Bush, Louisiana to I-12
Preliminary Environmental Assessment

Executive Summary

The Louisiana Department of Transportation and Development (LADOTD) proposes to construct a modern high speed, 4-lane, arterial highway from Bush, Louisiana to I-12. The applicant's preferred alternative would begin at the intersection of LA 41 and LA 40 in Bush, Louisiana and proceed southward for approximately 17.4 miles to LA 1088. The proposed project would impact special aquatic sites for which a Department of the Army permit would be required. The proposed project is not water-dependent and therefore alternatives to the proposed project are presumed to exist.

The LADOTD identified 17 alternative alignments within the study area. The applicant determined that all alternatives were practicable based on cost, existing technology, and logistics. However, in light of the applicant's project purposes, 11 were determined not to be practicable by the applicant as projected benefits for these alternatives were determined to be minimal. Both upgrades to existing highways (LA 21 and LA 41) were among those determined to provide minimal project benefit. Six alternatives were determined to be practicable. The applicant's preferred alternative was one of these six.

The environmental assessment considered all available information. The direct, secondary and cumulative impacts associated with constructing a 17 to 21 mile linear project on an earthen embankment of hauled-in fill material through a mostly undeveloped area containing substantial wetland acreage is discussed. Beneficial and adverse impacts are evaluated for specific alternatives but the discussion is general and speculative due to unresolved issues regarding highway design, construction techniques and source of hauled-in fill material. This information will be necessary to adequately address potential impacts and to determine which alternative is the least damaging, yet practicable. In the absence of this information, the Corps is unable to determine whether adverse and beneficial project effects are balanced and therefore unable to recommend a permit decision.

The review of available information indicates that adverse impacts associated with most alternatives considered by the applicant may result in long-term, significant, wide-scale, direct, secondary and cumulative impacts. Although direct impacts associated with shorter alternatives are slightly less than for those reported for the longer alternatives, secondary and cumulative impacts associated with these shorter alternatives would be considerably greater. The shorter routes traverse large expanses of undeveloped wetland areas whereas the longer routes skirt these areas. The environmental consequences of constructing a new highway appear to be much greater than upgrading an existing facility. Adverse impacts associated with construction on new alignment appear to outweigh benefits accrued by the proposed project.

Adverse impacts attributable to the applicant's preferred alternative, as well as the alternatives B, B/O or O, would be significant, long-term and wide scale. Although, the most recent discussions regarding these four alignments have led to potential alignment modifications to reduce adverse impacts, construction of any one of these alternatives would result in significant direct, as well as, secondary and cumulative impacts to aquatic resources in the project study area. As such, pursuing a permit for any of these alternatives will require an environmental impact statement. However, none of these alternatives appear to be least damaging, yet practicable alternative available to the applicant.

Because Alternative J follows the existing abandoned railroad embankment, it may have considerably less direct wetland impacts than has been identified by the applicant and possibly less than any other alternative constructed on new alignment. To what extent construction along this alternative would alter surface hydrology and impact wetlands could not be determined using the available information and will require further investigations. The applicant has stated that using the abandoned railroad embankment minimizes potential hydrologic impacts as the railroad berm has already altered the hydrology in the area. Likewise, realignment of Alternative Q to avoid wetland impacts and utilize more of the existing highways may result in an acceptable alternative although it most likely would have a greater impact on wetlands than Alternative J. Detailed information on existing conditions and highway design may demonstrate that either of these two alternatives may be considerably less damaging than currently reported to be and preparation of an environmental impact statement may or may not be required. Both would still adversely affect management of the two existing mitigation banks immediately to the west of these alignments. Development of a highway management plan by the applicant may avoid/minimize impacts to ongoing management practices at these banks.

Alternatives that are upgrades of existing highways, LA 21 or LA 41, may not have significant adverse impacts associated with them. In general, environmental adverse impacts associated with upgrading existing highways from 2- to 4-lane facilities are considerably less than construction on new alignment. Also, it is easier to document that environmental impacts can not be avoided. The applicant evaluated each of these upgrade alternatives and determined that each would produce some level of benefit for traffic moving through the region but not to the degree as construction on new alignment would have. Should the applicant determine that one of these alternatives was acceptable, we would need specific information regarding wetland impacts, project design and project location. If it is determined that adverse impacts were not significant, a permit, if required, could be considered without an environmental impact statement.

Because of the significance of the potential adverse impacts associated with most of the applicant's alternatives, preparation of an Envirnonmental Impact statement is recommended. An Environmental Impact Statement will develop information needed to determine the least damaging, yet practicable alternative and therefore, the Corps "Preferred Alternative".

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

August 21, 2008

PRELIMINARY ENVIRONMENTAL ASSESSMENT

APPLICATION NUMBER: MVN-2005-00037-MJ

APPLICANT: Louisiana Department of Transportation and Development

I. Proposed Project Stated Purpose.

A. APPLICANT'S STATED PURPOSE. To construct a modern, high-speed, 4-lane arterial highway from the southern terminus of the current modern 4-lane arterial portion of LA 21 in Bush, Louisiana to Interstate 12 (I-12).

B. BASIC PURPOSE. To provide for regional transportation needs. As such, the proposed project does not require siting within a special aquatic site to fulfill its basic purpose. In accordance with Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, Subpart B, Compliance With the Guidelines, (40 CFR 230.10(a)(3)), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.

II. Proposed Project Stated Need. The applicant has stated that the proposed project is needed as an alternative North-South connection that would potentially reduce congestion and delays for those traveling from Northern St. Tammany and Washington Parishes to I-12. The proposed project could increase safety by reducing the amount of traffic on existing routes (LA 41 and LA 21/LA 59/US 190) and thereby reducing the potential for accidents. Additionally, the resulting travel time savings would help support/enhance potential economic development in North St. Tammany and Washington Parishes. Finally, the applicant is obliged to construct a 4-lane or more highway from Bush, Louisiana to I-12, Louisiana to comply with Louisiana Revised Statute (R.S.) 47:820.2.B (e).

III. Project Description. The applicant proposes to construct a 4-lane, limited access, divided highway from the LA 40/41 intersection in Bush, Louisiana to I -12. The majority of the proposed project would be designed as a rural arterial (RA-3) with a design speed of 70 mph, which, according to the applicant, generally equates to a posted speed limit of 65 mph. The exception to this design would be as the proposed project transitions into exiting roadways. The typical cross section will have two, 12-foot travel lanes, an 8-foot outside shoulder and a 4-foot inside shoulder in each direction. The median width would vary depending upon highway design ranging between 40 and 60 feet, and a minimum right-of-way (ROW) requirement of 250 feet. To assure an adequate foundation, existing soils may be excavated and hauled-in

earthen fill obtained from an undisclosed source deposited to elevate the highway embankment over natural grades. Roadway embankments would be sloped with inside slopes of approximately 6:1 for 26 feet from edge of shoulder and then 4:1 thereafter. Roadside ditches would be constructed as required to reduce ponding along the roadway. A typical design of the ditch would be 4 feet below existing grade with a width of 4 feet. Ditches would be employed to divert surface flow to structural highway crossings as required. Drainage structures would be identified so as to have no net impact on the drainage of the area when considering peak run-off flows during the 10-, 50-, and 100-year storms at each of these locations. Drainage structures could include bridges, reinforced concrete boxes, and/or reinforced concrete pipes depending on the flow to be passed through the structure. Other than limiting access to the highway to only existing state highways (LA 1088, LA 36, LA 435 and LA 21/40/41), the applicant's project design does not include adequate mitigative measures to avoid or minimize project impacts on the natural environment. No information regarding additional ROW requirements for these interchanges was provided by the applicant.

IV. Project Study Area and Setting[1].

A. STUDY AREA.

1. Boundaries. The project area is located wholly within St. Tammany Parish, Louisiana. It is a triangular shaped area roughly bounded by LA 21, US 190 to the northwest and west, I-12 on the south and US 11 and LA 41 to the northeast and east. It encompasses approximately 244 square miles in area, or about 193,000 acres of land. The project area includes the towns of Abita Springs, Pearl River and portions of the cities of Slidell and Covington. Unincorporated places such as Bush, Hickory, Talisheek and Waldheim are within the project area.

2. Existing Transportation Facilities. The project area is serviced by two north/south highways, LA 41/US 11 along the eastern edge of the project area and LA 21/US 190 along the western edge. LA 59 is also a north/south roadway bisecting the western portion of the project area connecting Abita Springs to LA 21 to the north and I-12 to the south. There are two east/west highways connecting LA 41 and LA 59 in Abita Springs; LA 435 to Talisheek and LA 36 to Hickory. Other highways in the area provide connections to the north south highways and the east/west highways; LA 1083 connects LA 21 at Waldheim to LA 435 near Abita Springs, LA 1088 connects LA 36 to LA 59 near Mandeville south of I-12 and LA 34 which connects LA 36 to I-12. The area is bisected by many forest roads and minor residential roadways.

An abandoned rail corridor, Illinois Central Gulf, runs from Bush, Louisiana in a southeasterly direction to I-12. The applicant developed no information regarding the abandoned railroad corridor; width of the existing rail ROW, current condition and use. Based on aerial

[1] Much of the information used to develop this environmental assessment was prepared by the applicant or his agent. The Corps of Engineers has not verified any of the information provided. To fill in some of the gaps in the applicant's information, the Corps roughly estimated values and used information developed through evaluation of other permit applications and banking agreements in the immediate project area as well as information provided by federal and state resource agencies.

photography the ROW of the abandoned railroad appears to be approximately 200 feet wide from Bush, Louisiana to a point approximately 15.3 miles southeasterly from Bush, Louisiana. Forestry practices appeared to have encroached on the abandoned corridor southerly from this point obscuring the true ROW width. Review of quadrangle maps indicate that there was a rail yard at Talisheek with multiple tracks extending for approximately 1.3 miles south of LA 435. From this point south, there appears to have been a single track. There appears to be a maintained road surface along much of the corridor most likely used to access the area for timber management purposes.

B. PROJECT SETTING.

1. Land Use. A variety of land uses exists within the project area. The majority of the project area is rural in nature and consists of pine forests, pine savannas, farmlands and numerous waterways. By far, the dominate land use within the project area is timber management or undeveloped areas. What agricultural activity there is occurs north of LA 36, within a rough triangular section bounded by LA 36, LA 21 and LA 41. Residential uses, though scattered through-out the project area, have developed mainly off the major thoroughfares such as LA 41 between Pearl River and Hickory, LA 21 between Covington and Waldheim and again, on LA 21 closer to the community of Bush, Louisiana, along portions of LA 434, LA 435 and LA 59, and along either side of I-12, between US 190 and US 11.

Land use maps developed by the applicant show that the majority of the area located between LA 435 and I-12 is used primarily as timber management. The majority of the project area is pine flatwoods/savanna crossed by numerous small streams and rivers bordered by bayhead swamp and bottomland hardwood flatwoods. The project area contains a significant amount of wetlands located along and occupying broad flats directly connected to the waterways. General land elevations in this area flatten considerably with a gradual slope from 55 feet MSL to 30 to 25 feet along I-12. These broad flats are incised by small creeks and drains. The drains in the western portion of the study area drain to the Abita River. Those in the central portion of the area drain to Bayou Lacombe. The extreme southeastern portion of the area drains to Bayou Liberty. The broad flats within the project area store storm water and release it overtime to these waterways protecting development that occurs along the lower reaches. Sheetflow of water across these broad flats allows for the uptake of hydrocarbons and other pollutants released from residential and industrial development within the area and filters out sediment before the water is released into these waterways. These actions are important to maintaining water quality within the Lake Pontchartrain Basin.

2. Habitats. By far, the most abundant habitat type within the study area is the pine flatwood/savanna with inclusions of bayhead swamps and hardwood flats associated with streams and drains. Historically, these areas were dominated with longleaf pine in the upland areas and scatterings of longleaf pine through the wetland areas; typically open expanses with a less dense canopy of long-leaf pine and a ground cover dominated by a myriad of herbaceous species.

A regular fire cycle maintains these wetlands as open park-like forests, reducing shrub cover and preventing establishment of dense mixed hardwood forested systems. Recent forestry

practices have introduced loblolly pine and caused slash pine to extend its coverage from its wet refuges of the bayhead swamps and other wet drains to boarder areas of the flats. Fire policies established by local governments have reduced burning frequencies. Fire exclusion during the last century has degraded much habitat by allowing the development of closed-canopied forest with a dense shrub layer that shades the ground in many areas. Much of this habitat has been actively managed for timber production altering the habitat to a more dense forest structure, a pine plantation improving habitat for a number of vertebrate species while adversely affecting the botanical richness of these areas. Pine plantations can provide suitable habitat but if the trees are planted too closely together, the ground is eventually shaded and only sparse remnants of the savanna habitat remain. Management practices thin these areas providing for a less dense canopy where these habitats regenerate.

Although the extensive long-leaf pine forests once characteristic of the area have been replaced by managed pine forests and are burned less frequently, the pine flatwood savannas of southeastern Louisiana still maintain their extreme degree of plant species richness for which they are noted for rather than the wildlife associated with them. Communities within this ecosystem are extremely diverse, often supporting numerous rare and endemic plant and animal taxa, making this one of the most important natural systems in the southeastern United States. Recent research has shown small-scale plant species diversity to be among the highest of any habitat in the world with as many as 40 or more species found on a single square meter of high-quality savanna. The diversity of species per unit area in savannas, and closely allied hillside seepage bogs, is unequalled by any other habitat in Louisiana. The community is dominated by numerous species of grasses and sedges, but is perhaps best known for the insectivorous plants and orchids. Many other herbaceous plants are endemic or near-endemic to the savanna areas. Approximately 75% of the plant species occurring in this community are categorized as obligate wetland or facultative wetland species. These areas are considered extremely important since most of these native plants cannot exist in other wetland types and many are considered state-rare due to the limited natural range and potential habitat loss.

Even though these areas are most noted for their herbacious richness, it is important to note that several species of amphibian, reptile and bird intimately associated with longleaf habitats are currently listed or being considered for listing as threatened or endangered. The Eastern diamondback rattlesnake (*Crotalus adamanteus)* is a flagship species in the endangered longleaf pine ecosystem. Other species include the flatwoods salamander (*Ambystoma cingulatum*), gopher frog (*Rana captio*), pine snake (*Pituophis melanoleucus*), southern hognose snake (*Heterodon simus*) , gopher tortoise (*Gopherus polyphemus*), Bachman's sparrow (*Aimophila aestivalis*) and the red-cockaded woodpecker (*Picoides borealis*). The decline of most if not all of theses species is directly related to the loss and alteration of pine habitat in the Southeast.

3. Unique and Environmentally Sensitive Areas. Within the project study area, the applicant identified several areas that represent unique areas that should be avoided. These areas include mitigations banks operated and maintained by The Nature Conservancy and St. Tammany Mitigation Services. The Nature Conservancy operates the Talisheek Pine Flatwood/Savanna Mitigation Bank and the Abita Creek Flatwoods Mitigation Bank. Combined, these two banks comprise approximately 4,100 acres. An additional 115–acre site has been proposed as an addition to the Abita Creek bank. The Vicksburg District, Corps of Engineers is

currently considering other potential tracts proposed by The Nature Conservancy as mitigation banks. St. Tammany Mitigation Services operates the Bayou Lacombe Wet Hardwood Flats And Pine Flatwood/Savanna Wetlands Mitigation Bank that currently has 3,800 acres protected by a conservation servitude. The Corps is evaluating a proposal to expand this bank by another 750 acres.

V. Project Alternatives[2]

A. "NO BUILD" ALTERNATIVE.

In considering the "no build" alternative the applicant stated that the no-build would serve as a baseline condition which would be used to assess the level of benefits of the other alternatives. If the proposed project is not constructed, project-related impacts would be avoided. However, without a proposed project, the applicant concluded that the current and future higher traffic demand and delay issues would not be addressed. The applicant asserts that the no-build alternative neither serves the needs of the area nor achieves the purpose of the project. No information was developed regarding any other solutions to traffic congestion other than a build alternative.

