-quality standards for its pond discharges.



SOURCE: ALCOA INC. (JUNE 2002)

0 3500 7000
FEET

FIGURE 8-1

SURFACE WATER CONTROL STRUCTURES
AND PRIMARY DRAINAGES
THREE OAKS MINE
BASTROP AND LEE COUNTIES

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Horizon
ENVIRONMENTAL SERVICES, INC.

Alcoa will construct a number of engineered sedimentation ponds for sediment control and treatment. A system of diversions and ponds around the perimeter of the mine area will ensure that all mine drainage is captured and treated to meet effluent limitations prior to discharge. The locations of these control structures are shown on Figure 8-1. Sediment ponds are identified by the "SP" prefix, detention ponds are identified by the "DP" prefix, and reclamation ponds are identified by the "RP" prefix. The drawing identifies only those ponds and diversions that are necessary for water-control purposes. There will be numerous reclamation ponds in the post-mine landscape that are not shown on Figure 8-1.

The sediment ponds (SP-1, SP-2, SP-3, and SP-5) have been designed to provide sufficient detention time for settling of suspended solids such that the pond effluent will meet the discharge limitations stipulated in the pending TPDES permit application. Texas coal mining regulations require that these ponds be designed to have a minimum of 10 hours of detention time for a storm with a 10-year, 24-hour recurrence interval. Typically, Alcoa's sediment ponds are designed with 20 to 24 hours of detention time. Alcoa uses baffles within the sediment ponds, on an as-needed basis, to prevent short-circuiting and to increase the plug-flow detention time. Additionally, Alcoa also may apply flocculants to influent in order to decrease the settling time of suspended particles. The result is that the proposed sedimentation ponds at Three Oaks Mine ensure that mine discharges will not degrade water quality, thereby protecting downstream adjacent wetlands, streams, and other aquatic areas.

8.1.4 Best Management Practices

Under some circumstances, construction activities may take place in areas where runoff is not captured and treated by the perimeter sedimentation ponds. This occurs when Alcoa constructs the perimeter sedimentation ponds and diversions for the mine area; when depressurization or monitoring well pads and access roads are constructed outside the mine area; or when road construction and utility reroutes occur outside the mine area. In these cases, Alcoa uses BMPs to control erosion and minimize downstream sedimentation of adjacent areas. BMPs are also used within the mine area so as to minimize erosion and to reduce sediment loading on the sediment treatment ponds. A list of the BMPs to be used at the mine follows:

Temporary Vegetation - Areas that are disturbed by construction are revegetated as quickly as possible following construction activity to help control erosion. Depending upon season and moisture, Alcoa plants either quick-germinating, temporary vegetation or permanent vegetation. Timely revegetation efforts minimize sediment production. Additionally, timely revegetation saves money that would otherwise be spent repairing erosional rills and gullies and repairing engineered structures such as embankments, terraces, berms, and diversions. Seeding rates for temporary and permanent vegetation are contained in Table 145-3 of the RCT permit application. Species planted in future fish and wildlife habitat areas are contained in Table 144-1 of the RCT permit application.

Mulch – Alcoa uses mulch spreaders to uniformly distribute mulch on all regraded areas and on most areas disturbed by construction. Mulching stabilizes the soil, aids in moisture conservation, and promotes germination and response of temporary and permanent vegetation. Generally, hay or straw is applied along the contour and mechanically anchored. Application rates vary according to slope and season, although the minimum rate of mulch application is 2 tons per acre. Additionally, wherever and whenever cool season annuals or perennials are planted as temporary vegetation, the temporary vegetation is disked into the top 6 to 8 inches of soil prior to preparation and planting of permanent vegetation. The disked-in vegetation serves as mulch, stabilizing the soil and conserving soil moisture.

Silt Fence – Alcoa uses silt fences to control sediment whenever the potential exists for sediment to leave the permit area without capture and treatment in sedimentation ponds. Primarily, this occurs during the construction of sediment ponds and perimeter water-control diversions. Alcoa adheres to strict standards regarding the construction and use of silt fencing. As soon as practicable following each rainfall event, the silt fencing is inspected by the project engineer or environmental specialists for damage and efficiency, and, if necessary, repairs and modifications are made.