The applicant provided no information regarding operation of existing LA 21 north of Bush, Louisiana. LA 21 was upgraded from a 2-lane facility to a 4-lane divided highway. No details were provided as to the number of relocations and other social impacts. One question that had been posed to the applicant was why was it necessary to design the roadway differently south of Bush, Louisiana.

B. BUILD ALTERNATIVES. The applicant evaluated 17 alternatives (Figure 1) as to their practicability and potential benefits as well as detriments. Six of these alternatives (Figure 2 and 2a) were determined to be practicable by the applicant while the remaining eleven were determined to be impracticable by the applicant for various reasons. A discussion of each alternative follows.

1. Alternatives Determined To Be Practicable By The Applicant. The applicant reviewed each of the following alternatives and determined that each was practicable based on cost, existing technology, and logistics in light of overall project purposes. The applicant also determined that each of these alternatives met, to varying degrees, the project's stated purpose and need. A determination of the least damaging alternative was not performed.

a. Alternative P (Applicant's Preferred Route). The applicant's preferred route would begin at the intersection of LA 41 and LA 40 in Bush, Louisiana and proceed southward for approximately 17.4 miles to LA 1088. The majority of the project (15.7 miles) consists of a RA-3 typical cross section, which has a minimum ROW width requirement of 250 feet. The

[2] On April 1, 2008, the applicant agent and interagency team met to refine alternatives to reduce direct impacts associated with each. The results of the effort were made available to the interagency team on April 14, 2008. Acreage changes were minimal and adverse impacts associated with the project were not appreciably altered by the modified alignments. To expedite the preparation of the environmental assessment, we decided to use the alternatives and data provided previously by the applicant.

northern 1.2 miles of the project consists of a rural arterial-2 (RA-2) cross section, which also has a ROW width of 250 feet. The exception to this design is at the southern end of the project area. The last 1.5 miles would be designed as a suburban collector-3 (SC-3) typical section, which has a ROW width of approximately 180 feet. The route utilizes an abandoned railroad corridor from Bush, Louisiana to Talisheek, Louisiana, a distance of approximately 4.0 miles, before turning southwesterly for approximately 13.4 miles on new alignment to connect with LA 1088 north of I-12. The applicant has stated that traffic would have limited access along this alternative with access provided in Bush, Louisiana, at LA 435, LA 36 and at the intersection with LA 1088. Crossings of existing highways would be at grade except that the applicant has agreed to consider an overpass along Peg Keller Road.

The excavation and fill activities associated with construction of the preferred alternative would directly affect approximately 517.8 acres. Based on the review of soil maps by the applicant, approximately 327.2 acres[3] of the preferred ROW are identified as hydric soils[4] and could potentially be wetlands. A preliminary wetland delineation prepared by the applicant and not yet verified by the Corps suggested that the number of jurisdictional wetland acres to be impacted may be less. The applicant's wetland delineation identified 208 acres as wetlands. Besides the direct impact associated with construction, the applicant anticipates that this alternative could secondarily impact[5] approximately 7,826.7 acres that are potentially wetlands based on hydric soil maps.

Currently, there is no interchange at LA 1088 and I-12. The preferred alternative does not include an interchange with I-12. The applicant has decided to seek separate authorization for the proposed interchange as there are Federal Funds involved through a demonstration project at this site. An application for work in wetlands associated with this interchange has not been submitted to the Corps. All information developed for those alternatives using the terminus of LA 1088 assume that an interchange exists. One of the fatal flaw parameters used by the applicant to eliminate alternatives was the lack of an existing connection to I-12.

Habitats that would be impacted by this alternative include pine flatwoods, pine savanna, bayhead swamp, riparian areas along streams and mixed pine/hardwoods. Riparian areas are located along the ten waterways (including, from south to north, Double Branch, Talisheek Creek, Mule Bay (a linear creek), and Little Brushy Branch) crossed by this alternative. Some channel work may be required along these waterways. However, the applicant stated that needed work would not be identified until the design phase.

A preliminary hydrologic investigation completed for this alternative involved the hydrologic modeling of the watershed, development of hydrographs for existing and future conditions and the determination of potential drainage structures for this alternative. A total of

[3] Unsure as to whether the applicant adjusted acreage to account for rail or roadway embankments and/or other disturbed areas. NRCS soil maps do not account for existing disturbances.
[4] Hydric soils were used as a surrogate for wetlands due to the number of alternatives being considered and the length of those alternatives. Soils consider to be hydric were Guyton Silt Loam, Guyton Silt Loam, occasionally flooded, Myatt Fine Sandy Loam, Myatt Fine Sandy Loam, frequently flooded, Ouachita and Bibb Soils, frequently flooded and Stough fine sandy loam.
[5] The secondary impacts are based on the amount of hydric soils located with 0.5 miles (1,200 feet to either side) of the alternative.

31 proposed drainage structures would be required such that no net impact on the drainage of the area when considering peak run-off flows during the 10-, 50-, and 100-year storms at each of these locations. These structures would include six bridges, 15 reinforced concrete boxes, and ten reinforced concrete pipes. The hydrologic model did not consider what impact the proposed ditches and roadway embankment would have on area wetlands, specifically how they would drain existing wetlands, how the alternative would alter sheetflow or what effect channelizing area waterways would have on retention time of surface waters in these adjacent wetlands.

b. Alternative B. This route would widen LA 21 to a 4-lane highway from Bush, Louisiana to Waldheim, then turn south widening LA 1083 to a 4-lane highway. Heading south on new alignment as a 4-lane highway, it would cross LA 435 at a point approximately 0.6 miles northeasterly from Abita Springs. Continuing south from this point, the alternative would cross LA 36 at a point approximately 0.6 southeasterly from Abita Springs. Staying on this southerly heading it would intersect with LA 1088 before I-12. This alternative would be approximately 19.53 miles long; 10.3 miles on existing alignment and 8.7 miles on new alignment. The applicant provided limited information regarding the cross section but, we assume that the majority of the alignment would consist of a RA-3 typical cross section, which would have a minimum ROW width requirement of 250 feet. The applicant has stated that because of the existing driveways and roadway connections limiting access along this alternative would be impracticable.

Information developed by the applicant indicated that this alternative would directly affect approximately 487.6 acres[6] as a result of excavation and fill activities. Based on the review of soil maps, the applicant estimates that approximately 339.9 acres within the ROW are hydric soils. A high percentage would most likely be considered jurisdictional wetlands. Besides the direct impact associated with construction, the applicant anticipates that this alternative could secondarily impact approximately 7,943.7 acres that are potentially wetlands based on hydric soil maps.

Habitats that would be impacted by this alternative include pine flatwoods, pine savanna, bayhead swamp, riparian areas along streams and mixed pine/hardwoods. Riparian areas are located along nine waterways crossed by this alternative (including, from north to south, Abita Creek (twice), Tenmile Branch, East fork Bogue Falaya, Long Branch, English Branch, Ponchitolawa and Little creeks). Some channel work may be required along these waterways. However, the applicant stated that needed work would not be identified until the design phase. A hydrologic model was not prepared for this alternative.

c. Alternative B/O. This alternative is a combination of alternatives "B" and "O" and was developed as an alternative. It would widen LA 21 to a 4-lane highway from Bush, Louisiana to just north of Waldheim then continuing as a new 4-lane roadway about halfway between alternative "B" and "O" before capturing Alternative "O" just north of LA 435 terminating at LA 1088 near I-12. This alternative is an attempt by the applicant to use as much

[6] Unable to ascertain from information provided by applicant whether acreage for existing paved areas were subtracted from the total area. ROW widths for LA 21 differ from LA 1083 as they are of different design. Unsure of the additional ROW requirements for upgrading these two roadways from current design to a divided, 4-lane highway. Information regarding these two roads was not developed by the applicant.

of existing highway alignments and non-wetland areas as possible to minimize adverse impacts. This alternative would be approximately 19.19 miles long; 6.4 miles on existing alignment and 13.6 miles on new alignment. Based on information developed by the applicant, this alternative would result in direct impacts to 397.1 acres of hydric soils and secondarily affect 8,113.6 acres.

d. Alternative J. This alternative would be new construction of a 4-lane highway following the abandoned railroad corridor from Bush, Louisiana to a point due north of the Slidell Municipal Airport. Here the alternative leaves the railroad corridor to connect to Airport Road which ties into I-12 with an existing interchange. This alternative would be approximately 21 miles long; 16.6 miles using the abandoned railroad embankment 2.9 miles on new alignment and 1.5 miles of existing roadway. The majority of the project (18.3 miles), we assume, consists of a RA-3 typical cross section, which would have a minimum ROW width requirement of 250 feet. The northern 1.2 miles of the project consists of a RA-2 cross section, which has a ROW width of 250 feet. The exception to this design is at the southern end of the project area. The applicant provided no information as to whether any work would be necessary as this is an existing 4-lane roadway. We assume that as the proposed roadway is on new alignment, their would be limited access provided except at Bush, Louisiana and where the highway crosses LA 435, LA 36 and connects to Airport Road.

Information developed by the applicant indicated that this alternative would directly affect approximately 647 acres[7] as a result of excavation and fill activities. Based on the review of soil maps, the applicant estimates that approximately 473 acres within the ROW are hydric soils. A review of the recent aerial infrared photography (IR) of the area indicates that the abandoned railroad is easily discernable. Widths approximated from these IR's are between 100 and 200 feet from ditch to ditch. Areas within this ROW appear to have been severely impacted by railroad construction, operation and maintenance activities. Besides the direct impact associated with construction, the applicant anticipates that this alternative could secondarily impact approximately 10,341.5 acres that are potentially wetlands based on hydric soil maps reviewed by the applicant.

Habitats that could be impacted by this alternative include pine flatwoods, pine savanna, bayhead swamp, riparian areas along streams and mixed pine/hardwoods. Riparian areas are located along three waterways (including Bayou Lacombe and several associated unnamed drains, Talisheek Creek and Little Brushy Branch) crossed by this alternative. Some channel work may be required along these waterways. However, the applicant stated that needed work would not be identified until the design phase. A hydrologic model was not prepared for this alternative.

e. Alternative O. This route would be on new alignment beginning at the intersection of LA 41 and LA 40 in Bush, Louisiana and proceeding westerly before turning southerly approximately one mile east of LA 1083 and proceeding to an intersection with LA 1088 just north of I-12. This alternative would be approximately 18.34 miles long, all on new alignment. The applicant provided limited information regarding the cross section but, we

[7] Unable to ascertain from information provided by applicant whether acreage for the railroad embankment was removed from the acreage for hydric soils. The applicant did not provide typical cross sections of existing conditions along the length of the abandoned railroad.

assume that the majority of the alignment would consist of a RA-3 typical cross section, which would have a minimum ROW width requirement of 250 feet. We assume that as the proposed roadway is on new alignment, their would be limited access provided except at Bush, Louisiana, highway crossings at LA 435, LA 36 and the connection to LA 1088.

Information developed by the applicant indicated that this alternative would directly affect approximately 557 acres as a result of excavation and fill activities. Based on the review of soil maps, the applicant estimates that approximately 373.5 acres within the ROW are hydric soils. A high percentage would most likely be considered jurisdictional wetlands. Besides the direct impact associated with construction, the applicant anticipates that this alternative could secondarily impact approximately 8,090.4 acres that are potentially wetlands based on hydric soil maps.

Habitats that would be impacted by this alternative include pine flatwoods, pine savanna, bayhead swamp, riparian areas along streams and mixed pine/hardwoods. Riparian areas are located along 13 waterways (including, from north to south, Little Brushy Branch, Waterhole Branch, Abita Creek (twice), Tenmile Branch, Stratman Branch, Kimball Branch, Fanny Cook Bay, Beef Branch, English Branch, Ponchitolawa and Little creeks) crossed by this alternative. Some channel work may be required along these waterways. However, the applicant stated that needed work would not be identified until the design phase. A hydrologic model was not prepared for this alternative.

f. Alternative Q. This alternative would be new construction of a 4-lane highway following the abandoned railroad corridor from Bush, Louisiana to a point approximately 1.7 miles north of LA 36. Here the alternative leaves the railroad corridor to connect to LA 434 which ties into I-12 with an existing interchange. This alternative would be approximately 20 miles long; 12.3 miles using the abandoned railroad embankment 5.4 miles on new alignment and 2.3 miles of existing roadway. The majority of the project (16.5 miles), we assume, consists of a RA-3 typical cross section, which would have a minimum ROW width requirement of 250 feet. The northern 1.2 miles of the project would have a RA-2 cross section, which has a ROW width of 250 feet. The applicant provided no information as to what the ROW requirements would be for upgrading LA 434 to the required 4-lane. We assume that, as the proposed roadway is on new alignment, their would be limited access provided except at Bush, Louisiana and where the highway crosses LA 435, LA 36 and connects to LA 434.

Information developed by the applicant indicated that this alternative would directly affect approximately 598 acres[8] as a result of excavation and fill activities. Based on the review of soil maps, the applicant estimates that approximately 398.6 acres within the ROW are hydric soils. A review of the recent aerial infrared photography (IR) of the area indicates that the abandoned railroad is easily discernable. Widths approximated from these IR's are between 100 and 200 feet from ditch to ditch. Areas within this ROW appear to have been severely impacted by railroad construction, operation and maintenance activities. Besides the direct impact associated with construction, the applicant anticipates that this alternative could secondarily impact

[8] Unable to ascertain from information provided by applicant whether acreage for the railroad embankment was removed from the acreage for hydric soils. The applicant did not provide typical cross sections of existing conditions along the length of the abandoned railroad.

approximately 9,121.6 acres that are potentially wetlands based on hydric soil maps reviewed by the applicant.

Habitats that would be impacted by this alternative include pine flatwoods, pine savanna, bayhead swamp, riparian areas along streams and mixed pine/hardwoods. Riparian areas are located along three waterways (including, from north to south, Little Brushy Branch, Talisheek Creek and Bayou Lacombe and several associated unnamed drains) crossed by this alternative. Some channel work may be required along these waterways. However, the applicant stated that needed work would not be identified until the design phase. A hydrologic model was not prepared for this alternative.

2. Alternatives Determined not to be Practicable by the Applicant.

The applicant evaluated eleven additional alternatives as possible routes. These routes included alternatives on new alignment and upgrades to existing highways. The following briefly describes the alternatives and reasons why the applicant determined that they were not practicable.

a. <u>New alignments</u>.

1) Alternative C/D: New road paralleling LA 21, with a by-pass west of Abita Springs to meet I-12 between LA 59 and US-190. Although this is a new road and can be designed to meet modern standards, its indirect path will not provide a direct access to I-12. The southern portion of the road would require the use of an urban arterial standard, which would require the design speed to be lowered to 35-45 mph. Finally, the number of existing driveways and side road requiring access would reduce its ability to function as an arterial roadway.

2) Alternative E/F/G: New road from Bush, Louisiana to LA 1088 at I-12 (slight jog along abandoned railroad corridor, north of Talisheek). Alternative E/F/G is not considered a viable alternative due to impacts to the Talisheek Pine Flatwood/Savanna Mitigation Bank. This alternative would have converted 40 acres of wetlands in the bank to roadway embankment, drained an undetermined amount of additional wetlands and isolated approximately 375 acres to the east of the highway effectively making management of this smaller unit extremely difficult if not impossible. Management of the larger tract to the west would also have been more difficult as it would restrict the ability to burn the site except during acceptable weather conditions when wind would not carry smoke across the new highway.

3) Alternative I: New road along the abandoned IC Railroad south of Talisheek, connecting to LA 36, then widen LA 1088 to I-12 (see discussion for alternatives "H/L").

4) Alternative K: New road along abandoned railroad corridor, to meet I-12 near US 11. This alternative was determined impracticable as it would require the construction of a new interchange with I-12 which would be located 0.95 miles west of the US 11 interchange. The applicant stated that federal highway design criteria require a minimum of one mile between interchanges.