Rock Check Dams – Alcoa uses rock check dams in small diversion ditches and upper drainages to moderate potentially erosive flow velocities and to reduce sediment load by reducing stream-flow energy.

Hay Bale Dike – Alcoa uses hay-bale check dams to moderate flow velocities in upland swales and to trap sediment contained in sheet flow and newly concentrated overland flows. The hay bales are partially embedded and staked in rows perpendicular to the direction of flow.

Retention/Irrigation Systems – Water retained in Alcoa's treatment ponds is to be used for dust suppression and truck washing. This will provide dual processes for removing sediment from mine-area water: treatment (settling) and reuse (dust suppression and truck washing). Alcoa anticipates that the volume of water used for dust suppression and truck washing will exceed the volume of water received from the mine pits and from dewatering operations. Consequently, discharge from treatment ponds should only occur during rainfall events, at which time, rainfall runoff will dilute any mine-pit water and overburden groundwater remaining in the ponds. These diluted active-mine waters will be treated to comply with TPDES effluent requirements prior to discharge.

Extended Detention Basins – Alcoa uses "extended detention basins" or "sediment ponds" as a primary tool for removing sediment from mine area water. See previous discussion on sediment control and treatment structures at the Three Oaks Mine.

Constructed Wetlands – Alcoa will construct its temporary sedimentation structures with littoral shelves for temporary wetlands. Additionally, small wetland areas will be promoted in drainages within the mine area by providing dug-out retention areas behind rock-check dams. See drawings and discussion in Section 6.2 of this report. These temporary wetlands will provide additional evaporation, sedimentation, adsorption, and filtration functions to the ponds and drainages.

8.2 MINE OPERATIONS PROTECTIVE MEASURES

Alcoa has collected a substantial amount of baseline data in order to assess existing surface-water quantities and flow patterns for the proposed mine area. Changes in land cover, soil characteristics, and water-control plans associated with mining have the potential to affect natural runoff patterns and discharge characteristics. These changes, should they occur, may impact downstream aquatic habitats. Logically, significant decreases in water quantity would negatively impact aquatic habitats, and significant increases in water quantity should bolster aquatic habitats. Potential surface water quality concerns were evaluated in detail in Section 146 of the RCT permit application, the "Probable Hydrologic Consequences" evaluation.

Modeling results from this evaluation indicate that the proposed surface water-control plan will aid in sustaining flows downstream of the proposed Permit Area. Generally, the amount of water leaving the permit area due to rainfall runoff will be slightly greater than before mining, and the peak rates of flow will be diminished. The following summary tables (Table 8-3) summarize anticipated changes in water quantity.

TABLE 8-3
ANTICIPATED WATER-QUANTITY CHANGES

BIG SANDY CREEK AT HIGHWAY 290
COMPARISON OF BASELINE TO ACTIVE MINING CONDITIONS

Storm Event	Percent Change in Peak Flow Rate	Percent Change in Total Runoff Volume
10-year, 24-hour	-3%	2%
25-year, 24-hour	-3%	2%
50-year, 24-hour	-3%	2%
100-year, 24-hour	-3%	2%

MIDDLE YEGUA CREEK AT COUNTY ROAD 306
COMPARISON OF BASELINE TO ACTIVE MINING CONDITIONS

Storm Event	Percent Change in Peak Flow Rate	Percent Change in Total Runoff Volume
10-year, 24-hour	-7%	1%
25-year, 24-hour	-6%	1%
50-year, 24-hour	-6%	1%
100-year, 24-hour	-6%	1%

BIG SANDY CREEK AT HIGHWAY 290
COMPARISON OF BASELINE TO POST-MINING CONDITIONS

Storm Event	Percent Change in Peak Flow Rate	Percent Change in Total Runoff Volume
10-year, 24-hour	-17%	0%
25-year, 24-hour	-17%	0%
50-year, 24-hour	-17%	0%
100-year, 24-hour	-17%	0%