5) Alternative H/L: Widen LA 41 to Talisheek, then south along route "I". Route "H" leaves "I" after crossing LA 36 to join LA 434 just before the interchange with I-12. Route "L" leaves "I" before crossing LA 36 to meet LA 434 and widen LA 434 to I-12. Alternatives H/I/L traverse the Bayou Lacombe bank. Each of these alternatives would have converted approximately 58 acres of bank wetlands to roadway embankment, drained an undetermined amount of additional wetlands. The Roadway would divide the bank into two separate units of approximately 1,800 acres each. Management of the pine flatwoods/savanna portion of the bank would be complicated by the roadway, requiring burning of each unit at different times to reduce the potential for smoke impacts to traffic on the new highway.

b. Upgrades. Upgrading existing highways generally would have less of an impact on the natural environment. Both of the upgrades would meet the legislative mandate to provide a 4-lane or more highway from Bush, Louisiana to I-12 as required in Louisiana Revised Statute (R.S.) 47:820.2.B (e). However, the applicant determined that upgrading LA 21 or LA 41 did not meet the other stated purposes of the proposed project. The following discussions present the applicants arguments against upgrading either highway.

1) Alternative A: widen LA 21 to US 190, from Bush, Louisiana to US 190.

a) Practicability: In terms of cost, existing technology, and logistics widening LA 21 is practicable.

b) Meeting project purpose and need: The applicant believes that this alternative does not address all project purposes adequately. Information provided by the applicant suggests that Alternative A would provide marginal benefits but that it does not improve north-south connectivity in the project study area. The addition of two lanes to LA 21 would add north-south capacity providing a small savings in travel time and associated user costs along the upgraded portion. By reducing congestion and delays and the corresponding potential for accidents, the proposed action could have some minor effect on improved safety on highways in the project area. However, alternative A does not provide an alternative to funneling traffic into the US 190/LA 21 intersection. Traffic modeling performed by the applicant demonstrates that traffic would increase in this area of the corridor, which is contrary to the applicant's stated purpose and need.

Alternative A improves the Level-of-Service (LOS) on LA 21 in most corridor segments, with the exception of the area from LA 36 to US 190, where the LOS remains an F. This is due to the high volume of traffic funneled into an already congested area. In fact, it actually puts more vehicles on US 190 from US 190B ramp to Harrison Avenue, worsening congestion in that area. By adding two lanes to LA 21, while not adding lanes to the six-lane section of US 190, would result in relative free flow on LA 21 until reaching US 190 where traffic conditions would remain unchanged. The applicant has stated that it cannot widen US 190 beyond six lanes. No other solution to traffic congestion on US 190 was discussed. The widening of LA 21 has virtually no impact on traffic congestion elsewhere.

The applicant believes that Alternative A will not dramatically facilitate trips to northern St. Tammany or Washington Parish. The applicant estimates a 12-minute travel time savings over existing conditions for the expansion of LA 21 to 4 lanes. This is a minimal travel time saving when compared to the new road alternatives which provide an average travel time savings of 25 minutes, making the whole trip between 15 and 18 minutes long, as compared to 45 minutes. Alternative A provides virtually no travel time savings elsewhere on the network.

c) Environmental Impacts: The applicant developed information regarding potential impacts associated with alternative A. As this alternative considers upgrading an existing highway, most impacts to wetlands would be long-term, unavoidable but minor. Secondary impacts would be relatively minor as hydrology and surrounding habitat were previously impacted by construction and continued maintenance of the existing roadway. Improving access to the area may increase the overall rate of development along the immediate highway but there is considerably less wetlands in this area than any of the new construction alternatives.

(1) Based on hydric soils, the applicant estimated that the project could impact approximately 131 acres that potentially could be wetlands. The information provided did not determine what percentage was new ROW. Neither did the information discuss habitat type or quality.

(2) Alternative A could impact an endangered species according to information provided by the FWS. Additionally, Alternative A could impact four state species of concern. Based on information provided by FWS, relocation of the affected species is possible and should not present a serious problem if this alternative were selected.

(3) Alternative A would have no impacts to known archaeological sites, but a Phase I Cultural Resources Survey would likely be required to determine whether or not unknown archaeological/historical sites would be impacted.

(4) One of the applicant's concerns is the number of potential relocations this alternative could have. The applicant states that 127 residential and commercial structures along the route would be impacted (to what degree was not discussed). The applicant did not provide a map showing these relocation or information as to whether the structures themselves would be taken or whether the upgrading would just take roadside property. It is unclear whether the applicant considered reducing ROW requirements to avoid impacting these structures.

2) Alternative M/N: Widen LA 41 to Pearl River. M would bypass Pearl River to the west to connect to I-59 and then to I-12. N would go through Pearl River and connect to I-59 and then to I-12.

a) Practicability: In terms of cost, existing technology, and logistics widening LA 41 is practicable.

b) Meeting project purpose and need: The applicant believes that this alternative does not address all project purposes adequately. Even with the improvements to LA 41/US 11, the applicant contends that traffic will not exceed speeds of 7 to 10 mph in the most congested segments during peak period. This would be due to both the existing traffic and the lack of access management. Information provided by the applicant suggests that Alternative M would provide little benefit to improving north-south connectivity in the project study area. Traffic models indicate that Alternative M would reduce the number of vehicles on LA 21 by 200 and while average daily traffic on US 190 would increase by 850 vehicles. The addition of two lanes to LA 41 would add north-south capacity providing minimal savings in travel time and associated user costs along the upgraded portion. By reducing congestion and delays and the corresponding potential for accidents, the proposed action could have some minor effect on improved safety on highways in the project area.

The applicant believes that Alternative M will not dramatically facilitate trips to northern St. Tammany or Washington Parish. The applicant estimates a 5-minute travel time savings over existing conditions for the expansion of LA 41 to 4 lanes.

c) Environmental Impacts:

(1) Alternative M/N would impact approximately 89/75 acres that have been identified as hydric soils that potentially could be wetlands. The information provided did not determine what percentage would be new ROW. Neither did the information discuss habitat type or quality.

(2) Information collected by the applicant indicates that Alternative M/N could impact 22/19 endangered species. The data did not indicate species to be impacted.

(3) Alternative M/N would impact 3 known archaeological sites based on data developed by the applicant. A Phase I Cultural Resources Survey would likely be required to determine whether or not unknown archaeological/historical sites would be impacted.

(4) One of the applicant's concerns is the number of potential relocations this alternative could have. The applicant states that 198/234 residential and commercial structures along the route would be impacted. To what degree structures would be impacted was undetermined. The applicant did not provide a map showing these relocations or information as to whether the structures themselves would be taken or whether the upgrading would only take roadside property. It is unclear whether the applicant considered reducing ROW requirements to avoid impacting these structures.

VI. Impact Evaluation:

The following discussion addresses potential direct, secondary and cumulative impacts associated with constructing a 17 to 21 mile linear project on an earthen embankment of hauled-in fill material through a mostly undeveloped area containing substantial wetland acreage. Essentially, the applicant has requested a permit to construct a project without providing specific information that can be used to adequately address

associated adverse impacts. Although some of the applicant's practicable alternatives utilize existing highways or attempt to capture existing/abandoned transportation corridors for a portion of their alignments, there still remains a substantial amount of each alternative that will be constructed on new alignment. Some of the discussion is specific to a particular alternative but most is speculative due to unresolved issues regarding highway design, construction techniques and source of hauled-in fill material. This information will be required before beneficial and/or adverse project impacts can be thoroughly addressed.

Also, the applicant provided acreage requirements needed to construct a roadway on each alternative. The acreage values provided are somewhat confusing and do not lend themselves to comparison among different alternatives. For instance alternative P and O are both almost exclusively on new alignment whereas Alternative B and B/O follow existing highways for a large portion of their length before going on new alignment. Also, Alternatives Q and J use the abandoned railroad embankment for about half to almost their entire length respectively. A review of the applicant's data would indicate that Alternative P with 517.8 acres of direct impact would have less of a direct impact than Alternative J with 601.8 acres of direct impact. However, Alternative J incorporates the abandoned railroad embankment which ranges from approximately 100 to 200 feet wide (ROW width is based on examination of recent aerial photography).

A. SOIL/SUBSTRATE.

1. Factor description. Project area soil types include both hydric and non-hydric soils. The hydric soils encountered along most of the alternatives are Guyton Silt Loam, Guyton Silt Loam (occasionally flooded), Myatt Fine Sandy Loam, Myatt Fine Sandy Loam (frequently flooded), Ouachita/Bibb Soils (frequently flooded), and Stough fine sandy loam. The non-hydric soils found in the project area are Cahaba fine sandy loam (1 to 3 percent slopes), Latonia fine sandy loam, Prentiss fine sandy loam (0 to 1 percent slopes), Prentiss fine sandy loam (1 to 3 percent slopes), Ruston fine sandy loam (3 to 6 percent slopes), Savannah fine sandy loam (1 to 3 percent slopes) and Savannah fine sandy loam (3 to 6 percent slopes). Due to their very low hydraulic gradients (<0.5 percent slope), water remains ponded for extended periods. In addition, these soils often have an argillic (clay) horizon, which slows subsurface drainage preventing communications with soil strata below this layer. The amount of hydric soil impacted varies from 61 % to 73% depending upon the practicable alternative considered. Upgrades to existing highways would have significantly less hydric soils than for construction on new alignment. A discussion of each of the hydric soils is provided addressing position, potential use and limitations.

a. Guyton Silt Loam is level and poorly drained. It is on broad stream terraces. This soil has low fertility and high levels of exchangeable aluminum. Water and air move through this soil at a slow rate, and water runs off the surface slowly. A seasonal high water table ranges from the surface to a depth of about 1.5 feet from December to May. This Guyton soil is mainly used as woodland or pastureland. The main concerns in producing and harvesting timber are moderate seedling mortality and severe equipment use limitations caused by wetness. This soil is poorly suited to urban uses and intensive recreation uses, such as playgrounds and campsites, mainly because of rare flooding, wetness, slow permeability, and low strength for roads. Using fill to raise low areas or constructing levees help protect this soil from flooding.

Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Roads should be designed to offset the limited ability of the soil to support a load.

b. The Guyton Silt Loam (occasionally flooded) is level and poorly drained. They are on broad flats and in drainageways and depressional areas. This soil has low fertility and high levels of exchangeable aluminum. Water and air move through this soil at a slow rate, and water runs off the surface slowly. This soil is mainly used as woodland. The main concerns in producing and harvesting timber are severe seedling mortality and equipment use limitations caused by flooding and wetness. It is poorly suited to urban use and intensive recreation uses, such as playgrounds and campsites, mainly because of wetness, flooding, slow permeability, and low strength for roads. Major flood control structures, along with extensive local drainage systems, are needed to protect this soil from flooding. Drainage is needed if roads and building foundations are constructed. Roads should be designed to offset the limited ability of the soil to support a load.

c. Myatt Fine Sandy Loam is level and poorly drained. It is on broad flats or stream terraces. This soil has low fertility and high levels of exchangeable aluminum. Water and air move through this soil at a moderately slow rate. Water runs off the surface very slowly and stands in low places for long periods after heavy rains. A seasonal high water table ranges from the surface to a depth of 1 foot from November to April. This Myatt soil is mainly used as woodland. The main concerns in producing and harvesting timber are severe seedling mortality and equipment use limitations caused by wetness. This soil is poorly suited to urban uses, mainly because of flooding, wetness, and moderately slow permeability. Levees can provide protection from flooding. Filling low areas prior to construction also helps prevent flooding. Excess water can be removed by using shallow ditches and providing the proper grade for drainage.

d. Myatt Fine Sandy Loam (frequently flooded) is level and poorly drained. It is in depressional areas on stream terraces and in narrow drainageways. This soil has low fertility and high levels of exchangeable aluminum. Water and air move through this soil at a moderately slow rate, and water runs off the surface very slowly. A seasonal high water table fluctuates between the surface and a depth of about 1 foot from November to April. This Myatt soil is mainly used as woodland. In a few areas, it is used as pastureland. This soil is moderately well suited to use as woodland. Flooding and wetness are the main concerns in managing this soil for timber production. Suitable trees to plant are loblolly pine, slash pine, and sweetgum. Equipment use limitations and seedling mortality are concerns if drainage is not provided. This soil is not suited to urban uses or intensive recreation uses, such as playgrounds and campsites. Flooding and wetness are generally too severe. Protection from flooding is needed. Dikes and channels that have outlets to bypass floodwater can be used. Roads and streets should be located above the expected flood level.

e. Ouachita-Bibb soils (frequently flooded) are soils that are nearly level. They are well drained and poorly drained and are on the flood plains of major drainageways. Both soils generally are in a mapped area, but only one soil is in some areas. In areas of both soils, the Ouachita soil is on convex ridges, and the Bibb soil is in low positions between ridges. The texture of the surface layer changes as floodwaters rework the deposits. Soils in this unit have

low fertility and high levels of exchangeable aluminum. Water and air move at a moderate rate through these soils, and water runs off the surface very slowly. This soil is subject to brief periods of flooding mainly in the winter and spring, but flooding can occur anytime of the year and more often than twice in 5 years. A seasonal high water table ranges from a depth of 0.5 foot to 2 feet from December through April. The soils are mainly used as woodland. In a few areas, they are used as pasture. The soils in this map unit are moderately well suited to use as woodland. Suitable trees to plant are loblolly pine, eastern cottonwood, sweetgum, yellow poplar, and American sycamore. The main concerns in producing and harvesting timber are moderate equipment use limitations and severe seedling mortality caused by wetness and flooding. The soils in this map unit are not suited to urban uses and intensive recreation uses, such as playgrounds and campsites. The hazard of flooding is generally too severe. Protection from flooding is possible only by constructing large flood control structures, such as levees.

f. The Stough soils are level and somewhat poorly drained. They are on flats in positions that are slightly higher than those of the Myatt soils. This soil has low fertility and high levels of exchangeable aluminum. Water and air move through this soil at a moderately slow rate, and water runs off the surface slowly and stands in low places for short periods after heavy rains. A seasonal high water table ranges from about 1 foot to 1.5 feet below the surface from January to April. This soil is mainly used as woodland. Using equipment when the soil surface is moist can cause soil compaction. Conventional methods of harvesting timber can be used, but can be restricted by wetness in the winter and spring. This soil is poorly suited to urban uses. The main limitations are wetness and moderately slow permeability. Excess water can be removed by using shallow ditches and providing the proper grade for drainage.

2. Expected impacts. The proposed project involves the excavation of existing soils and the deposition and compaction of hauled-in fill material of unspecified quality, quantity and source. Because of the low soil strengths and wetness of the hydric soils in the project area, it is likely that a certain amount of excavation will be required to remove overburden material and replace it with higher strength soils. Also, to reduce the wetness in the roadway foundation roadside ditches would be excavated to a depth necessary to assure drainage of the foundation. Excavated material would likely be reworked or deposited adjacent to the roadway construction[9].

The excavation and deposition of fill material would alter natural contours and elevations increasing slopes along the entire length of the proposed project. Additionally, native soil profiles would be altered by the redistribution of area soils and the introduction of foreign soils to the area. Compaction of the substrate would occur during the construction phase and continue over time with project use. Soil compaction would decrease surface and substrate porosity forming barriers to surface and subsurface water flow.

The excavated material would be expected to consist mostly of sandy clay loam having a low fertility and high levels of exchangeable aluminum. Because of limited gas exchange within the hydric soil, it is anticipated that this material would be primarily anaerobic. Excavation of the drainage ditch and adjacent wetlands substrate would result in modifications to the physical condition and chemical composition of the existing soil profile. Removal of the upper soil layers would expose the underlying clay substrata. Because clay has binding and colloidal properties

[9] Excavation and disposal information was not addressed by the applicant.

different from organic particles, localized changes in soil chemistry are expected to occur. Soil chemistry would also be affected by the direct exposure of the anaerobic substrata to water and/or air. Most substrate elements and compounds under anaerobic conditions exist in a chemically reduced state. Interaction with the oxygenated environment would result in the conversion of soil chemicals to an oxidized state, thereby affecting soil pH, redox potential, and the overall chemical nature of the existing substrate.

3. Quantify/Qualify the Impacts. The typical cross-sections provided do not indicate disposal location of excavated material. The RA-2 and RA-3 typical cross-section provided show roadside ditches excavated below existing groundline with slopes 6:1 from the roadway and 4:1 from the ditches to outside the required ROW. Roadside ditches are expected to be excavated to a depth of approximately four feet below existing grade.

Impacts were not quantifiable and are dependent upon the alternative selected. It is anticipated that these impacts would most likely occur for all alternatives considered. However, for those alternatives that include upgrades to existing highway facilities and possibly those alternatives utilizing the abandoned railroad, the amount of earthen work and thus impacts to new areas would be substantially reduced. Direct impacts are expected to be long-term and serious to significant depending upon the alternative selected. Secondary impacts associated with the sloping and hauled-in fill material may extend several hundred feet or more from the impact site and would be dependent upon existing local conditions. Secondary impacts would be serious to significant depending upon the alternative selected. The applicant anticipates that the proposed project would likely spur development by reducing access times to areas. The cumulative effect of increased development could significantly impact aquatic resources in the project area.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts for alternatives using new alignment. Using existing highway corridors, reducing ROW requirements and or minimizing excavation would be measures to avoid/minimize associated impacts and some of the alternatives do incorporate to some degree the use of existing highways (A, M, B and B/O). Others use the abandoned railroad corridor for little (P) to a majority of their length (J more than Q).

B. CURRENTS, CIRCULATION OR DRAIN PATTERNS

1. Factor Description. The project area consists of broad wet flats crossed by a number of small drains and bayheads found in small to large depressional areas leading to the major area waterways, Bayou Liberty, Bayou Lacombe, Abita Creek and Ponchitolawa Creek. Water movement is generally down-slope on these broad flats until sheetflow is captured by one of these small drains. The slowly permeable soils in these broad flats trap local runoff and precipitation resulting in higher water tables than surrounding areas. Wet pine flatwoods often have an organic or clay hardpan near the surface, causing water from rainfall to remain on the surface instead of percolating through the soil. The water table is below the hardpan, and, in extreme cases, the hardpan restricts root growth. As a result, wet pine flatwoods can have saturated soils with standing water in the winter and early spring when transpiration is low and dry soils during the growing season from increased transpiration and lack of water movement

upward through the subsurface hardpan. Flatwoods plants are shallow rooted, presumably because a water table close to the surface restricts rooting depths. When the water table drops, these shallow-rooted plants are likely to experience drought stress. In wetland communities, slight differences in elevation can result in different environmental conditions for establishing plants. Lower-lying areas may range from saturated to moist year-round, while elevated areas dry out in the summer. Plants occurring within these communities can have narrow environmental tolerances.

The area is crossed by numerous timber roads, most with small road-side unmaintained ditches. Other ditches have been constructed throughout the study area. Most are ineffective at removing surface water.

2. Expected impacts. The proposed project involves excavating to construct roadside ditches and the depositing hauled-in fill material to construct a road dump. Both would alter existing surface hydrology. Altered hydrology is likely to have community-level effects on wetter flatwoods communities especially when existing ditches are captured by the proposed roadside ditches or new ditches are constructed that connect to the proposed roadside ditch. Shallow ditches are capable of draining surface water from these wetlands. Improving existing ditches would pull water from a considerable distance from the proposed roadway.

Roads alter the water level regime by impeding the flow of surface water through it. Acting as dams, roads cause water to flood more deeply, more frequently, and for longer periods on the up-gradient side than it would have, had the road not been in place. In contrast, a water deficit occurs on the down-gradient side (i.e., water generally floods less deeply, less frequently, and for a shorter duration). Roads need not be very high (0.5 m or less) to alter area hydrology because gradients are so low in flats. Even a low road can create a relatively large reservoir up-gradient and a reservoir shadow down-gradient. Because water levels in wet pine flats are primarily controlled by a balance between precipitation and evapotransportation, a reservoir may only fill with water completely when precipitation exceeds evapotransportation for extended periods or when a major precipitation event occurs.

For roads with effective roadside ditches designed to drain water away from the road, the effects of the ditch supersede the effect of the road. Ditches not only drain water away from the roadway but also from adjacent wetlands. Effects of ditches can extend far beyond the area for which they were intended, lowering the maximum height and duration of the soil water tables on nearby lands. Roadside ditches quickly drain the water in pine flatwoods after heavy rains, inducing greater peak flows into the streams and lowlands where the water is discharged.

Slight changes in the amount of surface water may have a large impact on the plant community composition due to narrow tolerances in soil saturation. Slight changes may result in environmental conditions unacceptable for species with very narrow limits. Changes in hydrology can also directly impact the herbaceous plant community when these alterations create better conditions for competing species. For example, planted slash pine and understory shrubs growing on wet, phosphorous-deficient soil can have much higher growth rates in the vicinity of roadside ditches, because in addition to draining water from the road, the ditches drain water

from within the community. Higher growth rates of slash pine and shrubs reduce survival and growth of herbaceous species through shading.

3. Quantify/Qualify the Impacts. Those alternatives that upgrade existing highways or use the abandoned railroad alignment to the maximum extent would have less of an impact on surface hydrology than those alternatives on new alignment. Direct impacts associated with the new road construction would be serious to significant based on the foot print of the proposed project. Considering the secondary affects of ditching, the adverse impacts are expected to be significant for alternatives on new alignment. The hydrologic alterations caused by ditching would be easily recognized within a relatively short time period following construction of the ditches. Initially, the ditch would be expected to impact wetlands at a distance of 33 to 100 feet outside the limits of construction. However, the extent of impact would gradually widen depending upon area topography and ditch depth and slope.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts associated with hydrologic alterations. There are several measures that could be incorporated into the design.

a. Road fills in wetlands should have adequate culverts to avoid impounding water. However, culverts only limit depth of surface water accumulation and seldom prevent impounding of water.

b. Avoid channelizing road runoff. Where road runoff is channelized, it is recommended that the runoff not be directed into streams or wetland basins.

c. In areas where sheet flow predominates, roads should be constructed in such a way that channelizing the flow is avoided.

d. Road ditches should be constructed in a manner to prevent additional drainage of water off of wetland sites.

e. Roads should cross streams perpendicularly to minimize damage to the stream and its floodplain.

C. SUSPENDED PARTICULATES/ TURBIDITY

1. Factor Description. Natural factors such as slope, precipitation, and soil texture influence erosion rates. Erosion and sedimentation do not appear to be significant problems in pine flatwoods because of their flat topography. Wetlands in the project vicinity function to remove sediments and suspended particulates from storm-water runoff directed through them.

2. Expected impacts. The proposed project involves extensive earthen work that would leave exposed earth susceptible to erosion. The sloping and ditching work would increase slopes within the work area increasing the potential for erosion of the surface material during storms. Eroded material would be carried from the construction site through the ditches down-slope entering adjacent wetlands where it would be deposited or carried into adjacent waterways

to be carried downstream increasing stream turbidity. The increased turbidity and sedimentation would adversely impact both the benthic and motile aquatic communities.

3. Quantify/Qualify the Impacts. The proposed project length varies from 17.4 to 21.0 miles. Each alternative crosses a number of waterways that are likely to be impacted by the proposed work. The eastern alternatives have fewer crossings of major waterways. Those through the center of the project area and along the western edge would result in broader impacts.

4. On-site measures to avoid/minimize impacts. Although the applicant proposes to develop an erosion control plan that would be implemented in accordance with the applicant's design policies for erosion control. A specific plan for this proposed project was not developed. Therefore, the applicant has not adequately addressed avoidance/minimization of potential adverse impacts.

Erosion control should be an essential component of on-site avoidance and minimization of adverse impacts. The loss of vegetative cover is unavoidable in excavation and depositional projects. Subsequent soil loss from these areas will contribute to sedimentation within entire drainages. It is necessary to arrest the erosion process early in its development and restrict erosion to the smallest areas possible. Although erosion cannot be prevented entirely, it can be harnessed before it damages valuable wetlands, lowlands, stream courses, endangered species habitat, or other high-quality sites. Traditional intervention using mesh nets, straw, rocks, and fast-growing grasses may be most appropriate, since it is critical to stabilize the soil quickly. However, the introduction of nonnative species (directly or secondarily through the spreading of straw) for soil stabilization is a serious and fast-growing threat to natural communities in the region. Cogon grass (*Imperata brasiliensis* and *I. cylindrica*) and Bahai grass (*Paspalum notatum*) are already identified as species that are invading and disrupting native plant communities in Florida, Alabama, Mississippi, and Louisiana. Japanese honeysuckle (*Lonicera japonica)*, kudzu, and Australian pine (*Casuarina cunninghamiana*) were introduced as erosion control species with devastating consequences for the southeastern region. When alternative techniques exist, erosion control efforts should avoid using invasive exotics, because they may establish in natural communities. In particular, the use of love grass (*Eragrostis* spp.) for erosion control in the longleaf pine ecosystem is a concern. Similar concern exists over the use of *Vetiver* spp. for erosion control.

D. WATER QUALITY (temperature, salinity patterns and other parameters)

1. Factor Description. The wetlands to be affected by the proposed project are important to maintaining water quality values within the project area. The affected wetlands maintain water quality by retaining sediment and contaminates and removing or transforming nutrients. The wetlands accomplish this function by trapping suspended solids and chemical contaminants, such as pesticides and heavy metals that may be adsorbed to the suspended particles, preventing the contaminants from moving into deep water or groundwater aquifers where they enter the food chain. Deposition of sediments can ultimately lead to removal of contaminates through burial, chemical breakdown, or temporary assimilation into plant material.

Area wetlands also remove and/or transform nutrients (nitrogen and phosphorus). The mechanisms by which wetlands perform this function includes storage of nutrients within the sediment or plant substrate, the transformation of inorganic nutrients to their organic forms, and transformation and subsequent removal of nitrogen as a gas. The strategic position of the area wetlands, coupled with the ability of wetland vascular plants to remove nutrients from waters and sediments during the growing season and release them later in the growing season when light or temperatures will not support profuse algal growth, seems to be a general phenomenon, and one important in maintaining water quality in adjoining systems. The content of amorphous, extractable aluminum in area soils is the most important factor influencing the ability of a wetland to assimilate phosphorous over long periods. Soils having high concentrations of aluminum, such as those in the project area, have a much higher capacity to retain phosphorus.

2. Expected impacts. Anticipated impacts include the direct and secondary loss of area wetlands that perform water quality enhancement. Excavation and depositional activities would result in the direct loss of wetlands and the water quality enhancement provided by them. The excavation of ditches and associated sloping work would remove surface water from adjacent wetlands quickly before these wetlands are able to remove sediments and pollutants. Runoff would be directed into adjacent waterways where sediment and pollutants would either remain suspended and carried down stream or fall out and settle to the bottom of the waterway where they would impact aquatic vegetation and fishery resources.

The proposed project would also introduce contaminants into the area in the hauled-in fill material. It is anticipated that hauled-in fill material will be clean clay material obtained off site. Generally, contaminant levels are minimal in this type of material. However, should contaminants be present, periodic leaching could occur. Secondarily, contaminants would be introduced via surface runoff from the road surface and would impact adjacent wetlands and receiving waters. Stormwater runoff would carry roadway deposits containing products of vehicle emissions, oils, radiator fluid, rubber and other contaminants into the adjacent water bodies. In addition, highway maintenance includes the occasional use of herbicides to control the growth of roadside vegetation. Most of this material would enter adjacent waters before it could be treated.

3. Quantify/Qualify the Impacts. Direct and secondary adverse impacts are expected to be serious and potentially significant. The severity of adverse impacts depends upon the alternative selected. Those alternatives on new alignment would have a greater potential for significant water quality impacts than alternatives upgrading existing roadways. Additionally those on new alignment are likely to spur development which cumulatively would result in significant, long-term water quality impacts in the project area. Adverse impacts are expected to be long-term and regionally significant.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts. No on-site mitigative measures were proposed by the applicant.

E. FLOOD CONTROL FUNCTIONS.

1. Factor Description. Wet pine flatwoods/savannas minimize the danger of damaging floods by storing and preventing rapid runoff of water. These wetlands provide excellent surface water storage areas primarily due to their very low hydraulic gradients (<0.5 percent slope). In addition, soils often have an argillic (clay) horizon, which slows subsurface drainage (preventing communications with subsurface layers). Water level fluctuations are primarily determined by the balance between input from precipitation and loss due to evapotransporation. Outflow via surface sheetflow is slow and intermittent. At a landscape scale, outflow of water via overland flow may substantially contribute to the water supply in down-gradient areas.

The applicant prepared a preliminary hydrologic investigation for Alternative P which involved the hydrologic modeling of the watershed, development of hydrographs for existing and future conditions[10] and the determination of potential drainage structures for this alternative. With the appropriately designed conveyance structures, no net impact on the drainage of the area would occur when considering peak run-off flows during the 10-, 50-, and 100-year storms.

2. Expected impacts. Shallow ditches are capable of significantly reducing the amount of surface water that area soils would store. The site hydrology would change during the initial clearing and grading activities of construction. Trees, shrubs and grasses that had intercepted rainfall are removed, and natural depressions that had temporarily ponded water are graded to a uniform slope. Having lost its natural storage capacity, the cleared and graded site can no longer prevent rainfall from being rapidly converted into stormwater runoff. Ditches which would alter natural contours would remove the stormwater runoff. The proposed project would also increase impervious surfaces through the construction of roadways. Water would be directed off these hard surfaces and adjacent sloped areas to roadside ditches which would convey the runoff to nearby waterways. Stormwater runoff collected by wetlands adjacent to the roadway would also discharge to the roadside ditches rather than store the surface water. Construction of a roadway across the length of the project area would intercept area sheetflow and redirect the stormwater to area waterways. Cumulatively, development spurred by the construction of this roadway would further reduce surface water storage capacity in the area. Shallow ditches in most of these wetlands are capable of removing much of the surface water. Reduced storage capacity within these study area wetlands could result in reduced storage times and potentially serious, down-gradient, flooding issues.

A consequence of providing access into less accessible areas is induced development. As these wet pine flatwoods/savannas are converted into less pervious urban soils, or pavement, both the frequency and magnitude of storm flows increase dramatically. As a result, the bankfull events could occur two to seven times more frequently after development occurs. In addition, the discharge associated with the original bankfull storm event can increase by up to five times. As a consequence, the elevation of a stream's 100-year floodplain becomes higher and the boundaries of its floodplain expand. In some instances, property and structures that had not

[10] The hydrologic investigation states that the various runoff hydrographs take into account existing and forecasted land-use. Land-use data used in the study represents the parish's current land-use and long-term planning goals. Structures are sized to accommodate the peak runoff from a 50-year storm under future conditions.

previously been subject to flooding are now at risk. Additionally, such a shift in a floodplain's hydrology can degrade wetland and forest habitats. Flooding of down-gradient development would become more likely as aerial coverage by development within the study area increases.

3. Quantify/Qualify the Impacts. Direct, adverse impacts associated with the roadway are expected to be serious, wide-scale and long-term. The proposed project could potentially have significant impacts to areas away from the development by providing drainage to a large portion of the study area.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts.

F. SPECIAL AQUATIC SITES.

1. Factor Description. A large proportion of the mid to southern part of the study area contains extensive expanses of areas determined to be special aquatic sites. These special aquatic sites include pine flatwoods and related habitats including pine savanna, bayhead swamp and riverine habitat found along the numerous drains and streams that would be crossed by the various alternatives. The wetlands associated with Bayou Lacombe and Abita Creek watershed can be very high quality wetlands. This is supported by the rare plant communities found, the sheer size and diversity of the system, the many functions these wetlands provide to the project study area and Lake Pontchartrain and the recognition of the significance of the area by state and federal agencies as well as private conservation agencies such as The Nature Conservancy.

Using available soil data, the applicant developed information regarding potential wetland impacts by habitat for those alternatives he considered practicable. The applicant's estimates of wetland impacts are included in Table 1.