MIDDLE YEGUA CREEK AT COUNTY ROAD 306
COMPARISON OF BASELINE TO POST-MINING CONDITIONS

Storm Event	Percent Change in Peak Flow Rate	Percent Change in Total Runoff Volume
10-year, 24-hour	-34%	1%
25-year, 24-hour	-33%	1%
50-year, 24-hour	-31%	1%
100-year, 24-hour	-31%	1%

These results indicate mining will not decrease the quantity of water available to adjacent downstream aquatic habitats, wetlands, or streams. In fact, results indicate that the quantity may increase. Further, the projected reductions in peak flows will benefit downstream aquatic habitats. Decreases in peak flow will reduce the potential for erosion and will sustain steam flows for longer periods following rainfall-runoff events. Without the sediment ponds and reclamation ponds, storms would generate more extreme discharge and a quicker return to a lower baseline flow. The effect of the ponds is to spread the storm flow through time. Baseline monitoring indicates that stream-flow patterns in the region's creeks and drainages are highly irregular, and that flow is non-existent or very low during many months of the year. Consequently, aquatic habitats, when they do exist, would necessarily benefit from sustained flows.

9.0 HYDROLOGY FOR MIDDLE YEGUA MITIGATION SITE

As explained in Section 8.2, mining may impact natural runoff patterns and discharge characteristics of the mined area. However, stream modeling results indicate that these changes are not likely to decrease the quantity of water available to adjacent downstream aquatic habitats, wetlands, or streams. To the contrary, modeling results indicate that the quantity of water may increase. Further, the projected reductions in peak flows will benefit downstream aquatic habitats. Decreases in peak flows will reduce the potential for erosion and will sustain flows downstream for longer periods following rainfall-runoff events.

The water retention and measured release of flow by sediment ponds and endlakes are similar to the response of a stream to a storm event that would occur if the water were retained by a large wetland. One of the complementary hydrologic functions of wetlands is to release water to streams and rivers after the highest discharges have passed. Thus, the storage capacity of wetlands not only suppresses the peaks of the hydrograph, but also raises the valleys. The value of water storage by wetlands is to reduce flooding in wet weather, and to maintain the flow of streams and rivers during dry weather. These sustained flows support the growth of distinctive kinds of wetland organisms. Consequently, wetland vegetation within the proposed Middle Yegua Mitigation Site, directly downstream of SP-1, would be supported by the sustained flow releases from the mine area ponds.

10.0 SOILS

10.1 RECLAMATION

Post-mine soils in the mine-reclamation area will be constructed from overburden and interburden sources. The reconstructed soils are anticipated to have textures with an improved balance of sand, silt, and clay, and are not expected to display the adverse physical characteristics of the native topsoil, which generally has either excessive sands or excessive clays. In addition, the pH and acid/base relationship in the reconstructed soils is expected to be more advantageous to vegetation than the native topsoils. Based on reclamation procedures at the Sandow Mine, it is anticipated that restoration of productive post-mining land uses will occur.

10.2 MIDDLE YEGUA MITIGATION SITE

Soils have been mapped within the proposed Three Oaks Mine Permit Area, and a detailed soils map is provided in Section 134 of the RCT permit application, Plate 134-1. The predominant soils within the proposed Middle Yegua Mitigation Site are the Sandow series soils. The Sandow series consists of very deep, moderately well-drained, moderately slowly permeable soils in floodplains of streams. The soil formed mainly in stratified loamy alluvium. Slopes are typically less than 1%, but range from 0 to 2%. The depth of the alluvium is 7 to 15 feet. A brief duration of flooding occurs from 1 to 5 times a year during most years, unless protected.

Redoximorphic features are present below 8 inches; however, auquic conditions exist only below depths of about 40 inches in the soil. There is irregular distribution of organic carbon at a depth of 10 to 40 inches.

There are also smaller pockets of the Rader soil series that are present on nearly level to gently sloping stream terraces or terrace remnants. Slopes range from 0 to 3%. These soils have a perched water table above the Bt horizon (25 to 39 inches) during periods of prolonged rainfall. Auquic features include the depletion of iron due to wetness at 25 inches and below.