Based on estimates provided by the applicant, the majority of the wetlands expected to be impacted would be pine flatwoods. The pine flatwoods/savannas of southeastern Louisiana are noted for their extreme degree of plant species richness. The community is dominated by numerous species of grasses and sedges, but is perhaps best known for their insectivorous plants and orchids many of which are endemic to the savanna areas. Approximately 75% of the plant species occurring in this community are categorized as obligate wetland or facultative wetland species. Small-scale plant species diversity in this habitat is among the highest of any habitat in the world and is unequaled by any other habitat in Louisiana. As many as 40 or more species can be found on a single square meter of high-quality savanna and closely allied hillside seepage bogs. These areas are considered extremely important since most of these native plants can not exist in any other wetland type and many are considered rare due to their limited natural range and potential habitat loss.

Development pressure and land management practices have progressively degraded and fragmented this unique habitat association. Those factors threaten the remaining savannas, not only in Louisiana, but also throughout the coastal plain of the southeastern United States. The Louisiana Heritage Program estimates that less than 10 percent of the original pine savanna habitat in southeastern Louisiana remains in relatively natural condition. Those remnant areas

are important centers of biotic diversity, and provide significant habitat for many species considered rare and unique.

Although area wetlands have been managed for timber for many years, they still perform important functions that are beneficial to the health of adjacent waterways and the public using them. Discussed previously are the ability of these wetlands to perform erosion control, surface water storage and water enhancement functions. Additionally, these wetlands provide valuable habitat for a number of economically important wildlife species as well as a myriad of other wildlife species including some considered threatened and endangered. These wetlands support a highly diverse herbaceous layer that includes a number of locally and globally rare species. The US Fish and Wildlife Service and Environmental Protection Agency have noted that many of the wetland habitats within the project area are aquatic resources of national importance due to their increasing scarcity and high value for fish and wildlife within their federal trusteeship (i.e., migratory birds and federally listed threatened and endangered species).

2. Expected impacts. Those wetlands within the construction limits of the proposed project would be excavated and/or filled. All functions attributable to these wetlands would be lost within the construction limits of the proposed roadway. Additionally, the hydrologic alteration in adjacent areas induced by ditching and road embankment would remove surface water in adjacent areas seriously affecting their ability to perform wetland functions. Activities that disturb soil or alter hydrology, increase susceptibility of pine communities to invasion by species not natural to the community. Old-field weed species may invade following disturbances, which may reduce fire frequency and facilitate hardwood invasion. Safety issues associated with operation of the highway would prevent fire management activities near the roadway in most cases and limit it within the general vicinity except during favorable wind conditions. Although some areas adjacent to the highway would still provided habitat, the loss of surface waters would alter the herbaceous and aquatic species composition and encourage growth of non-indigenous plants. As the proposed highway would provide a more direct ready access to the project area, pressure to develop these areas would increase sharply, significantly increasing the loss of these wetlands and the important functions and values which the wetlands provide.

Alternatives J, P and Q utilize the abandoned railroad route. The eastern boundary of the Money Hill Mitigation Bank abuts the abandoned railroad for all three of these alternatives. The eastern boundary of the Bayou Lacombe Mitigation Bank is approximately a quarter of a mile from the abandoned railroad route used by alternatives J and Q. Alternative P passes within a quarter of a mile of the northwest corner of this bank. Both banks rely on fire management as the principal tool to enhance and maintain bank lands and accrue credits to replace adverse impacts associated with Department of the Army permits. The loss of the ability to burn would reduce the credit potential of these banks. Both banks at his time have sold all or nearly all the available credits to be accrued.

3. Quantify/Qualify the Impacts. Direct and secondary adverse impacts are expected to be long-term, regionally important, and result in significant degradation of wetlands in and adjacent to the project ROW. Adding the cumulative impact associated with residential, commercial and industrial development spurred by the project within the study area, adverse

impacts to wetland function and values would be even more significant. The proposed project would adversely impact existing banks within the study area reducing the potential for long-term management of these banks.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts to special aquatic sites. Specifically requested was how they proposed to accommodate management practices at the area bank allowing fire management as needed. The applicant did suggest that adverse impacts associated with project implementation could be compensated at existing banks in the watershed. If the mitigation credits in these banks were not available, they could develop a permittee-responsible mitigation plan.

G. WILDLIFE HABITAT (breeding, cover, food, travel, general).

1. Factor Description. Pine flatwoods are of critical, regional importance as they provide (1) essential forested habitat for wildlife including wide-ranging species; (2) tree canopy for canopy-dependent species including Neotropical migrants, tree-cavity dependent species, and tree-nesting species; (3) a habitat that seasonally functions as both a wetland and upland. The relatively predictable nature of this hydrologic transformation allows for an abundant diversity of plant life, including both wetland and upland annuals, and supports a diverse invertebrate fauna and, as a result, a diverse vertebrate fauna.

Hydric flatwoods serve as wading bird foraging areas, foraging, denning, and travelways for a number of mammals, and essential red-cockaded woodpecker foraging and nesting habitat. Although no mammal is endemic only to the wet pine flatwoods/savanna, many species regularly utilize wet pine flatwoods/savanna. Pine flatwoods/savannas provide valuable habitat for a variety of migratory and resident bird species, including Henslow's sparrow, Bachman's sparrow, loggerhead shrike, brown-headed nuthatch, American woodcock, woodduck, turkey, herons, egrets, ibises, raptors including the great horned owl, and a variety of songbirds, including yellow-billed cuckoo, wood thrush, pine warbler, hooded warbler, white-eyed vireo, and red-headed woodpeckers. These songbirds have exhibited substantial population declines over the last 30 years. The project area wetlands are likely to support mammals such as gray and fox squirrels, raccoon, eastern cottontail, opossum, and white-tailed deer. Wet pine flatwoods/savanna are an important habitat for a number of rare amphibians and reptiles including the flatwoods salamander (*Ambystoma cingulatum*), gopher frog (*Rana captio*), pine woods tree frog (*Hyla femoralis),* oak toad (*Bufo quercicus),* box turtle (*Terrapene carolina),* eastern diamondback rattlesnake (*Crotalus adamanteus),* black racer (*Coluber constrictor), pine* snake (*Pituophis melanoleucus*), southern hognose snake (*Heterodon simus*) and gopher tortoise (*Gopherus polyphemus*).

It is not unusual to encounter wet season species in wet pine flatwoods/savanna habitat in the dry season, as they move between remaining semi-permanent ponded areas. Similarly, it is not uncommon to observe mesic residents foraging at the moist edges of wet pine flatwoods/savanna pools, or crossing inundated wet pine flatwoods/savanna, as they travel between mesic and xeric areas in habitat matrix that includes wet pine flatwoods/savanna.

2. Expected impacts. Construction activities would result in the permanent loss of wildlife habitat. In addition to the direct loss of wildlife habitat through the conversion to a roadway and associated ditches within the construction limits of the proposed project, the proposed project would go through large continuous wetland tracts fragmenting these into smaller tracts. Natural linkages formed by the riverine habitat would be cut reducing the ability of wildlife to move from one area to another. The proposed 250-foot wide or wider ROW would be a barrier to the movement of many wildlife species sensitive to disturbances. Slower moving terrestrial species and many arboreal species would find it difficult to cross the wide expanse of the highway. Noise and lights from construction activities and use of the highway would be a disturbance to wildlife in the general vicinity of the roadway. Regional biodiversity could be seriously affected since the species most severely impacted by the change are most likely those requiring large contiguous habitat areas. It is important to note that several species of amphibian, reptile and bird intimately associated with these habitats are currently listed or being considered for listing as threatened or endangered. Continued loss of the remaining habitat without regard for the importance of the spatial arrangement and regional context will continue to impact regional biodiversity. Fragmentation of these wetlands would represent an irreplaceable loss of these unique and valuable resources. Fragmentation effects imply that the value of the remaining habitat also is diminished.

3. Quantify/Qualify the Impacts. Direct losses of wetland habitat caused by the proposed project are expected to be long-term, regionally disruptive, and significant. Secondary impacts associated with the direct impacts are expected to extend well beyond the construction limits and would also be considered long-term, basin-wide and significant. The potential for induced development is high for some alternatives and would result in the loss of significant amount of wetland habitat.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts to reduce the severity of the wildlife impacts.

H. HABITAT FOR FISH AND OTHER AQUATIC ORGANISMS.

1. Factor Description. The wet pine flatwoods/savanna provide essential habitat to the breeding life cycle of numerous aquatic and wetland-dependent animals, and a major forest cover for cover-dependent species. Wet pine flatwoods/savannas provide both aquatic habitat for young and adult amphibians and adult tree frog climbing areas. The amphibian life-cycle is particularly well-adapted to the hydrologic cycle of wet pine flatwoods/savanna, providing both aquatic habitat for young and adults and upland habitat for more terrestrial species adult forms.

Fish occur in wetter areas within the pine flatwoods/savanna when seasonal water elevations can support them. The dominant fish species of the wet pine flatwoods/savanna include the gulf starhead topminnow (*Fundulus nottii),* blackspotted topminnow (*Fundulus olivaceous*) and the golden topminnow (*Fundulus chrysotus*) and three poeciliids, the mosquitofish (*Gambusia affinis),* the least killifish (*Heterandria formosa),* and the sailfin molly (*Mollienesia latipinna).* These fish are a fundamental link between the primary producers and higher trophic level fish and wildlife species. The typical cyprinodont diet consists of plant and animal tissue including periphyton, insect larvae, and vascular plant detritus. They subsequently

are food for sport fish and wading bird species. The pattern of fish utilization of the wet pine flatwoods/savanna follows the hydrologic cycle. Beginning in June, the standing water levels allow small forage fishes to escape predation and expand into unoccupied feeding and nursery grounds provided by the shallow sheetflow wetlands. The increased habitat space allows for a population boom in species capable of a life cycle in inches of water. As water levels recede, fish retreat to the bayheads and area drains and streams. The concentration of forage fish biomass in shallow isolated areas is exploited by larger fishes, wading birds, turtles, alligators, and piscivorous mammals.

The abundance and diversity of insect fauna is related to the variable hydrology, host plant diversity, and microhabitat presence (*e.g.*, fungal bracts, dead trees, hosts for parasites, *etc*.) available in an ecosystem that functions as both a wetland and upland. Within the insects, the more obvious and abundant organisms are species that: have a life cycle that combines an aquatic larval stage with an adult flying form that utilizes the prey or plants of wet pine flatwoods/savanna; have a life cycle that combines a larval stage living in live or dead wood of the canopy or midstory of wet pine flatwoods/savanna and an adult form that either lives within live or dead wood and/or utilizes prey or plants of the wet pine flatwoods/savanna; have a larval stage that feeds on the diversity of perennial and annual plant life of wet pine flatwoods/savanna and an adult stage that acts as a pollinator of the flowering plants of wet pine flatwoods/savanna; or have a life cycle linked to conversion of detritus and/or carcasses of the abundant animal and plant life of wet pine flatwoods/savanna. Dragonflies, damselflies, mayflies, lacewings, butterflies, moths, bees, wasps, flies, and mosquitoes are the commonly encountered flying insects of the wet pine flatwoods/savanna. On plant and leaf surfaces, obvious species include grasshoppers, crickets, katydids, roaches, thrips, true bugs, cicadas, aphids, whiteflies, scales, a wide variety of beetles, caterpillars, galls, maggots, fruit flies and the diverse arthropod predators of herbivorous species. Springtails, silverfish, wood roaches, earwigs, termites, bark lice, bark beetles, boring beetles, wood boring caterpillars, wood boring Hymenoptera, and their associated predators are common in decaying and live wood. During the wet season, nymphs of dragonflies, damselflies, lacewings, mayflies, mosquitoes, aquatic lepidopterans, water bugs, backswimmers, water striders, diving beetles, and whirligig beetles inhabit the sheetflow wetlands, and during the dry season move into drying pools of the wet pine flatwoods/savanna. Arachnids of the wet pine flatwoods/savanna include web-building spiders, hunting spiders, water spiders, daddy-longlegs, mites, and ticks. Millipedes, centipedes, snails, and slugs also utilize the wet pine flatwoods/savanna.

2. Expected impacts. The construction of the roadway and associated ditches would result in the direct loss of aquatic habitat and resources utilizing those areas by filling and excavation activities. All alternatives would have sloping and ditching work associated with the construction of the roadway. This work would drain adjacent wetlands reducing the amount and length of time surface water would be stored. Aquatic species found in these seasonally flooded systems have adapted life cycles that allow them to successfully breed and rear young to adulthood in normal years. The proposed project would reduce the inundation depth and duration within the construction limits of the roadway and adjacent wetlands drained by the roadside ditches such that these species could not complete their life cycles in these areas.

Construction of the roadway would leave large areas of earth unprotected. Sloping work would increase the potential for erosion of the surface material during storm events. Roadside ditches would carry eroded material from the construction site down-slope entering adjacent wetlands or adjacent waterways where the sediment would be deposited. Turbid water interferes with respiration and filter-feeding behavior of macroinvertebrates as well as reduces fish feeding success due to visual impairment. Turbidity decreases photosynthesis for primary producers. Sediment deposition fills pools and interstitial spaces in the stream bottom necessary for macroinvertebrates and juvenile fishes. Sedimentation of shallow areas chokes out aquatic vegetation. Turbidity resulting from sediment can reduce light penetration for submerged aquatic vegetation critical to stream and estuary health. In addition, the reflected energy from light reflecting off of suspended sediment can increase water temperatures. Sediment can physically alter habitat by destroying the riffle-pool structure in stream systems, and smothering benthic organisms such as clams and mussels. Finally, sediment transports many other pollutants to the water resource. Organic matter, washed from impervious surfaces during storms, can present a problem in slower moving downstream waters. In addition, organic carbon is formed indirectly from algal growth within systems with high nutrient loads. As organic matter decomposes, it can deplete dissolved oxygen in lakes and tidal waters. Declining levels of oxygen in the water can have an adverse impact on aquatic life. Vehicles leak oil and grease that contain a wide array of hydrocarbon compounds, some of which can be toxic to aquatic life at low concentrations.

As a result of diminished storage of surface waters directly caused by the road construction and induced development, stormwater runoff would increase both the frequency and magnitude of storm flows in area streams. The increased volume of water carried by area streams results in flow beyond the “critical erosive velocity”. The increased energy resulting from these more frequent bankfull flow events results in erosion and enlargement of the stream channel, and consequent habitat degradation. Reduced surface water storage capacity of these wetlands would not only increase the rate of stormwater runoff during storm events but, as important, it would reduce available, near-surface, ground water important in maintaining stream flow during drier periods. The decline in the physical habitat of the stream, coupled with lower base flows and higher stormwater pollutant loads, would have a severe impact on the aquatic community. It has been suggested that new development impacts aquatic insects, fish, and amphibians at fairly low levels of imperviousness, usually around 10% impervious cover. New development appears to cause declining richness (the number of different species in an area or community), diversity (number and relative frequency of different species in an area or community), and abundance (number of individuals in a species).

3. Quantify/Qualify the Impacts. Sedimentation and turbidity levels are anticipated to be significant without appropriate measures to prevent runoff from the construction sites from entering adjacent wetlands and waterways. Once vegetation has become established on the excavated and filled areas turbidity levels are likely to be reduced. Therefore, although potentially significant, impacts are expected to be relatively short-term (one or two years following completion of the proposed project). Recovery time for receiving waterways and wetlands maybe substantially longer but without additional disturbances, aquatic resources within adjacent waterways should recover from construction-source turbidity.

The direct and secondary impacts associated with draining and filling wetlands would occur to some extent for all alternatives. Those alternatives upgrading existing highways would have less of an impact as hydric conditions in adjacent areas have already been affected by existing facilities. Those alternatives on new alignment are anticipated to have long-term, potentially significant and wide-scale direct and secondary impacts on aquatic resources as result of draining wetlands.

Increasing access to the project area will increase the rate and development type within the study area. The cumulative effect of this induced development would likely drain extensive wetland areas within the study area reducing area wetland's ability to support aquatic organisms. Cumulative losses are anticipated to be long-term, wide-ranging and significant.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts. The applicant proposes to develop an erosion control plan that would be implemented in accordance with the applicant's design policies for erosion control.

I. ENDANGERED OR THREATENED SPECIES.

1. Factor Description. According to the USFWS database, nine federally listed threatened or endangered species occur within the project area. Five of these are threatened, and four are endangered. The species which occur in the parish are the bald eagle, brown pelican, red-cockaded woodpecker, West Indian manatee, gopher tortoise, ringed map turtle, dusky gopher frog, gulf sturgeon, Louisiana quillwort and an unidentified amphibian. The Louisiana National Heritage Program database has identified the location of two bird species, thirteen reptiles, seven amphibians, two fish, ten invertebrates and two hundred twenty-five plants within the project area of special concern. The applicant provided data identifying known locations within the study area of the federally listed species and those of state concern.

2. Expected impacts. Alternative A would impact a site known to support the Louisiana quillwort. The species is known from several locations in the Abita Creek and any waterway crossings within this drainage may support the species. Impacts to those species of concern by the state are possible as thorough surveys have not been prepared for any of the alternatives. Possible impacts could occur on any alternative selected.

3. Quantify/Qualify the Impacts. As limited information was developed by the applicant impacts are unknown.

4. On-site measures to avoid/minimize impacts. Attempts will be made to relocate individuals found within the ROW to areas where they would not be affected by the project.

J. BIOLOGICAL AVAILABILITY OF POSSIBLE CONTAMINANTS, ETC.

1. Factor Description. The applicant performed a preliminary review of known contaminated sites within the study area. None of the alternatives considered would likely impact a known site. The applicant did not provide any information regarding the presences or

concentrations of contaminants along existing roadways in the project area. The applicant also failed to describe the hauled-in fill material or its source.

2. Expected impacts. The applicant would excavate material from the roadbed and ditches and rework the material to slope the roadside for drainage. Excess material would likely be deposited adjacent to the construction site. Reworking the material could release any contaminates found in the soil. The applicant proposes to use hauled-in fill material to construct the road embankment. The source of the fill material has not been identified. The hauled-in material would consist of a clean, compactable material (sand, silty sand or clay) and would be obtained from a source yet to be determined. In general, the applicant tests samples of the borrow material to assure that the physical properties of the soil meet standards for which it is to be used. Contaminants are not tested for unless it is believed that an issue exists.

Secondary impacts associated with highway operation include runoff from the construction, operation, and maintenance of highways and bridges which can adversely affect vegetation, surface waters, and wetlands with a variety of pollutants, including sediments, heavy metals, hydrocarbons, and toxic substances. Although the runoff constituents and concentration levels vary with highway type and location, the sources of highway runoff pollutants fall into two basic categories: vehicle traffic and chemicals used to manage roadside vegetation. The specific impacts of highway and bridge runoff on aquatic ecosystems are both site-specific and runoff event-specific. In general, highway pollutants can affect water quality through either acute toxicity or gradual accumulation. Paved roadways often generate higher loads of metals and toxicants than other nonpoint source pollutants. Nutrient loadings from highways tend to be of concern when they are located upstream of a reservoir or estuary. Potential adverse environmental effects associated with specific constituents include the following:

a. *Suspended solids* increase turbidity, transport other pollutants adhered to particle surfaces, and reduce runoff storage capacity in ponds and lakes.

b. *Heavy metals* are toxic to many aquatic organisms and can bioaccumulate in fish tissues, thus posing potential health risks to humans.

c. *Nutrients* degrade water quality by stimulating the growth of algae and aquatic weeds. Rapid increases in these populations can then deplete oxygen levels to the extent that fish and other aerobic organisms die off.

d. *Biochemical oxygen demand (BOD)* reduces dissolved oxygen levels as a result of the biological processes that break down organic constituents in runoff.

e. *Polycyclic Aromatic Hydrocarbons* (PAHs) include compounds such as benzo(a)pyrene that are found in petroleum products and are carcinogenic. These compounds can pose risks to human health if drinking water or fish become contaminated with them. PAHs in streams and lakes usually do not pose a health risk for people because they tend to adhere to sediment particles rather than dissolve in water. However, it is possible that aquatic invertebrates could be impacted.

3. Quantify/Qualify the Impacts. The alternatives using existing roadways and the abandoned railroad embankment would disturb existing contaminates in the soil deposited by operation and maintenance of these facilities. These contaminants would be released in stormwater runoff from the site during initial clearing and excavation of the adjacent areas. Clean fill material would be hauled to the site burying any existing contaminants. Direct and secondary impacts are expected to be long-term due to the operation and maintenance of the roadway. Although there may be a potential for the release of contaminants in the soil along existing roadways, alternatives using existing roadways would have significantly less of a cumulative effect on adjacent areas and waterways than those on new alignment as the new alignments would introduce contaminates into more pristine areas.

4. On-site measures to avoid/minimize impacts. The requirements for borrow and unsuitable soil are outlined in Part II of LA DOTD's specifications. In general, borrow material must come from an approved source and soil samples and tests are performed to check the physical properties of the soil. Contaminants are not tested for unless it is believed that an issue exists[11]. The applicant states that there are established procedures to be followed when hazardous materials are encountered in order to minimize impacts to the surrounding soil and water.

A wide range of environmental planning and design management practices can be used to reduce the environmental impacts of highways and bridges and can be initiated long before a road is completed. In general, highways and bridges should be planned so that mileage through sensitive environments, such as wetlands and estuaries, is minimized. River crossings should be avoided if possible, and sufficient setbacks should be established during construction to minimize disturbance of the surrounding environment. During the siting process, consideration should also be given to maintaining sufficient setbacks for the protection of drinking water sources. Efforts should be taken to avoid channelization and floodplain alteration to allow natural processes to continue after roads are in place.

The applicant has not adequately addressed avoidance/minimization of adverse impacts although the applicant.

K. FLOODPLAIN USE.

1. Factor Description. The majority of the study area is located within the 100 year and 500 year floodplains. Information presented by the applicant provided by the St. Tammany Parish shows that there are three different flood zones designated in the study area; Zone A, Zone X500 and Zone X. Zone A is an area inundated by 1% annual chance of flooding, for which no Base Flood Elevations have been determined. These areas are considered high risk. These areas are located within and immediately adjacent to the drains and creeks. Zone X500 are areas of the 500-year floodplain with average depths of less than 1 foot or with drainage areas less than 1 square mile. These are areas are inundated by 0.2% annual chance of flooding. These areas are considered low risk. The majority of the area is considered to be in Zone X which or has been determined to be outside the 500-year floodplain or determined to be outside of the 1% and 0.2% annual chance floodplain. These areas are considered low risk.

[11] But if contaminates are not tested for how do they become an issue.

2. Expected impacts. Ditches constructed along the highway would capture and divert stormwater once stored in impacted wetland areas. Induced development would drain additional wetlands with the stormwater directed to the area waterways. As a consequence, the elevation of a stream's 100-year floodplain becomes higher and the boundaries of its floodplain expand. In some instances, property and structures that had not previously been subject to flooding could now be at risk. Flooding of down-gradient development would become more likely as development within the study area increases. Additionally, such a shift in a floodplain's hydrology can degrade wetland and forest habitats.

3. Quantify/Qualify the Impacts. Adverse impacts are expected to be long-term and wide-spread. Depending upon the alternative to be constructed, adverse impacts are potentially significant.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts. The applicant has only proposed that drainage structures through the roadway would be designed to accommodate the peak runoff from a 50-year storm under future conditions.

L. AESTHETICS OF THE AQUATIC ECOSYSTEM.

1. Factor Description. The long-leaf forests that historically dominated the landscape have been described as "park like" with many open vistas through tall stands of pines. Frequent fires produced flowery shows throughout the spring and summer into fall. Timber management and reduced frequency have diminished the abundance of flowers and therefore, reduced the effect of these flowery displays. The wetland mitigation banks found in the study area have rehabilitated former timber management areas to the pine flatwood/savanna habitats through the removal of non-native trees and the re-establishment of a fire regime meant to mimic naturally occurring fires. The banks consist of mostly grasslands as the planted longleaf pines are mostly in grass and sapling stages. The flower displays are very extravagant.

2. Expected impacts. The proposed excavation and filling of wetlands would result in the loss of wetlands that currently provide aesthetic value. Secondarily, the project would increase turbidity in waterways some distance from the work. The proposed project would also alter area hydrology. The altered hydrology would cause a shift to drier vegetation. Although the more rare herbaceous species found in these habitats are sensitive to even slightest change in surface wetness, there are some that are capable of growing in a wide range of hydric conditions. However, those species still are adapted to the wet and dry cycle of the savanna habitats. The drier conditions caused by the altered hydrology would encourage encroachment of woody vegetation which would likely shade out most of the helophytic herbaceous species common to the pine flatwood/savanna habitats.

3. Quantify/Qualify the Impacts. Direct impacts associated with clearing, grading excavating and filling would be long-term, wide spread and significant. Increases in surface water turbidity from project related activities are expected to be short-term, wide spread and potentially serious unless erosion controls are used.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts.

M. TRAFFIC/TRANSPORTATION PATTERNS.

1. Factor Description. The applicant analyzed the major state highway segments in the project area to determine current LOS. Of those highways studied, two sections appear to be operating at capacity and five sections of highway operated above capacity (indicative of an LOS E or F situation). Table 2 provides 2001 LOS and average daily traffic for these highway sections. These corridor segments appear, for the most part, to be in the more densely developed or urban sections of Slidell, Covington, Mandeville and St. Tammany Parish.

2. Expected impacts. An analysis of traffic diversion potential for Alternatives A, B, O, P, Q, J, M and the no-build using the St. Tammany Parish Transportation Model to project traffic was conducted. This analysis assumed the implementation of a Bush, Louisiana to I-12 alternative, the St. Tammany Parish 10-year Capital Improvement Program and the St. Tammany Parish Long Range Plan. LA 59 (Abita Springs to I-12) and LA Highway 36 (LA 21 to Abita Springs, LA 59) were both examined. However, impacts to traffic operations appear minimal since both corridor segments appear to have the potential for operating at an acceptable LOS by 2025. None of the alternatives appear to have the potential to decrease speeds or LOS to the point where these corridors are over capacity (LOS F).

The applicant compared the no-build alternative to each of the build alternatives for LA 21 and US 190 segments. Modeling results are provided in table 2. Summarizing the information, only alternatives B, O, P, Q and M provide an improvement to corridor speed and/or LOS on LA 21 (US 190 B to LA 36) as compared to the No-Build. Alternatives A and J result in no improvements or potential worsening of traffic on LA 21 as compared to the No Build. The applicant contends that only alternatives B, O, P, Q and J provide an acceptable level improvement to corridor speed and/or LOS on US 190 (US 190 B to I-12 Service Road) as compared to the No Build. Alternatives A and M result in no improvements or potential worsening of traffic on US 190 when compared to the No Build. Only alternatives B, O, P and Q provide the potential for improvements to both LA 21 and US 190 as compared to the No-Build.

3. Quantify/Qualify the Impacts. One of the applicant's purposes for constructing a 4-lane highway is to improve traffic flow on existing highways in the project area. To a small extent, any of the alternatives would benefit traffic flow on existing highways by removing traffic not having their intended destination on one of these roadways.

Initially, the LOS on the new roadway will be level A[12]. With increased access to rural areas, new development would occur first near the existing intersections with the new highway and areas where access is not limited. With the increase in development, congestion would be

[12] LOS A describes free-flow operations. Free-flow speed prevails. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. Even at the maximum density for LOS A, the average spacing between vehicles is about 503 ft, or 26 car lengths, which affords the motorists a high level of physical and psychological comfort.

expected to increase. The expected rate of development was not speculated upon by the applicant.

4. On-site measures to avoid/minimize impacts. To maintain traffic at acceptable levels, the applicant proposes to use limited access where possible. The applicant has indicated that Alternatives O, P, Q, J and possibly portions of B would likely have a limited access. Limited access would not be available for Alternative M and portions of Alternative B and B/O which are upgrades of existing highways.

N. LAND USE CLASSIFICATION.

1. Factor Description. As discussed above in Section IV., "Project Study Area and Setting", the majority of the area crossed on any new alignment would be undeveloped. A lack of access has kept the area from developing. Scattered residential and commercial development has occurred along existing highways.

2. Expected impacts. The applicant discusses land use changes likely to occur as a result of the proposed project in Bush, Louisiana to I-12 Study Phase I Report, Technical Memorandum #4. They state that the opening of previously poorly accessible land masses in central St. Tammany Parish would fuel new residential development, which would provide a growing base of support for new business establishments, particularly retail and a wide range of services. Development of a new highway corridor north of Bush, Louisiana to I-12, would most immediately be an economic benefit to the community of Bush, Louisiana itself as well as to Abita Springs. Both communities would enjoy more direct and convenient access to the flows of traffic carried by I-12. Firms requiring more immediate access to I-12, i.e., those engaged in wholesale trade, warehousing, and transportation and warehousing, would be more prevalent closer to I-12 or in areas immediately accessible to I-59 and I-10."

3. Quantify/Qualify the Impacts. Based on information provided by the applicant, direct impacts would include the conversion of between 517.8 and 601.8 acres to transportation use. The applicant indicates that as much as two-thirds of amounts are expected to be wetlands based on the presence of hydric soils. The remaining acreage is classified as non-wet woodland. The proposed project would likely spur development along the new roadway. Development in the wetlands along the existing highway corridor is likely since intersections between major thoroughfares are sought after as prime development sites.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts.

O. ECONOMIC IMPACTS.

1. Factor Description. One of the stated purposes of the proposed road is to support/enhance potential economic development in North St. Tammany and Washington Parishes. The applicant discussed the economic decline of the Bogalusa economy but does not discuss potential reasons why the decline has occurred. "The City of Bogalusa has been on a steady decline since the 1960s and quite apparently is in need of economic stimulus to reverse

this downward slide. Over the past four decades from 1960 to 2000, its population has declined from 21,423 to 13,365 (a decrease of 37.6%) and its resident-based labor force has shrunk from 7,290 to 4,642 (or 36.3%). In 2000, the median household income in Bogalusa was $19,261, which was about 21% less than Washington Parish's median income and equal to just 40% of St. Tammany's median of $47,883. Although interstate highway access to Bogalusa has improved within the past 20 years, it still is quite limited."

St. Tammany Parish's local economy is largely based on service, trade, and construction. Much of its service sector is concentrated in health care and education. Its trade sector is dominated by rapidly expanding retail activities that have emerged over the past ten years to serve a fast-growing largely affluent population. This fast growth and expanding buying power has been a strong underpinning for both residential and nonresidential construction throughout St. Tammany Parish. Since 1978, its total wage and salary employment base has grown over 3 ½ times from 16,534 to 58,155, far outpacing all other parishes in the Metropolitan Statistical Area in growth over the past 20 years. Three sectors contributing most significantly to this rapid growth are wholesale trade (up 7.2 times the 1978 employment level), retail trade (up 4.6 times), and services (up 4.0 times). Rapid growth in the wholesale trade sector is an indication of the expanded presence of warehousing and distribution activities that have located in St. Tammany to take advantage of strategic proximity and accessibility to the interstate highway system. This growth is mirrored somewhat by the near tripling of jobs in the parish's transportation sector. St. Tammany's rapid population growth over the past twenty plus years is the driving force behind the almost fivefold rise in retail employment and the fourfold rise in service jobs (Tables 4.1.12 and 4.1.13).