11.0 PLANTING PLAN

11.1 FINAL RECLAMATION PLANTING

In an effort to naturalize the riparian corridors, the lower floodplain terrace, the upper floodplain terrace (where applicable), and the upland buffer will be planted at a minimum rate of 500 native trees and shrubs per acre. Trees and shrubs will also be planted within the base of stream channels at the reduced density of 200 per acre. Trees and shrubs will be bare-root seedlings from nursery stock. Trees and shrubs will be planted by hand within scattered groupings on a minimum of 10-foot centers. A minimum of 6 tree species (no species will comprise more than 30% of the planted trees) and 4 shrub species (no species will comprise more than 30% of the planted shrubs) from the "Recommended Species List" (See Table 6-1) will be planted. Species will be planted at an appropriate elevation based on their inundation tolerance. Planting area(s) appropriate for each species are specified in Table 6-2.

To additionally enhance floodplain terrace(s) and the upland buffer, a minimum of 5 native grass and forb species will be seeded throughout. Grasses and forbs will be seeded at the manufacturer's recommended seeding rates. However, if switchgrass is utilized, it will not exceed 3 pounds live seed per acre.

11.2 MIDDLE YEGUA MITIGATION SITE PLANTING

Trees and shrubs will be planted throughout the mitigation site at an average rate of 400 per acre. A minimum of 8 tree species and 6 shrub species (no species will comprise more than 30%) from the "Recommended Species List" will be installed to increase species diversity, as well as to provide food and habitat for a wider range of wildlife. The excavated depressions within the openings will be planted with herbaceous species at a rate of 400 per acre. Herbaceous plants to be installed will be bare root or in planting sleeves from nursery stock. Plants will be installed on a minimum of 3-foot centers within scattered groupings. A minimum of 6 hydrophytic/aquatic species (no species will comprise more than 30%) from the "Recommended Species List" will be planted. Species will be planted at an appropriate elevation based on their inundation tolerance.

12.0 PLANTING SUCCESS CRITERIA

The same planting success criteria will be utilized to evaluate both the reclamation areas and the Middle Yegua Mitigation Site. It is anticipated that both the reclamated riparian corridors and the enhanced riparian corridor within the Middle Yegua Mitigation Site will be 75% wooded and 25% herbaceous (including hydric/aquatic).

12.1 HERBACEOUS VEGETATION

The floodplain terrace(s) will achieve 80% vegetative cover within 3 years after planting. If survival drops below 80%, a supplemental planting will be conducted. The 80% vegetative cover must then be achieved and maintained for 3 consecutive years following the supplemental planting. None of the 3 most-dominant species will be non-native, noxious, or invasive species. If nuisance species are found to be in greater concentrations, they will be removed manually or with careful herbicide application. As above, if these success criteria are not achieved, the USACE will be consulted with proposed additional measures to achieve the stated success criteria.

12.2 TREES AND SHRUBS

The tree-and-shrub planting will be deemed successful if at least 50% survival is achieved for 5 consecutive growing seasons following the initial planting. If survival drops below 50%, a supplemental planting will be conducted. The 50% survival rate must then be achieved for 2 consecutive years following the supplemental planting. If this success criterion is not achieved, the USACE will be consulted with proposed additional measures to achieve the stated success criteria. The 3 most-dominant species of trees and shrubs must be species typically dominant in natural situation and no species will constitute more than 30% of the surviving tree and shrub species.

13.0 PERFORMANCE STANDARDS

The permittee will be responsible for maintaining the Middle Yegua Mitigation Site until the USACE is satisfied that those components of the site intended to become:

- "waters of the US" meet the definition of a "waters of the US" under the Regulatory Program regulations applicable at the time the project is authorized

- both wetlands and "waters of the US" meet the definition of a wetland under the Regulatory Program regulations applicable at the time the project is authorized

- "waters of the US" are functioning as the intended type of "waters of the US" and at the level of ecological performance prescribed in the mitigation plan

- buffer and riparian zones and other areas integral to the enhancement of the aquatic ecosystem are functioning as the intended type of ecosystem component and at the level of ecological performance prescribed in the mitigation plan

14.0 ECOLOGICAL BENEFITS VS. ADVERSE IMPACTS

Texas A&M University (Texas A&M) was hired by Alcoa to assess wildlife populations within Sandow Mine reclamation and to compare these populations with wildlife populations in the proposed Three Oaks Mine site. Nova Silvy, Ph.D., a professor in the Department of Wildlife and Fisheries Science, led the university study. Silvy's wildlife census results indicate that species diversification and population are among the ecological benefits that can be expected following mining.

Texas A&M conducted its surveys during May and June of 2000, carrying out a series of wildlife census operations along 15 miles of roads traversing Sandow reclamation. Surveys were taken in the early morning, late evening, and late at night with spotlights and binoculars. Silvy repeated these surveys on 3 different occasions. For comparison, a parallel series of census counts was conducted in the proposed Three Oaks Mine site.

The number of birds counted on Sandow reclamation was more than twice the number counted on the undisturbed site, and the number of species counted was about 15% greater than those found in the undisturbed site. Further, Texas A&M counted 50% more white-tailed deer in the reclamation area than in the comparison area. Additionally, about 240% more raptors were counted in the Sandow reclamation as on the comparison site. These high raptor counts are indicative of a much higher small-mammal population within Sandow reclamation. The biologists also sighted 78 dickcissels in the Sandow reclaim. Dickcissels are a declining grassland bird species in the central US. By comparison, no dickcissels were sighted in the undisturbed areas. Silvy stated that the reclamation at Sandow provides the contiguous native grassland habitat critical to the species survival (a habitat that has been rapidly declining over the past decade). A full report of the findings of this investigation is in Section 133 of the RCT Permit.

At Sandow, environmental specialists have found that it is entirely possible to reconstruct mined lands such that wildlife return to the area in far greater numbers than existed prior to mining. The Sandow Mine reclamation includes more than 700 acres of water resources, and the disturbed area is reclaimed with nearly 5 times as many water features as existed prior to mining. This ratio is similar to the amount of water resources anticipated at the Three Oaks Mine. These new water resources are an essential component for attracting wildlife to mine reclamation areas. Additionally, the Three Oaks post-mine landscape will be composed, primarily, of "fish and wildlife" land use – meaning that the large majority of Three Oaks Mine will be planted in native species, wooded, and managed for fish and wildlife habitat, while the Sandow Mine reclamation areas are primarily pastureland. Consequently, following reclamation at the Three Oaks Mine, the wildlife diversity and population can be expected to exceed those found at Sandow and by default, pre-mine populations, as well.

15.0 THREATENED OR ENDANGERED SPECIES

The US Fish and Wildlife Service (USFWS) provided its stamped concurrence that no federally threatened or endangered species are likely to be adversely affected, nor any designated critical habitat is likely to be adversely modified by the relocation of FM 696/619 or by the mining and related activities to be conducted within the 16,062-acre proposed Three Oaks Mine Permit Area.

16.0 CULTURAL RESOURCES

An extensive cultural resources investigation of the entire Three Oaks Mine Permit Area was prepared by TAS, Inc. from 1999 to 2002, and is provided in Section 125 of the RCT Permit. All cultural resource issues associated with the disturbance area are currently being resolved through the appropriate means with the Texas Historical Commission. The Middle Yegua Mitigation Site will have no impact on cultural resources, as the cultural resources investigation revealed no cultural resource within the mitigation site. Additionally, the fish, wildlife, and vegetation surveys did not indicate any ecologically sensitive areas within the mitigation site. The proposed earth-moving activities and changes in topography required to fulfill the mitigation plan will be so minor that there will be no impact to the local or regional hydrology.

17.0 LONG-TERM MANAGEMENT OF MITIGATION SITE

17.1 RECLAMATION

Maintenance in the restored riparian corridors will be limited to erosion control (if required), restoration of original grade should siltation impede water flow, or nuisance species removal. Prior written approval from the USACE will be obtained for activities involving re-grading or significant earthmoving within stream channels. Areas will be maintained in their planned post-mine use at least until the RCT bond is released.