2. Expected impacts. According to information provided by the applicant, positive economic benefits would accrue in Washington Parish but would be somewhat muted in magnitude from that expected in St. Tammany Parish with the construction of a new 4-lane highway providing improved access to the interstate highway system. Clearly, improved transportation access to Washington Parish, and Bogalusa in particular, certainly would not hurt these economically ailing communities. However, improved transportation access provided by a new 4-lane highway alone would not be the sole driving force needed to bring new economic development and growth opportunities. Information provided by the applicant states:

> *"The body of research focused on this question varies widely in measuring the direct influence highways have on economic development effects, particularly in rural or non-metropolitan areas. However, a frequently quoted phrase found in many such studies is that 'highways are a necessary, but not sufficient condition for generating rural economic development.' A new highway in and of itself will not produce a vibrant rebirth of Bogalusa's economy. However, without this critical element of infrastructure, many other economic development initiatives are likely to fall well short of their goals in producing new jobs and private investment. The Bush, Louisiana to I-12 corridor would provide more direct access to the I-12/I-10 highway system and no doubt, in the long run, benefit the community's existing manufacturing establishments and possibly provide the impetus for expansion of this and related sectors such as wholesale trade, transportation and warehousing. "*

3. Quantify/Qualify the Impacts. The proposed project should provide short-term benefits to the local economy by providing employment opportunities, the sale of equipment and materials, and the generation of taxes from the sale of materials. The local economy would benefit secondarily by the introduction of revenue into the community. Construction crews would probably spend some money locally for such items as food and gasoline. The proposed project should provide a short-term economic boost for the area.

Long-term, beneficial economic impacts would result from providing a direct access to large undeveloped areas. The highway would provide access to areas currently isolated due to a circuitous and deficient roadway system serving the area. Providing a north/south corridor through this area will provide access and provide for long-term, development possibilities and thus support the expansion of St. Tammany Parish's economy. Land values along the newly constructed roadway would also increase. Bogalusa would probably benefit from the improved access and better transportation linkages in the long-term but the likely economic effects are dependent upon many other factors not related to the highway.

4. On-site measures to avoid/minimize impacts. The applicant has not adequately addressed avoidance/minimization of adverse impacts.

VII. Summary of Direct, Secondary and Cumulative Effects:

A. DIRECT IMPACTS. Excavation, disposal and filling activities on a linear project between 17.4 and 21.0 miles long would directly impact wetlands. The quantity and quality of wetlands to be impacted are dependent upon the alternative selected. Upgrading existing roadways would impact considerably less wetlands of lower quality than those on new alignment. Using hydric soil data, the applicant estimates that new alignment practicable alternatives would potentially impact from 327.2 to 472.9 acres of wetlands.

Wetlands impacted by the proposed project function to store surface water, contribute to baseflow by providing the water supply in down-gradient areas, perform water quality enhancement by removing sediment and contaminates in stormwater runoff before entering adjacent waterways, provide habitat for wildlife and aquatic organisms, and are unique among Louisiana's wetland ecological systems in the high diversity of herbaceous species. These wetlands also provide recreational opportunities for those with access to the properties including, hunting, bird watching, hiking, photography, etc. The direct impact of the construction of a linear project would be the loss of all these functions.

Based on information provided by the applicant and the lack of measures to avoid/minimize these impacts, direct impacts are expected to be long-term, wide-scale and significant.

B. SECONDARY IMPACTS. The applicant proposes to construct a highway through wetlands crossing several waterways. Construction activities, operation and maintenance activities associated with a highway project are disruptive to adjacent water bodies, riparian

areas, and wetland areas because it increases sediment and contaminant loads, alters surface drainage patterns, changes the subsurface water table, increases stormwater runoff and results in the degradation and/or destruction of adjacent wetlands and riparian habitat and diminishes aesthetic appeal of streams and landscapes. Assuming the secondary effects associated with the highway extend 1,200 feet to either side of the highway, the applicant estimates that an additional 7,900 to 10,300 wetland acres could be affected by the proposed project.

Based on information provided by the applicant and the lack of adequate measures to avoid/minimize these impacts, secondary effects are anticipated to be long-term, wide-scale and significant.

C. CUMULATIVE EFFECTS. The cumulative effect of altering area hydrology could potentially increase the risk of down-gradient flooding. Also, water quality may be reduced in area streams due to increased sediment and contaminant loads. Habitat destruction, fragmentation and alteration would reduce the amount and quality of wildlife habitat in the study area.

By providing north/south access to the study area where the existing highway network doesn't support development expansion, the applicant anticipates that the proposed highway would fuel new residential development that would provide a growing base of support for new business establishments, particularly retail and a wide range of services within the study area and region. Although there is an ever increasing amount of development occurring in the area, residential development has generally occurred as single family homes constructed on five acre and larger lots located in close proximity to existing highway network. The potential land use conversions acknowledged by the applicant indicates that future wetland loss would be inevitable and would likely be stimulated by any road construction especially those on new alignment.

VIII. Benefits Vs Detriments

The benefits attributed to the highway by the applicant include reduced travel times, reduced traffic congestion on existing highways, and economic development for the Bogalusa area. Information provided by the applicant indicates that reduced travel time would be achieved for most alternatives and ranges from four to 20 minutes[13]. Reduction in traffic congestion for highway segments along LA 21 and US 190 appears to be minimal with LOS remaining at or over capacity for all alternatives. Models indicated none of the alternatives would improve traffic congestion on the segment of LA 41/US 11 near Slidell. The applicant's economic information states that Bogalusa would probably benefit from the improved access and better transportation linkages in the long-term but the likely economic effects are dependent upon many other factors not related to the highway.

[13] The applicant provided estimates of time savings at different times during the evaluation process. Some alternatives were considered in one evaluation but not another. There were also differences in time savings for an alternative in one study versus the other.

The project could result in long-term, significant, wide-scale, direct, secondary and cumulative regional impacts. The environmental consequences of constructing a new highway appear to be much greater than upgrading an existing facility. Adverse impacts appear to outweigh any benefits accrued by the proposed project.

IX. Sequencing:

A. Avoidance[14]. A review of the information provided by the applicant does not adequately address how avoidance of special aquatic sites was considered in the development of alternatives. The applicant determined that upgrading an existing area highway to a 4-lane facility was not practicable as the public benefits associated with reduced travel times and improvement to traffic capacity were minimal. Additionally, the applicant indicates that the cost per mile would be higher due to the number of relocations associated with these upgrades.

B. Minimization[15]. Throughout the development of information for project review, one of the main thrusts by the Corps has been to develop a project that incorporates mitigative measures that could reduce the amount and severity of direct, secondary and cumulative impacts. The applicant was requested to consider upgrading existing highways, using alternatives that incorporated existing disturbances, reducing ROW widths to reduce direct impacts and/or residential/commercial impacts, elevated crossings, minimize ditching to maximize the maintenance of area sheetflow through the project, etc. The applicant has not adequately addressed minimization of adverse impacts. The only mitigation measure incorporated into some of the alternatives is to design the proposed project as a limited access[16] highway. The applicant indicates that by limiting access it would allow St. Tammany Parish and DOTD District 62 "to maintain better access management through driveway permitting rules and Traffic Impacts Analysis requirements which were unavailable to them in the past." In order to limit or even prevent future access to a new highway would require the applicant to design the highway as a controlled access highway[17].

[14] The Clean Water Act (CWA) Section 404(b)(1) Guidelines (Guidelines) "Section 230.10(a) allows permit issuance for only the least environmentally damaging practicable alternative. The thrust of this section on alternatives is avoidance of impacts. Section 230.10(a)(1) requires that no discharge shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact to the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. In addition, Section 230.10(a)(3) sets forth rebuttable presumptions that 1) alternatives for non-water dependent activities that do not involve special aquatic sites are available and 2) alternatives that do not involve special aquatic sites have less adverse impact on the aquatic environment. Compensatory mitigation may not be used as a method to reduce environmental impacts in the evaluation of the least environmentally damaging practicable alternatives for the purposes of requirements under Section 230.10(a)."

[15] "Section 230.10(d) states that appropriate and practicable steps to minimize the adverse impacts will be required through project modifications and permit conditions. Subpart H of the Guidelines describes several (but not all) means for minimizing impacts of an activity."

[16] "Limited Access - Roadways with access limited to specific points (interchanges) with arterial or other limited access roadways."

[17] "Controlled access highway" means every highway, street or roadway in respect to which owners or occupants of abutting lands and other persons have no legal right of access except at such points only and in such manner as may be determined by the public authority having jurisdiction over such highway, street or roadway."

Of the six alternatives determined to be practicable by the applicant, Alternatives P and O do little to minimize impacts. Direct impacts alone are considered significant for these two alternatives. Alternatives B and J do more to maximize utilization of existing roadways or disturbances but still result in significant direct impacts. Alternatives B/O and Q fall in between. Issuance of permit for any of these alternatives without additional information, further refinement of project design and incorporation of mitigative measures will be extremely difficult.

C. Compensatory Mitigation[18]. The applicant indicates that he would use a mitigation bank to perform required mitigation. Should we determine that one of these alternatives is the least damaging, yet practicable, a mitigation plan incorporating as much on-site mitigative measures will be necessary to reduce secondary impacts associated with this project prior to considering an off-site mitigation plan. We have also requested that the applicant develop a permittee-responsible mitigation plan due to enormity of the mitigation requirements that are likely to be required to fully compensate for anticipated direct, secondary and cumulative impacts associated with this project.

X. Conclusions and Recommendations:

We do not have sufficient data available at this time to recommend a favorable permit decision for any alternative. The information provided by the applicant and/or developed by the Corps indicates that adverse impacts associated with all the alternatives considered by the applicant may result in significant impacts. As such, NEPA requires the preparation of an environmental impact statement. However, development of additional information for some of the alternatives may result in a finding of a less than significant impact especially if mitigative measures to avoid or minimize adverse impacts can be identified and incorporated into the project design.

Adverse impacts attributable to the applicant's preferred alternative, as well as the alternatives B, B/O or O, would be significant, long-term and wide scale. Although, the most recent discussions regarding these four alignments have led to potential alignment modifications to reduce adverse impacts, there remains the potential for significant direct, as well as, secondary and cumulative impacts to aquatic resources in the project study area. As such, pursuing a permit for any of these alternatives will require an environmental impact statement. However, none of these alternatives appear to be least damaging, yet practicable alternative available to the applicant.

Although direct impacts associated with alternatives with shorter routes are slightly less than for those reported for the longer routes, secondary and cumulative impacts associated with these shorter routes would be considerably greater than for the longer routes. The shorter routes traverse through the middle of large expanses of undeveloped wetland

[18] *"Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts which remain after all appropriate and practicable minimization has been required. Compensatory actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands) should be undertaken, when practicable, in areas adjacent or contiguous to the discharge site (onsite compensatory mitigation). If on-site compensatory mitigation is not practicable, off-site compensatory mitigation should be undertaken in the same geographic area if practicable (i.e., in close physical proximity and, to the extent possible, the same watershed)."*

areas whereas the longer routes skirt these areas. Because Alternative J follows the existing abandoned railroad embankment, it may have considerably less direct wetland impacts than has been identified by the applicant and possibly less than any other alternative constructed on new alignment. To what extent construction along this alternative would alter surface hydrology and thus adjacent wetlands could not be determined using the available information and will require further investigations. The applicant has stated that the abandoned railroad embankment actually minimizes potential hydrologic impacts as the railroad berm has already altered the hydrology in the area. Likewise, realignment of Alternative Q to avoid wetland impacts and utilize more of the existing highways may result in an acceptable alternative although it most likely would have a greater impact on wetlands than Alternative J. More detailed information on existing conditions and highway design may demonstrate that either of these two alternatives may be considerably less damaging than currently reported to be and preparation of an environmental impact statement may or may not be required. Both would still have some adverse impacts on management of the two existing mitigation banks immediately to the west of these alignments. Development of a highway management plan by the applicant may avoid/minimize impacts to ongoing management practices at these banks.

For those alternatives that are upgrades of existing highways, LA 21 or LA 41, adverse impacts may or may not be significant. Detailed information was not provided regarding adverse impacts associated with these two alternatives. The applicant was concerned that upgrading either existing highway could result in considerable relocations of residential and/or commercial structures. It is possible that the number of relocations could be further reduced if the applicant would consider modifications of the project design and/or realignment of segments that would avoid and/or minimize identified relocations. In general, environmental adverse impacts associated with upgrading existing highways from 2- to 4-lane facilities are considerably less than construction on new alignment. Also, it is easier to document that environmental impacts can not be avoided. The applicant evaluated each of these upgrade alternatives and determined that each would produce some level of benefit for traffic moving through the region. However, the applicant's modeling results indicated that these alternatives would not produce the level of benefits that construction on new alignment would produce. Based on the level of benefit produced, the upgrade alternatives were not considered practicable by the applicant even though in reviewing cost, existing technology, and logistics, the applicant determined that both alternatives were practicable. Should the applicant determine that one of these alternatives was acceptable, we would need specific information regarding wetland impacts, project design and project location. If it is determined that adverse impacts were not significant, a permit, if required, could be issued without an environmental impact statement.

XI. Environmental Assessment

A. A thorough review of the project all available information provided by the applicant and information developed by the Corps for this and other projects within the area of interest relevant to environmental concerns, reveals potentially serious environmental effect(s).

B. Alternatives are available to avoid or minimize potential adverse impacts and accomplish objectives of the project.

C. Other: Because of the significance of the potential adverse impacts associated with construction of a new highway through largely undisturbed wetland areas, preparation of an Envirnonmental Impact statement is required. An Environmental Impact Statement will develop information needed to determine the least damaging, yet practicable alternative and therefore, the Corps "Preferred Alternative".

Date	**Preparer**
Date	**Reviewer**
Date	**Approving Official**

Figure 1: Alternatives considered by the applicant.

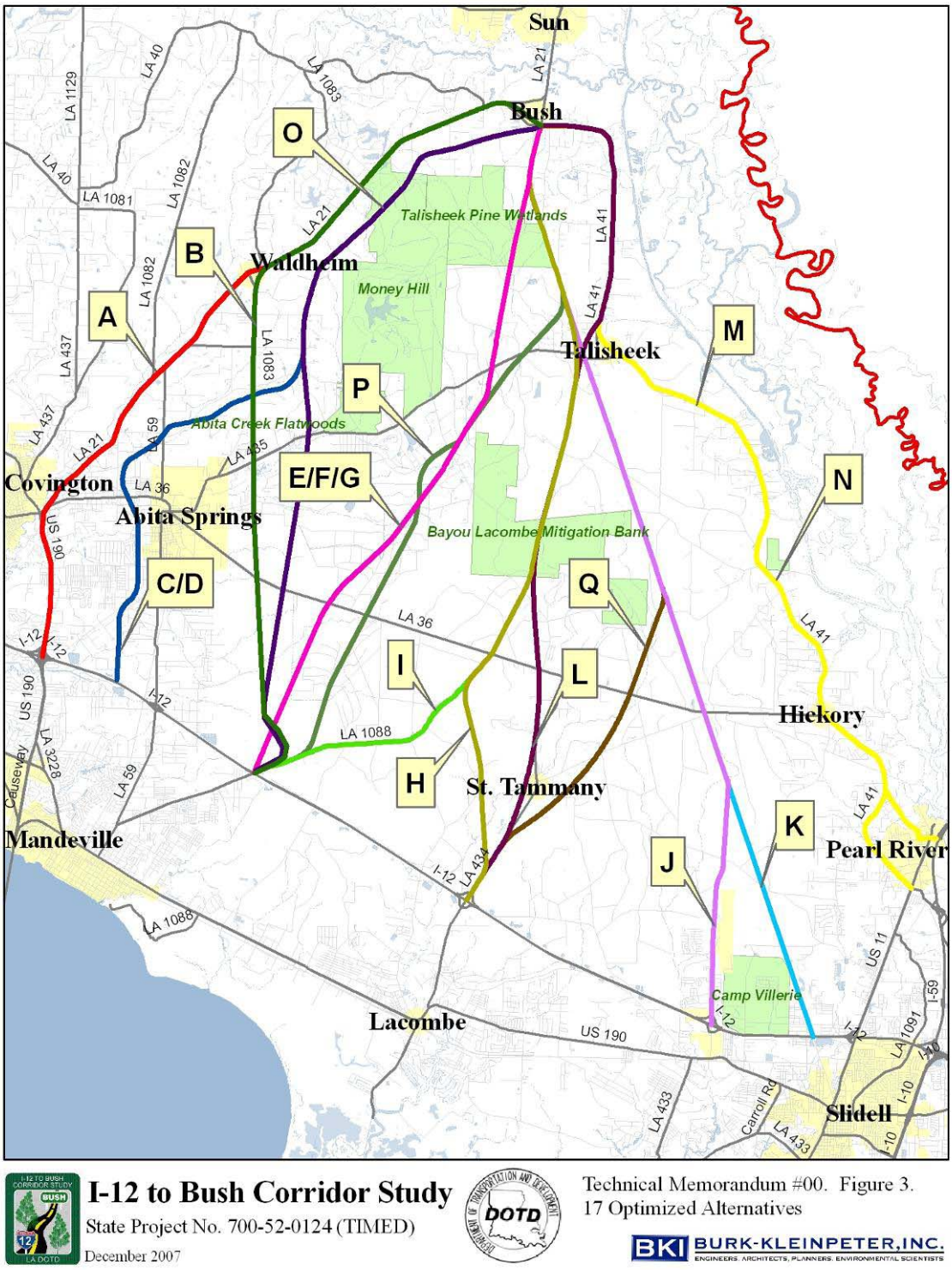

Figure 2: Alternatives determined to be practicable by the applicant.

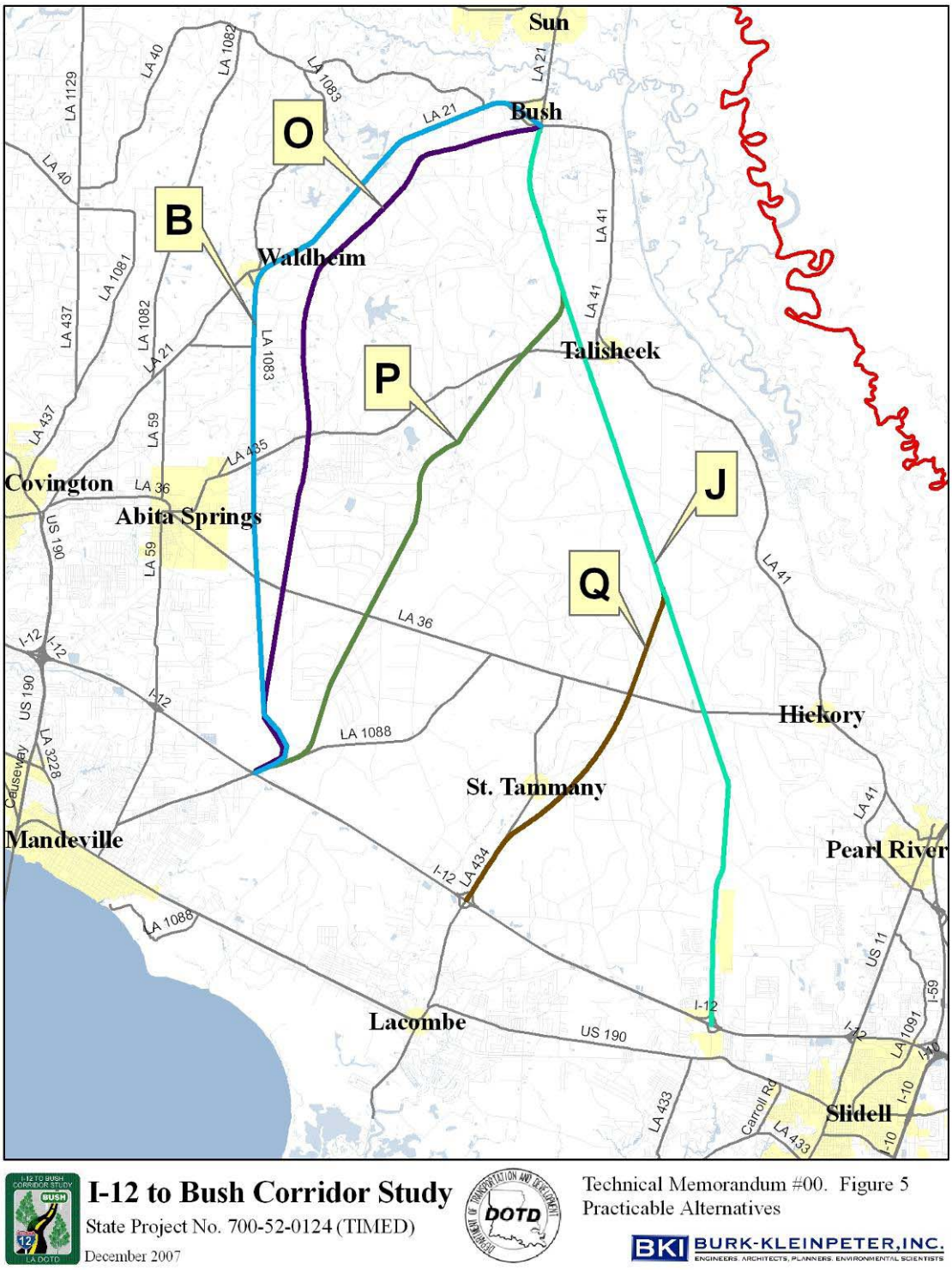

Figure 2a: Alternative B/O, also determined practicable by the applicant.

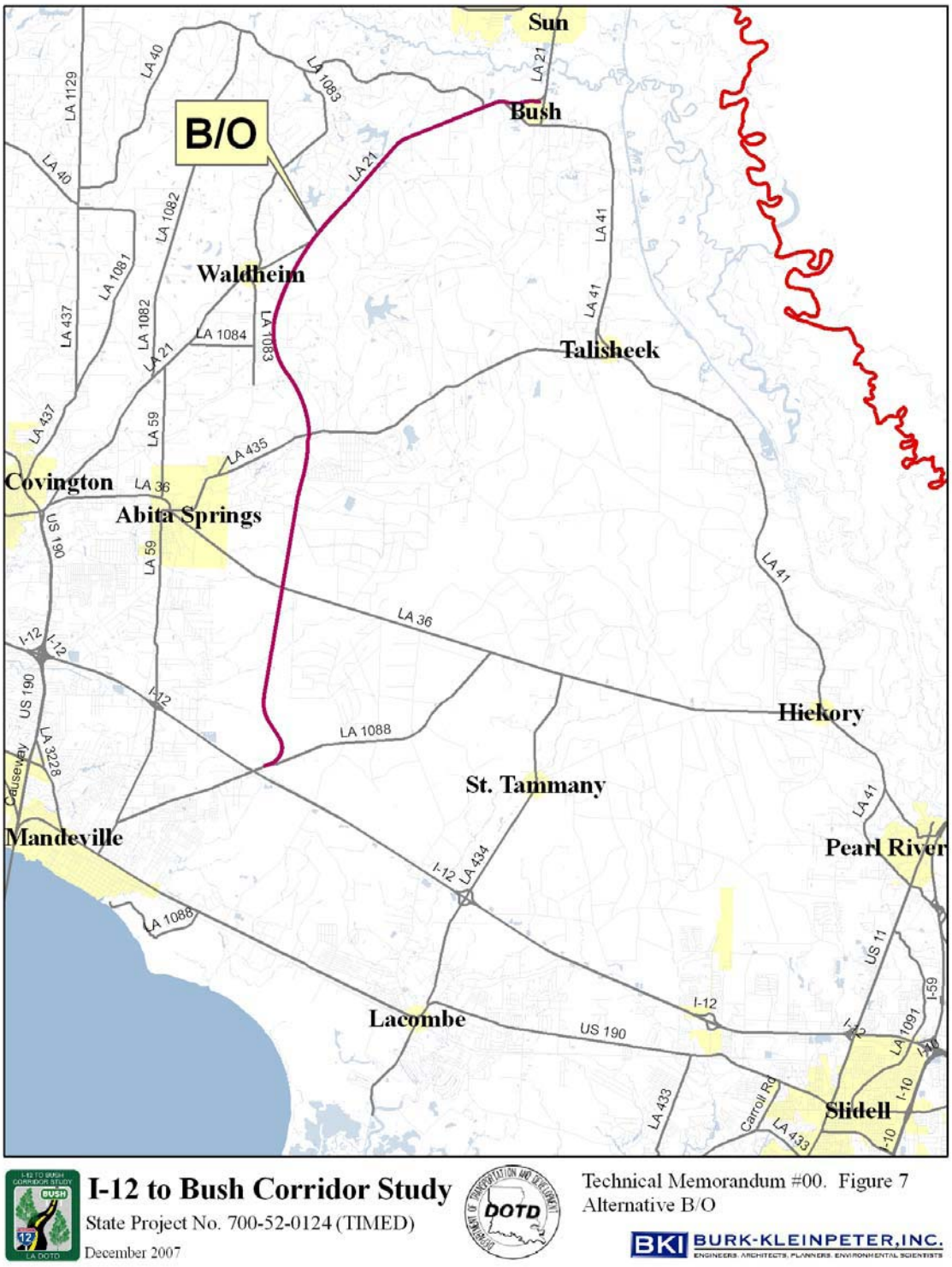

Figure 3: Highway segments determined to have Levels of Service at or above capacity.

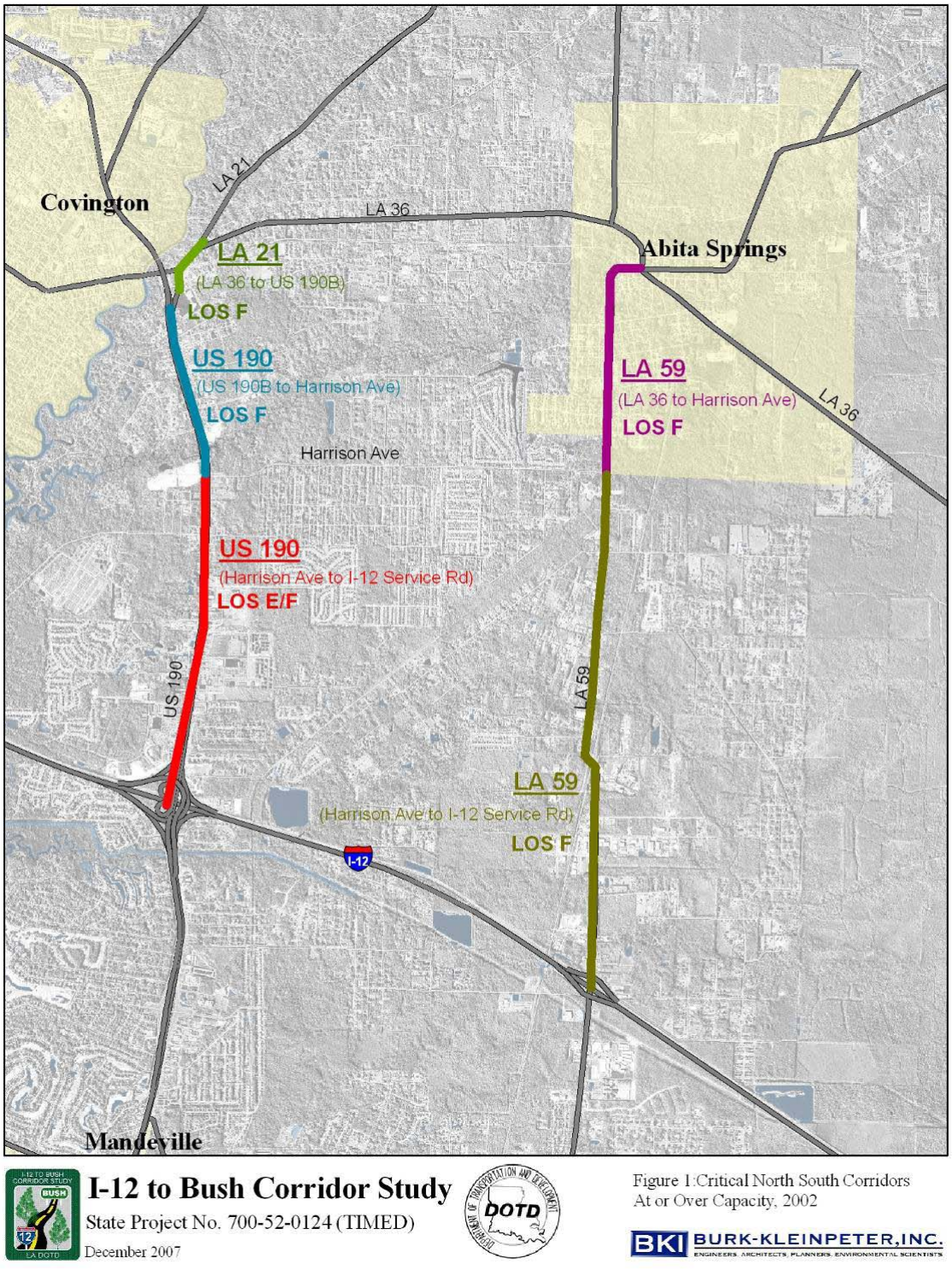

Table 1: Anticipated direct and secondary wetland impacts by habitat.

	Alternative B		Alternative B/O		Alternative O		Alternative P		Alternative Q		Alternative J	
Habitats	Direct	Secondary	Direct	Secondary	Direct	Secondary	Direct	Secondary	Direct	Secondary	Direct	Secondary
Riverine	79.8	2,332.2	93.1	2,396.1	105.8	2,195.4	92.4	1,790.9	96.2	2,748.4	99.6	2,467.1
Pine flatwoods/ Savanna	260.1	5,584.6	304.0	5,717.5	267.7	5,895.0	234.8	6,012.9	302.4	6,368.7	373.3	7,869.8
Bayhead swamp	0.0	26.9	0.0	0.0	0.0	0.0	0.0	23.0	0.0	4.5	0.0	4.5
Total	339.9	7,943.7	397.1	8,113.6	373.5	8,090.4	327.2	7,826.8	398.6	9,121.6	472.9	10,341.4

Table 2: Change in Traffic Volume, Level-of-Service and Speed As compared to Projected No-Build for Alternatives A, B, O, P, Q, J, and M

	Alternative																							
Corridor and Segment	No Build			A			B			O			P			Q			J			M		
	ADT	LOS	Speed	ADT	LOS	Speed	ADT	LOS	Speed	ADT	LOS	Speed	ADT	LOS	Speed	ADT	LOS	Speed	ADT	LOS	Speed	ADT	LOS	Speed
LA 21																								
US 190 B to LA 36 (EB) (3)	30,700	F	11.4	35,200	F	6.6	28,900	F	12.2	27,600	F	12.5	28,000	F	12.4	30,300	F	11.7	31,800	F	10.6	30,500	F	11.5
LA 36 to US 190 B (WB) (3)		D	20.9		D	20.8		D	21.0		D	21.1		D	21.1		D	21.0		D	20.9		D	21.0
Corridor Segment Average (Overall)		E	15.2		F	12.3		E	15.7		E	15.9		E	15.9		E	15.4		E	14.7		E	15.3
Change vs. No-Build (ADT and Speed (% of change and #))		---	---	4,500	-19%	-2.9	-1,800	3%	0.5	-3,100	5%	0.7	-2,700	4%	0.7	-400	1%	0.2	1,100	-3%	-0.5	-200	1%	0.1
US 190																								
US 190 B to Harrison Avenue (1.07 mi)	58,800	B	30.0	59,500	B	29.8	54,400	B	30.8	52,900	B	31.1	56,500	B	30.4	58,200	B	30.1	53,100	B	31.1	58,900	B	29.9
Harrison Avenue to I-12 SB (1.50 mi)	57,700	F	5.2	57,800	F	5.4	54,000	F	6.5	52,700	F	7.1	55,800	F	5.8	57,700	F	5.2	53,400	F	6.8	59,000	F	4.9
Corridor Segment Average (Overall)	58,040	F	11.1	58,140	F	11.0	54,050	E	15.6	52,680	D	17.8	55,980	E	13.1	58,010	F	11.2	53,270	E	16.8	58,890	F	10.5
Change vs. No-Build (ADT and Speed (% of change and #))		---	---	100	-1%	-0.1	-3,990	30%	4.5	-5,360	44%	6.7	-2,060	13%	2.0	-30	1%	0.1	-4,770	38%	5.7	850	-4%	-0.6