17.2 MIDDLE YEGUA MITIGATION SITE

Long-term management of the mitigation site will consist primarily of performing the extensive monitoring plan, including annual monitoring and reporting, accompanied by intensive monitoring utilizing a standard habitat assessment method to provide baseline data and to document change in the first 5 years following initiation of the mitigation plan, and on 5-year increments until the USACE has provided written notice that the area has achieved the type of "waters of the US" intended. Following successful documentation of the mitigation site's success and subsequent termination of annual monitoring, Alcoa will continue to perform an annual visual inspection of the mitigation site to ensure continued success throughout the life of Three Oaks Mine. Alcoa will perform fence repair and other minor maintenance as needed. If a major disturbance occurs, the USACE will be contacted and a course of action agreed upon.

18.0 MITIGATION MONITORING

18.1 ANNUAL MONITORING

Monitoring will include evaluating the hydrology, vegetation, soils, and habitat for aquatic and terrestrial wildlife within permanent reclamation riparian corridors and the Middle Yegua Mitigation Site. Monitoring methods will include both qualitative and quantitative data collection. Monitoring will also include developing a photographic record of the progress of the project.

On an annual basis, typical monitoring techniques for both the reclamated riparian corridor and the Middle Yegua Mitigation Site will include:

- vegetative sampling to determine tree and shrub survivorship, % herbaceous cover, species composition, % nuisance species, and recruitment
- monitoring changes in the soil profile (e.g., color, texture, redoximorphic features, etc.); monitoring the development of hydric soil characteristics where applicable; Representative pits for each community; subsequent assessments should be near pit but not in pit
- noting changes in hydrology, and results of monitoring frequency, duration, depth, of inundation or saturation
- taking annual photographs at permanent stations established within reclamation and mitigation areas
- documenting wildlife usage observed during monitoring effort
- documenting other qualitative information concerning snags, coarse woody debris, storm damage, indicators of extreme flooding events, etc.

18.2 FIVE-YEAR INTENSIVE MONITORING OF MIDDLE YEGUA MITIGATION SITE

A standard habitat assessment method, such as Texas Parks and Wildlife's “Wildlife Habitat Assessment Procedure” will be performed to provide baseline data to accurately characterize the mitigation site. A second assessment will be conducted 5 years after the initial mitigation efforts. If the site has not achieved the stated goals within the first 5 years, then an additional intensive monitoring event will be performed at 10 years from the initial mitigation efforts.

19.0 REPORTING PROGRAM

The permittee will designate a responsible party or position, in writing, to coordinate with the USACE on mitigation monitoring and compliance. The permittee will establish a self-monitoring program that includes annual written compliance reports to the USACE due October 1 of each year.

The mitigation monitoring and reporting will be conducted for a minimum of 5 years, but will be continued until written confirmation from the USACE is received that the mine reclamation and Middle Yegua Mitigation Site have met the stated success criteria and are on the way to developing the intended type of functions. The first annual report will describe pre-construction (baseline) conditions of the disturbance area and the Middle Yegua Mitigation Site and proposed activities (mining impacts, reclamation, and mitigation) for the upcoming year. Subsequent annual reports will address schedule changes and provide a summary of all activities that occurred during the reporting period.

Each compliance report will include, at a minimum, the following information:

- a description of any changes in the construction or mitigation plan implementation schedule
- a summary of activities that occurred during the reporting period, including demonstration of the permittee's compliance with the permit conditions, and documentation of the progress and/or completion of all authorized work, including mitigation plan activities in meeting performance standards and planting success
- demonstration that the permittee is in compliance with all permit conditions
- documentation of the progress and/or completion of all authorized work, including mitigation plan activities
- a tally of the project's actual impacts to “waters of the US”
- documentation of the use of BMPs for erosion control
- documentation of the use of BMPs for the protection of adjacent aquatic sites during construction
- photographs, maps, and drawings to support the written components of the mitigation plan

20.0 MITIGATION SPECIALIST QUALIFICATIONS

As of the writing of this proposed mitigation plan, Mr. Marty Irwin, Senior Environmental Specialist, at Alcoa would be the appointed mitigation specialist responsible for overseeing the implementation of the mitigation plan at the Middle Yegua Mitigation Site. Mr. Irwin would also be responsible for overseeing the mitigation monitoring, annual reporting, and future maintenance within the mitigation site and for reclamation. Mr. Irwin attended Texas Tech where he earned a Bachelor of Science degree in Range Management and a second Bachelor of Science degree in Wildlife Management. Mr. Irwin has been employed by Sandow Mine for 15 years and has performed a wide range tasks within the mine reclamation group.

If Mr. Irwin leaves this position, Alcoa will notify the USACE in writing within 60 days. Individuals in this position will have a minimum of a Bachelor's degree in a related field and 2 years experience in reclamation or wetlands and/or habitat mitigation.

21.0 MITIGATION PLAN IMPLEMENTATION SCHEDULE

21.1 RECLAMATION

Temporary enhancements, including sedimentation pond plantings and the construction of pools within temporary stream channels, will be utilized for each sedimentation pond and temporary stream channel throughout the life of mine. The physical enhancement features will be a part of the construction process. Plantings will be performed during the spring and early summer. If features are constructed in the fall or winter, planting will be conducted as soon as the weather permits the following spring.

21.2 MIDDLE YEGUA MITIGATION SITE

As previously discussed, the proposed mitigative efforts for the off-site mitigation will begin concurrent with the initiation of mining at Three Oaks Mine.

22.0 DEED RESTRICTION

Alcoa proposes to place a deed restriction over the entire Middle Yegua Mitigation Site to protect it from impacts in perpetuity. As addressed earlier, this off-site mitigation enhances and protects approximately 55 acres, including 7800 linear feet of high-quality, mature riparian corridor and intermittent creeks. The perimeter of the mitigation site will be surveyed and fenced. Alcoa will provide a copy of the recorded deed restriction to the USACE within 90 days of initiation of mining activities in Three Oaks Mine. The deed restriction will be based on the example provided in Appendix A. The deed restriction will specify that:

- the area shall not be disturbed, except by those activities that would not adversely affect the intended extent, condition, and function of the mitigation area or those activities specifically provided for in the USACE-approved mitigation plan or in the special conditions of the Department of Army authorization

- the restriction shall not be modified or removed from the deed without the written approval of the USACE

- conveyance of any interest in the property shall be subject to the deed restriction

APPENDIX A

EXAMPLE DEED RESTRICTION

NOTICE OF RESTRICTION

STATE OF TEXAS

KNOW ALL MEN BY THESE PRESENTS THAT:

COUNTY OF LEE

Alcoa is the owner of that real property more particularly described and shown in Exhibit A (hereinafter the "Property) attached hereto and made hereof. The approximately 55-acre Property is also referenced in "The Mitigation Plan For Three Oaks Mine". The Property is subject to special conditions of Department of the Army Section 404 Permit Number ___, dated ____, or a revision thereof. One of the special conditions of the referenced permit requires restrictions be placed on the deed for the Property for the purpose of providing compensation for adverse impacts to waters of the United States. Any purchaser of all or any part of the Property, or any person having an interest in or proposing to acquire interest in all or part of the Property, or any person proposing to develop or improve all or any part of the Property are as follows:

1) The Property, is hereby dedicated in perpetuity as "a waters of the US mitigation area" associated with mining activities on Three Oaks Mine.

2) This restriction may not be removed or revised without obtaining a modification of the aforementioned Department of the Army authorization and prior written approval of the Department of the Army. Permit modifications may be granted only by the USACE.

4) The Property will not be disturbed, except by those activities that would not adversely affect the intended extent, condition, and function of the mitigation area or by those activities specifically provided for in the approved mitigation plan or in the special conditions for this permit.

4) Livestock grazing, mowing, and similar activities will not be allowed in the Property.

5) Disturbance of the dedicated property may require Department of the Army authorization.

This notice of restriction does not grant any property rights or exclusive privileges.

EXECUTED THIS ___ day of _____, 2002.

BY:_____

SUBSCRIBED AND SWORN TO BEFORE ME by _____, on this the ___ day of _____, 2002, to certify which witness my hand and seal of office.

_____
Notary Public in and for the State of Texas

My commission expires:_____
Printed Name of Notary:_____